Staff Assessment and
Draft Environmental Impact Statement

CALICO SOLAR PROJECT

Application For Certification (08-AFC-13)
San Bernardino County

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION

STAFF REPORT

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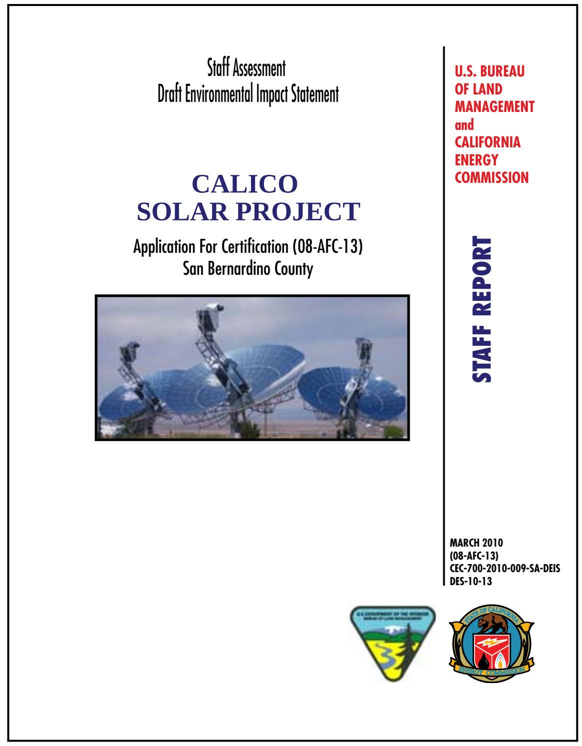
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U.S. BUREAU OF LAND MANAGEMENT

PROJECT OFFICE

Jim Stobaugh
Project Manager

BARSTOW FIELD OFFICE

CALIFORNIA ENERGY COMMISSION

SITING OFFICE

Christopher Meyer
Project Manager

SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

Terrence O'Brien
Deputy Director

CALICO SOLAR PROJECT

STAFF ASSESSMENT AND DRAFT ENVIRONMENTAL IMPACT STATEMENT AND DRAFT CALIFORNIA DESERT CONSERVATION AREA PLAN AMENDMENT

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Jim Stobaugh and Christopher Meyer

INTRODUCTION

Calico Solar, LLC (Applicant) is seeking approval to construct and operate the Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) and its ancillary facilities (Calico Solar Project). The Applicant is a private party that is a wholly owned subsidiary of Tessera Solar. The main objective of the Calico Solar Project is to provide clean, renewable, solar-powered electricity to the State of California. The electricity from the Calico Solar Project will assist the State in meeting its objectives as mandated by the California Renewable Portfolio Standard (RPS) Program and the California Global Warming Solutions Act. The Calico Solar Project will also address other state and local mandates adopted by California's electric utilities for the provision of renewable energy.

Southern California Edison (SCE) selected the Calico Solar Project to help meet its objectives under the legislative requirements of the RPS Program through a least-cost, best-fit competitive solicitation. The Applicant and SCE have entered into a 20-year Power Purchase Agreement (PPA) for the provision of renewable electricity. This PPA will help SCE meet both its statutory mandate to purchase at least 20% of its electric power from renewable resources by 2010 and its future electricity requirements. The California Public Utilities Commission (CPUC) approved the PPA on October 27, 2005.

The Applicant submitted an Application for Certification (AFC) to the California Energy Commission (Energy Commission) for the proposed project on December 2, 2008. (The application was originally submitted by SES Solar One, LLC, SES Solar Three, LLC and SES Solar Six, LLC for the SES Solar One Project. In January 2010, the above entities merged into Calico Solar, LLC, and the name of the SES Solar One Project was changed to the Calico Solar Project.) The Energy Commission is the lead State agency responsible for evaluating the environmental effects of project and for complying with the California Environmental Quality Act (CEQA) for project related discretionary actions by the Energy Commission.

The project proposes the use of land managed by the United States Department of the Interior, Bureau of Land Management (BLM); therefore the Applicant has submitted a request for a right-of-way (ROW) grant to the BLM. In addition, the BLM will decide whether to approve, approve with modification or deny a ROW grant to the Applicant for the Proposed Calico Solar Project. The BLM will also consider amending the California Desert Conservation Area (CDCA) Plan in this analysis. If the BLM decides to grant a ROW, the BLM would also amend the CDCA Plan as required for the Proposed Action, Action Alternative, or No Action Alternative as required. The BLM is the federal lead agency for the evaluation of project effects and compliance of the proposed project with the requirements of the National Environmental Policy Act (NEPA) related to possible BLM discretionary actions related to the ROW grant request.

PROPOSED PROJECT

Project Location and Description

The Applicant intends to develop an electric-generating facility with a nominal capacity of 850 megawatts (MW) using concentrated solar power. The Calico Solar Project would be constructed on an approximately 8,230-acre (ac) site in the Mojave Desert in San Bernardino County, California. The site is approximately 37 miles east of Barstow, 174 miles east of Newberry Springs, 57 miles northeast of Victorville, and approximately 115 miles east of Los Angeles (straight line distances). The Calico Solar site is located on BLM managed lands. Key features of the proposed project are described briefly below and in more detail in the following sections:

- The electric-generating facility would include the construction of a new 230-kilovolt (kV) substation approximately in the center of the project site, an operation and administration building, a maintenance building, and a substation building.
- The Calico Solar Project would be constructed in two phases: Phase I would consist of up to 11,000 SunCatchers configured in 1.5-MW solar groups of 60 SunCatchers per group. The total net nominal generating capacity of Phase 1 is 275 MW described as Southern California Edison's (SCE) Early Interconnection Option. Phase I would require approximately 2,320 acres. The renewable energy from Phase I will be transmitted via the existing 220-kV SCE Lugo to Pisgah transmission line. The Calico Solar Project will be connected to the grid at the SCE Pisgah Substation via a 2.0-mile-long, 230-kV interconnection transmission line. Approximately 739 feet of this connecting transmission line is outside of the project site. Phase I would require only minor upgrades to the Pisgah Substation and no upgrades to the existing Pisgah to Lugo transmission line.
- Phase II would expand the Calico Solar Project to a total of 34,000 SunCatchers configured in 1.5-MW solar groups of 60 SunCatchers each, with a total net generating capacity of both phases of 850 MW. Phase II would require approximately 5,910 acres of the project site. The 575-MW Phase II would consist of approximately 23,000 SunCatchers. The additional 575 MW generated in Phase II would require new transmission capacity within the grid. This is anticipated to be provided by the proposed 500-kV Pisgah to Lugo transmission line (assumed to be a project independent of the Calico Solar Project). This upgrade is described as SCE's Full Build-out Option. The construction and operation of Phase II is contingent on the approval and development of transmission line.

Solar Power Plant Equipment and Facilities

The Calico Solar Project would use the proprietary SES SunCatcher™ technology. Each SunCatcher consists of a 25-kilowatt (kW) solar power generating system. The system is designed to track the sun automatically and to focus solar energy onto a Power Conversion Unit (PCU), which generates electricity. The system consists of an approximately 38-foot-diameter solar concentrator dish that supports an array of curved glass mirror facets. These mirrors collect and focus solar energy onto the heat exchanger of the PCU. The PCU converts the solar thermal energy into electricity via a Solar Stirling Engine designed to convert solar power to rotary power through a thermal conversion process. Each SunCatcher would operate independently and would generate grid-quality electricity.

Power generated by groups of 60 SunCatchers would be collected through a 600-volt (V) underground power collection system. This collection system would combine the output from the units and connect each 1.5-MW group to a generator step-up unit (GSU) transformer with an output voltage of 34.5 kilovolt (kV). The output from the GSUs would be grouped into 3-, 6-, and 9-MW groups, which would be connected via 34.5-kV underground collection circuits to 48- or 51-MW, 34.5-kV overhead collection circuits, each of which would be connected directly to the on-site collection substation. The on-site collection substation would be connected via a 230-kV, double-circuit overhead interconnection transmission line for delivery of generated electricity to the SCE Pisgah Substation, where the interconnection to the California Independent System Operator (CAISO)-controlled grid would take place.

The Calico Solar Project includes construction and operation of an on-site substation, which would include transformers, circuit breakers, metering, and other protection required to connect the project to the SCE Pisgah Substation. The Calico Solar Project interconnect transmission system would require construction of approximately 2.0 miles of double-circuit 230-kV transmission line to transmit the electricity generated on the project site to the SCE transmission facilities.

Related permanent facilities on the project site will include a Main Services Complex, which would be in a central location on site to provide for efficient access routes for maintenance vehicles servicing the SunCatcher solar field. The Main Services Complex would include the following:

- Operation and Administration Building. The project administration offices and personnel facilities would be in this one-story building. This building would also contain meeting and training rooms, engineering offices, a visitor’s room, and support services. The project maintenance facilities, shop, and warehouse storage will be adjacent to the operation and administration building.
- Maintenance Building. The maintenance building would contain maintenance shops and offices, PCU rebuild areas, maintenance vehicle servicing bays, chemical storage rooms, the main electrical room, and warehouse storage for maintenance parts to service the SunCatchers.
- Water Treatment System. The water treatment structure would be southeast of the Main Services Complex. The water treatment structure would house water treatment equipment and safe storage areas for water treatment chemicals. A motor control center for the water treatment equipment and pumps will be located within this structure. Two wastewater evaporative ponds designed for wastewater containment would be located south of the water treatment structure.
- Yard Tanks. The yard tanks would be at-grade steel tank reservoirs and/or polyethylene tanks. The water treatment system would include a raw water tank with a permanent booster pump station, a potable water treatment system, ground-set steel or polyethylene potable water and a fire water storage tank, a booster pump station to accommodate potable water needs and fire-flow requirements, a disinfection system, a demineralized water treatment system for mirror washing water, a polyethylene storage tank for demineralized water storage, chemical storage, reject water and sludge disposal and evaporation ponds, and various support piping, valves, and miscellaneous equipment to support the system. All tanks, foundations,

and piping connections would be designed and constructed to the appropriate standards for contents and seismic zone considerations.

- Control Building. The control building would be near the substation. This building would contain relay and control systems for the substation and the operations control room.
- Utilities and Services for Ancillary Facilities and Structures. A diesel powered fire water pump and a diesel operated standby power generator would be adjacent to the operation and administration building. Electric service for the Main Services Complex would be obtained from SCE. Electric power will be provided via overhead service from an SCE overhead distribution line located. Communications service will be provided via an overhead service from existing underground communications lines located on the north side of the railroad located north of Interstate 40.

Construction Logistics Area

The Applicant proposes using one temporary construction logistics area for staging contractor equipment and trailers, assembly yards, storage of materials, equipment laydown and wash area, construction personnel parking, and assembly areas for SunCatchers. The temporary facilities and structures in that construction logistics area would include:

- Assembly Building. SunCatcher assembly would be performed in one temporary assembly building in the construction logistics area. This building would be removed after all of the SunCatchers have been assembled and installed. The assembly building would be beside the Main Services Complex.
- Transport trailer storage. Storage for trailers would be provided south of the assembly buildings in a storage facility that will accommodate 75 to 100 trailers, maintaining a 3- to 5-day inventory of SunCatcher parts during the assembly phase. These trailers would be removed and salvaged after all of the SunCatchers have been installed.
- Laydown Area. One construction laydown area would be provided: immediately south of the Main Services Complex.

Construction of the Calico Solar Project is expected to begin in late 2010 and would take a total of approximately 44 months for full project construction. The construction period may not be continuous. However, renewable power from the project could come online much earlier than 44 months after the start of the project. As groups of SunCatchers are constructed and become operational, their renewable power would immediately be supplied to the grid.

Water Supply and Discharge

The Applicant proposes to use groundwater for project construction and operation obtained from a well located in Cadiz, California. Cadiz is located approximately 64 miles southeast of the proposed project site within the Cadiz Valley groundwater basin of the Colorado River Hydrologic Region.

The Applicant is also currently drilling wells and conducting aquifer testing to further assess groundwater conditions at the project site.

The Applicant proposes to use treated groundwater for potable needs. The groundwater would first be demineralized, then stored in a designated storage facility equipped with chemical dosage for disinfection. This treated potable water would be available at the Main Services Complex and may be piped to the Satellite Service Complex. If potable water is not piped to the Satellite Services Complex, bottled water would be made available.

Fire Protection

The Main Services Complex would include an approximately 175,000-gal water tank for mirror washing and fire suppression and control. Portable fire extinguishers would be located at strategic locations throughout the site. The fixed fire protection system would provide a wet, water-based sprinkler fire suppression system for the buildings. Employees would be given fire safety training, including instruction in fire prevention, the use of portable fire extinguishers and hose stations, and the reporting of fires to the local fire department.

Access Roads and Maintenance Paths

Arterial roads, unpaved perimeter roads, and unpaved access routes would be constructed on the Calico Solar Project site. Site access during the construction phase will be provided from Hector Road, which has an existing interchange from I-40 at the southwest portion of the site.

Site Security and Fencing (During Construction and Operations)

The 8,230-acre project site would be fenced, excluding the private parcels of land designated as not a part of the project. Access to the federal land managed by the BLM would be authorized under a ROW grant. Operations site security would consist of controlled access gates, perimeter security fencing, 24-hour site security monitoring via closed-circuit television and intercom, and regular vehicular patrols. Construction security would consist of fencing installed around the perimeter of the project site at the start of construction, and gated entrances and exits.

Stormwater Management Approach

The project site would be developed utilizing the existing land features without undergoing major grading operations. Off-site flow would be intercepted prior to entering the project site using large debris basins located at the toe of each mountainous drainage basin near the northern project boundary. These project debris basins are designed to retain storm water discharge and associated debris resulting from a 100-year storm. In addition to intercepting debris from the mountains, the proposed debris basins will also provide for peak runoff attenuation of the surface flows. The design attempts to protect the project site from flooding, sediment deposition, and scour. Onsite runoff will be intercepted in detention basins constructed onsite and sized to retain the 100-year onsite runoff and debris flows. The onsite basins are designed to retain 4-years of average sediment accumulation for the area or subarea they are designated to serve.

A Storm Water Pollution Prevention Plan (SWPPP) would be prepared. Site drainage during construction would follow pre-development flow patterns, with ultimate discharge to property boundary. Low-flow culverts consisting of a small diameter storm drain with a perforated stem pipe will be installed for sediment control and to provide for storm peak attenuation. The design and location of the detention basins would depend upon the Proposed Action or Action Alternative selected.

Facility Operation and Maintenance

The Calico Solar Project would be an “as-available” resource. Therefore, the project would operate anywhere between a minimum of approximately 18 MW net when the first SunCatcher units are interconnected to the transmission grid during the construction period to 850 MW on completion of construction. The capability for independent operation of all 34,000 units would give maximum flexibility in operations. The Calico Solar Project is expected to have an annual availability of 99%.

The Calico Solar Project would operate approximately 3,500 hours annually. The number of available operating hours would depend on the availability of the sun’s energy at greater than 250 watts per square meter. SunCatchers would be unable to generate electricity when the sun’s energy is below 250 watts per square meter in the early morning or late evening hours and when cloud cover limits the sun’s energy for power generation. Also, SunCatchers would be unable to generate electricity during daylight hours when the wind speed exceeds 35 miles per hour (mph), as SunCatchers will be stowed in a safe de-track position at and above this wind speed to prevent damage. The Applicant anticipates that the Calico Solar Project would be operated with a staff of approximately 164 full-time employees. The project would operate 7 days per week, generating electricity during daylight hours when solar energy is available. Maintenance activities would occur 7 days a week, 24 hours a day to ensure SunCatcher availability when solar energy is available. Maintenance activities would include SunCatcher mirror washing. The daily average water requirement for SunCatcher mirror washing under regular maintenance routines would be approximately 10.4 gal of raw water per minute.

Waste Management

Wastewater generated at the Main Services Complex would be discharged into a septic system with

sanitary leach fields, and would be designed in accordance with applicable Laws, Ordinances, Regulations, and Standards (LORS), including those of San Bernardino County, the Regional Water Quality Control Board (RWQCB), and the California Department of Health Services (CDHS). Disposal of clear liquids would be conveyed to on-site sanitary leach fields, and sewer sludge would be pumped and disposed of by trucks to an approved offsite disposal facility.

Solid waste from the Calico Solar Project water treatment system would be trucked to an appropriate off-site landfill from two evaporation ponds as a non-hazardous, low-moisture cake. An estimated 60,000 pounds (lbs) per year of salt cake would be trucked off-site to an appropriate landfill or recycled. The full 60,000 lbs would be scheduled for removal at the end of the evaporation process. Approximately 1.5 loads would be required per year.

Non-hazardous wastes generated during construction and operation includes scrap wood, concrete, steel/metal, paper, glass, scrap metals and plastic waste. All non-hazardous wastes would be recycled to the extent possible and non-recyclable wastes would be collected by a licensed hauler and disposed in a Class III solid waste disposal facility. Hazardous wastes would be recycled to the extent possible and disposed in either a Class I or II waste facility as appropriate. All operational wastes produced at the Calico Solar Project would be properly collected, treated (if necessary), and disposed of at either a Class I or II waste facility as appropriate.

Hazardous materials used during facility construction and operations would include paints, epoxies, grease, transformer oil, and caustic electrolytes (battery fluid). Several methods would be used to properly manage and dispose of hazardous materials and wastes. A Hazardous Materials Management Program

(HMMP) would be developed and implemented during the project construction and operation phases. At a minimum, the HMMP would include procedures for hazardous materials handling, use and storage; emergency response; spill control and prevention; employee training; and recordkeeping and reporting.

Project Decommissioning

Project closure can be temporary or permanent. Temporary closure is defined as a shutdown for a period exceeding the time required for normal maintenance, including closure for overhaul or replacement of the major components, such as major transformers, switchgear, etc. Causes for temporary closure include inclement weather and/or natural hazards (e.g., winds in excess of 35 mph, or cloudy conditions limiting solar insolation values to below the minimum solar insolation required for positive power generation, etc.), or damage to the Project from earthquake, fire, storm, or other natural acts. Permanent closure is defined as a cessation in operations with no intent to restart operations owing to Project age, damage to the Project that is beyond repair, adverse economic conditions, or other significant reasons.

In the unforeseen event that the Calico Solar Project is temporarily closed, a contingency plan for the temporary cessation of operations would be implemented. The contingency plan would be followed to ensure conformance with applicable LORS and to protect public health, safety, and the environment. The plan, depending on the expected duration of the shutdown, may include the draining of chemicals from storage tanks and other equipment and the safe shutdown of equipment.

The planned life of the Calico Solar Project is 40 years; however, if the Calico Solar Project is still economically viable, it could be operated longer. It is also possible that the Calico Solar Project could become economically noncompetitive before 40 years have passed, resulting in early decommissioning. When the Calico Solar Project is permanently closed, all the project equipment, facilities, structures and appurtenant facilities must be removed from the site. Because the conditions that would affect the decommissioning decision are largely unknown at this time, these conditions would be presented to the CEC, the BLM, and other applicable agencies in a detailed decommissioning plan prior to the planned permanent decommissioning.

ALTERNATIVES

In addition to the proposed Calico Solar Project, two other Build Alternatives on the same general site and three No Project/No Action Alternatives are also evaluated in detail in this environmental document. **Executive Summary Table 1** summarizes the acreages and MW production of the two build alternatives and **Executive Summary Table 2** describes the three No Project/No Action Alternatives. The two build alternatives include a Reduced Acreage Alternative, and the Avoidance of Donated and Acquired Lands Alternative that would avoid donated lands and lands acquired with federal Land and Water Conservation Funds. The No Project/No Action Alternatives all consider not approving the Calico Solar Project and either amending or not amending the CDCA Plan as required regarding land use designations for the site.

Executive Summary Table 1
Summary of the Build Alternatives

Build Alternative	Megawatts	Acres (approximate)	SunCatchers
Calico Solar Project	850	8,230	34,000
Reduced Acreage Alternative: proposes construction and operation of a 2,600-acre facility using the SunCatcher technology. On-site facilities would be similar to the Calico Solar Project. This alternative would require the SCE 275-MW Early Interconnection Option upgrade.	275	2,600	11,000
Avoidance of Donated and Acquired Lands Alternative: developed to avoid impacts to donated and LWCF-acquired lands on the project site. The boundary of this alternative would be similar to the site boundary of the proposed action less donated and acquired land parcels. This alternative would require the SCE Full Build-out Option upgrade.	720	7,050	28,800

Executive Summary Table 2
Summary of the No Project/No Action Alternatives

No Project/No Action Alternative	Calico Solar Project?	Amendment to the CDCA Plan?
1) No Approval of the Calico Solar Project and no CDCA Plan Amendment	Calico Solar Project not approved: no solar energy power generation project would be constructed on the project site	No CDCA Plan Amendment: BLM would continue to manage the site consistent with the existing land use designation in the CDCA Plan for the site
2) No Approval of the Calico Solar Project and Amendment of the CDCA Plan to Allow Solar Energy Power Generation Projects on the Project Site	Calico Solar Project not approved: solar energy power generation projects could be constructed on the site (as a result of the CDCA Plan amendment)	Yes: BLM would amend the CDCA Plan to allow for solar energy power generation projects on the site
3) No Approval of the Calico Solar Project and BLM Amends the CDCA Plan to Not Allow Any Solar Energy Power Generation Projects on the Project Site	Calico Solar Project not approved: no solar energy power generation projects could be constructed on the site (as a result of the CDCA Plan amendment)	Yes: BLM would amend the CDCA Plan to not allow any solar energy power generation projects on the project site

Comparison of the Alternatives

Executive Summary Table 3 describes the ability of the Calico Solar Project, the two build alternatives, and the three No Project/No Action Alternatives to meet the defined project purpose and objectives.

Executive Summary Table 3
Ability of the Alternatives to Meet the Project Purpose and Objectives and Site Criteria

Project Purpose and Objectives	Calico Solar Project	275-MW Reduced Acreage Alternative	Avoidance of Donated and Acquired Lands Alternative	No Approval of Calico Solar Project and No CDCA Plan Amendment	No Approval of Calico Solar Project and Amendment of CDCA Plan to Allow Solar Energy Power Generation Projects on Project Site	No Approval of Calico Solar Project and BLM Amends CDCA Plan to Not Allow Any Solar Energy Power Generation Projects on Project Site
Provide clean, renewable, solar-powered electricity and to assist SCE in meeting its obligations under California's Renewable Portfolio Standard Program (RPS)	Yes	Yes	Yes	No	Potentially	No
Assist SCE in reducing its green-house gas emissions as required by the California Global Warming Solutions Act	Yes	Yes	Yes	No	Potentially	No
Provide up to 850 MW of renewable electric capacity under a 20-year PPA with SCE	Yes	No	No	No	Potentially	No
Contribute to the 20% renewables RPS target set by California's governor and legislature	Yes	Yes	Yes	No	Potentially	No
Assist in reducing greenhouse gas emissions from the electricity sector	Yes	Yes	Yes	No	Potentially	No
Contribute to California's future electric power needs	Yes	Yes	Yes	No	Potentially	No

Project Purpose and Objectives	Calico Solar Project	275-MW Reduced Acreage Alternative	Avoidance of Donated and Acquired Lands Alternative	No Approval of Calico Solar Project and No CDCA Plan Amendment	No Approval of Calico Solar Project and Amendment of CDCA Plan to Allow Solar Energy Power Generation Projects on Project Site	No Approval of Calico Solar Project and BLM Amends CDCA Plan to Not Allow Any Solar Energy Power Generation Projects on Project Site
Assist the California Independent System Operator (CAISO) in meeting its strategic goals for the integration of renewable resources, as listed in its Five-Year Strategic Plan for 2008-2012 (CAISO 2007)	Yes	Yes	Yes	No	Potentially	No
To construct and operate a 850 MW renewable power generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities	Yes	No	No	No	Potentially	No
To locate the facility in areas of high solarity with ground slope of less than 5%	Yes	Yes	Yes	No	Potentially	No

PUBLIC AND AGENCY COORDINATION

The Energy Commission's CEQA-equivalent process and the BLM's NEPA process provide opportunities for the public and other agencies to participate and consult in the scoping of the environmental analysis of this proposed project, and in the evaluation of the technical analyses and conclusions of that analysis. The following subsections describe the status of these outreach efforts for the proposed Calico Solar Project. These activities are also described in the *Final Scoping Report*.

Agency Coordination

The Energy Commission certification is in lieu of any permit required by state, regional, or local agencies and by federal agencies to the extent permitted by federal law (Public Resources Code, Section 25500). However, both the Energy Commission and BLM typically seek comments from and work closely with other regulatory agencies that administer LORS that may be applicable to a proposed project. The following paragraphs describe the agency coordination that has occurred through this joint SA/EIS process for the proposed Calico Solar Project.

United States Army Corps of Engineers

The United States Army Corps of Engineers (USACE) has jurisdiction to protect water quality and wetland resources under Section 404 of the Clean Water Act. Under that authority, USACE reviews proposed projects to determine whether they may impact such resources, and/or be subject to the requirements for a Section 404 permit. Throughout the SA/DEIS process, the Energy Commission, BLM, and the Applicant have provided information to the USACE to assist them in making a determination regarding their jurisdiction and need for a Section 404 permit. No jurisdictional determination has yet been made.

United States Fish and Wildlife Service

The United States Fish and Wildlife Service (USFWS) has jurisdiction to protect threatened and endangered species under the federal Endangered Species Act (ESA). Formal consultation with the USFWS under Section 7 of the ESA is required for any federal action that may adversely affect a federally listed species. The site is known to be occupied by desert tortoise. The desert tortoise is currently listed as threatened under the federal ESA and state ESA.

State Water Resources Control Board/Regional Water Quality Control Board

The Regional Water Quality Control Board (RWQCB) has the authority to protect surface water and groundwater. Throughout the SA/DEIS process, the Energy Commission, BLM, and the Applicant have invited the RWQCB to participate in public scoping and workshops, and have provided information to assist the agency in evaluating the potential impacts and permitting requirements of the proposed project.

California Department of Fish and Game

The California Department of Fish and Game (CDFG) have the authority to protect water resources through regulation of modifications to streambeds, under Section 1602 of the

Fish and Game Code. The Energy Commission, BLM, and the applicant have provided information to CDFG to assist in their determination of the impacts to streambeds, and identification of permit and mitigation requirements. The CDFG also has the authority to regulate potential impacts to species that are protected under the California Endangered Species Act (CESA).

San Bernardino County

The revised Calico Solar Project site contains no private land under the jurisdiction of San Bernardino County (County). The Energy Commission and BLM provided opportunities during scoping for the County to provide input to the environmental technical studies for the project.

Public Coordination

The Energy Commission's CEQA-equivalent process and the BLM's NEPA process provide opportunities for public participation in the scoping of the environmental analysis, and in the evaluation of the technical analyses and conclusions of that analysis. For the Energy Commission, this outreach program is primarily facilitated by the Public Adviser's Office (PAO). As part of the coordination of the environmental review process required under the Memorandum of Understanding (MOU) between the Energy Commission and the BLM California Desert District, the Energy Commission and BLM have jointly held public meetings and workshops which accomplish the public coordination objectives of both agencies.

The PAO's public outreach is an integral part of the Energy Commission's AFC review process. The PAO reviewed information provided by the Applicant and also conducted its own outreach efforts to identify and locate local elected and certain appointed officials, as well as "sensitive receptors" (including schools, community, cultural and health facilities and daycare and senior-care centers, as well as environmental and ethnic organizations). Those agencies and individuals that provided comments concerning the project have been considered in staff's analysis. This SA/DEIS provides agencies and the public with an opportunity to review the Energy Commission's staff's analysis of the proposed project. Comments received on this SA/DEIS will be taken into consideration in preparing the subsequent project documents, including the Supplemental SA/Final EIS.

The AFC, this SA/DEIS, and other project documents are located on the Energy Commission's website at http://www.energy.ca.gov/sitingcases/calicosolar/index.html.

STAFF'S ASSESSMENT

Each technical area section of this SA/DEIS contains a discussion of the project setting, impacts, and where appropriate, mitigation measures and Conditions of Certification. The SA/DEIS includes the staff's assessment of:

- the environmental setting of the proposal;
- impacts on public health and safety, and measures proposed to mitigate these impacts;
- environmental impacts, and measures proposed to mitigate these impacts;

- the engineering design of the proposed facility, and engineering measures proposed to ensure the project can be constructed and operated safely and reliably;
- project closure;
- project alternatives;
- compliance of the project with all applicable laws, ordinances, regulations and standards (LORS) during construction and operation;
- environmental justice for minority and low income populations, when appropriate; and
- proposed mitigation measures/Conditions of Certification.

SUMMARY OF PROJECT RELATED IMPACTS

Executive Summary Table 4 summarizes the potential short- and long-term and cumulative adverse impacts of the proposed Calico Solar Project, the anticipated mitigation and Conditions of Certification, and the level of significance of the impacts after mitigation, under CEQA.

Note that the Energy Commission's "recommended Conditions of Certification" are incorporated into the proposed action that is analyzed by BLM for purposes of NEPA compliance, and the NEPA conclusions regarding potential impacts assume that these mitigations will be implemented as authorized through decision.

Executive Summary Table 4
Summary of Potential Short-Term, Long-Term, and Cumulative Adverse Impacts

Environmental Parameter	Complies with Applicable LORS	Short- and Long-Term Adverse Impacts	Cumulative Adverse Impacts	Mitigation and Conditions of Certification	CEQA Level of Significance After Mitigation
Air Quality	Yes	No significant short term or long term adverse impacts with mitigation/Conditions of Certification incorporated	No cumulative adverse impacts	**AQ-1** through **AQ-15** and **AQ-SC1** through **AQ-SC9**	Less than significant
Biological Resources	Yes	No significant short term or long term adverse impacts with mitigation/Conditions of Certification incorporated	Would result in significant impacts to Newberry Springs watershed streams, desert tortoise, Mohave fringe-toed lizard, big horned sheep occupied range, white-margined beardtongue, and wildlife movement and connectivity	**BIO-1** through **BIO-29**	Significant and unavoidable
Cultural Resources	Yes	Potential for significant adverse impacts with mitigation/Conditions of Certification incorporated	Potential for cumulative adverse impacts	**CUL-1**	Potential for significant and unavoidable impacts
Facility Design	Yes	No significant short term or long term adverse impacts with mitigation/Conditions of Certification incorporated	Not applicable	General Conditions	Less than significant
Geology, Paleontology, and Minerals	Yes	No significant short term or long term adverse impacts with mitigation/Conditions of Certification incorporated	No cumulative adverse impacts	**PAL-1** through **PAL-7,** and **GEN-1, GEN-5,** and **CIVIL-1**	Less than significant
Hazardous Materials	Yes	No significant short term or long term adverse impacts with mitigation/Conditions of Certification incorporated	No cumulative adverse impacts	**HAZ-1** through **HAZ-6**	Less than significant

Environmental Parameter	Complies with Applicable LORS	Short- and Long-Term Adverse Impacts	Cumulative Adverse Impacts	Mitigation and Conditions of Certification	CEQA Level of Significance After Mitigation
Hydrology, Soils and Water Resources	Yes	No significant short term or long term adverse impacts with mitigation/Conditions of Certification incorporated	No cumulative adverse impacts	**SOIL&WATER-1** through **SOIL&WATER-6**	Less than significant
Land Use and Recreation	**No**	No Significant short term and long term adverse impacts reduced with mitigation/Conditions of Certification incorporated	Would result in significant impacts related to cumulative land conversion	**None proposed**	Cumulative land use impacts from land conversion would be significant and unavoidable.
Noise and Vibration	Yes	No significant short term or long term adverse impacts with mitigation/Conditions of Certification incorporated	No cumulative adverse impacts	**NOISE-1** through **NOISE-6**	Less than significant
Public Health and Safety	Yes	No significant short term or long term adverse impacts with mitigation/Conditions of Certification incorporated	No cumulative adverse impacts	None required	Less than significant
Power Plant Efficiency	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Power Plant Reliability	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Socioeconomic and Environmental Justice	Yes	No significant short term or long term adverse impacts with mitigation/Conditions of Certification incorporated	No cumulative adverse impacts	None required	Less than significant
Traffic and Transportation	Yes	No significant short term or long term adverse impacts with mitigation/Conditions of Certification incorporated	No cumulative adverse impacts	**TRANS-1** through **TRANS-7**	Less than significant

Environmental Parameter	Complies with Applicable LORS	Short- and Long-Term Adverse Impacts	Cumulative Adverse Impacts	Mitigation and Conditions of Certification	CEQA Level of Significance After Mitigation
Transmission Line Safety/Nuisance	Yes	No significant short term or long term adverse impacts with mitigation/Conditions of Certification incorporated	No cumulative adverse impacts	**TLSN-1** through **TLSN-4**	Less than significant
Transmission System Engineering	Yes	No significant short term or long term adverse impacts with mitigation/Conditions of Certification incorporated	No cumulative adverse impacts	**TSE-1** through **TSE-7**	Less than significant
Visual Resources	**No**	Would result in significant short term (construction) and long term (operation) adverse impacts.	Could result in cumulative adverse impacts	**VIS-1** through **VIS-5**	Significant and unavoidable
Waste Management	Yes	No significant short term or long term adverse impacts with mitigation/Conditions of Certification incorporated	No cumulative adverse impacts	**WASTE-1** through **WASTE-8**	Less than significant
Worker Safety and Fire Protection	Yes	No significant short term or long term adverse impacts with mitigation/Conditions of Certification incorporated	Could result in cumulative adverse impacts	**WORKER SAFETY-1** through **WORKER SAFETY-7**	Less than significant

Air Quality

The staff concludes that with the adoption of the air quality Conditions of Certification the proposed Calico Solar Project would comply with all applicable LORS and would not result in any significant CEQA air quality impacts. These Conditions of Certification meet the CEC's responsibility to comply with CEQA and the BLM's responsibility to comply with the NEPA.

Staff concludes that the proposed project would not have the potential to exceed PSD emission threshold levels during direct source operation and the facility is not considered a major stationary source with potential to cause adverse NEPA air quality impacts. However, without adequate fugitive dust mitigation, the proposed project would have the potential to exceed the General Conformity PM10 applicability threshold during construction and operation, and could cause potential localized exceedances of the PM10 NAAQS during construction and operation. This potential exceedance of federal air quality standards would be considered a direct, adverse impact under the NEPA. This impact would be less than adverse with the proposed mitigation measures controlling fugitive dust.

The Calico Solar Project would emit substantially lower greenhouse gas (GHG)[1] emissions per megawatt-hour than fossil fueled generation resources in California. The Calico Solar Project, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]).

Alternatives. The Reduced Acreage Alternative would use approximately 32% of the SunCatchers, provide 32% of the power generating potential, and would affect approximately 32% of the land of the land of the proposed 850-MW project. The worst-case short-term construction emissions and ground level pollutant concentration impacts would be similar to the proposed project and would require the same level of mitigation. The total construction period and total construction emissions and long-term ground level pollutant concentration impacts would be reduced from those required to construct the proposed project. The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated, but mainly out of air basin, criteria pollutant emissions would be reduced. The impacts of the proposed project would not occur on the lands not used due to the smaller project size. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's CDCA Plan, including another solar project. The CEQA level of significance for the Reduced Acreage Alternative would be the same as for the proposed project, with the same significance rationale, where if left unmitigated there is the potential for significant NOx and PM emission impacts during the Alternative project's construction and operation. The mitigation that would be proposed for the Reduced Acreage Alternative would be the same as that proposed for the proposed project.

The Avoidance of Donated and Acquired Lands Alternative would use approximately 85% of the SunCatchers, provide 85% of the power generating potential, and would

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affect approximately 86% of the land (7,050 acres) of the proposed 850-MW project. Additionally, like the proposed project, the Avoidance of Donated and Acquired Lands Alternative would require the SCE Full Build-out Option upgrade. The worst-case short-term construction emissions and ground level pollutant concentration impacts would be nearly the same as the proposed project and would require the same level of mitigation. The total construction period and total construction emissions and long-term ground level pollutant concentration impacts would be marginally reduced from those required to construct the proposed project. The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated, but mainly out of air basin, criteria pollutant emissions would be slightly reduced. The impacts of the proposed project would not occur on the donated or acquired lands. However, the land on which the project is proposed may become available to other uses that are consistent with BLM's land use plan, including another solar project. The level of significance under CEQA for the Avoidance of Donated and Acquired Lands Alternative would be the same as for the proposed project, with the same significance rationale, where if left unmitigated there is the potential for significant NOx and PM emission impacts during the Alternative project's construction and operation. The mitigation that would be proposed for the Avoidance of Donated and Acquired Lands Alternative would be the same as that proposed for the proposed project (staff recommended Conditions of Certification).

Under the three No Action/No Project Alternatives, the air quality impacts of the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM's California Desert Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

Biological Resources

The staff concludes that without mitigation, the Calico Solar Project would be a substantial contributor to the cumulatively significant loss of the Mojave Desert's biological resources, including the State and federally threatened desert tortoise and other special-status species. Impact avoidance and minimization measures described in staff's analysis and included in the Conditions of Certification would help reduce impacts to sensitive biological resources. However, compensatory measures are necessary to offset project-related losses, and to assure compliance with State and federal laws such as the federal and State Endangered Species Acts and regulations protecting waters of the State.

Alternatives. The Reduced Acreage Alternative would reduce some impacts to biological resources identified on the site, including desert washes, desert tortoise habitat and some identified populations of rare plants. The footprint of the Reduced Acreage Alternative would also minimize potential conflicts with Nelson's bighorn sheep by avoiding potential foraging habitat and providing greater distance between bighorn sheep and construction/operation activities. While barriers to wildlife movement would still remain, by moving the project footprint away from the foothills, the project would reduce barriers to wildlife movement for desert tortoise, bighorn sheep and other species. The Conditions of Certification are the same as those for the proposed project.

Implementation of these Conditions would mitigate for the direct, indirect and cumulative impacts of the Reduced Acreage Alternative, and would be less than significant under CEQA.

The Avoidance of Donated and Acquired Lands Alternative would decrease the project site by 15% for a total project size of 7,050 acres. Implementation of the Avoidance of Donated and Acquired Lands Alternative would have the same types of impacts as the proposed alternative but the magnitude would be decreased. Similar to the proposed project, this 720-MW alternative would also require the upgrades to the SCE Pisgah-Lugo transmission line and the Pisgah Substation and result in the same biological impacts in those areas. The Conditions of Certification are the same as those for the proposed project. Implementation of these Conditions would mitigate for the direct, indirect and cumulative impacts of the Reduced Acreage Alternative, and would be less than significant under CEQA.

Under the three No Action/No Project Alternatives, the impacts to biological resources from the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM's California Desert Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

Cultural Resources

On the basis of a 25% sample of the cultural resources inventory of the project area of analysis, staff conclude that the Calico Solar Project would have significant impacts/effects on a presently unknown subset of approximately 139 known prehistoric and historical surface archaeological resources and may have significant impacts/effects on an unknown number of buried archaeological deposits, many of which may be determined historically significant (i.e. eligible for the National Register of Historic Places and the California Register of Historical Resources) under the Programmatic Agreement currently under development as part of the Bureau of Land Management's National Historic Preservation Act Section 106 (Section 106) consultation process. The adoption and implementation of the Condition of Certification would reduce the potential impacts of the proposed action on these cultural resources to less than significant under CEQA, would resolve effects under Section 106, and would further ensure that the proposed action would be in conformity with all applicable LORS.

Alternatives. The Reduced Acreage Alternative would substantially reduce the impacts of the project by occupying only 31% of the proposed project area and avoiding many sensitive cultural resources. Fifteen cultural resources sites have been identified as part of the 25% re-survey for this alternative. The Reduced Acreage Alternative is anticipated to have significant effect per NEPA, significant impact per CEQA, and adverse effect per Section 106 of the NHPA. When resource evaluations have been completed, impacts will be assessed. The observation and identification of 15 cultural resources thus far as part of the 25% re-survey suggests periodic use of the project landform in the past. Severity and extent of impacts would be reduced given the presence of fewer cultural resources within this alternative that is 31% the size of the proposed project. If impacts are deemed significant, mitigation measures would be stipulated and refined in a Programmatic Agreement negotiated among all consulting parties and executed by the BLM, as described for the proposed Project.

Although the Reduced Acreage alternative would result in a reduction of impacts to cultural resources, it cannot be determined with the presently-available information whether impacts to historically-significant resources would occur, and if so, whether they could be avoided. Therefore, it is presumed that this alternative could also result in significant impacts under CEQA. While implementation of a Programmatic Agreement is anticipated to reduce the severity of impacts to cultural resources, it cannot be determined at this time whether impacts would be reduced to a level below significance under CEQA. Therefore, it is anticipated that this alternative has the potential to result in significant unavoidable impacts under CEQA, though the severity of impacts would be less than with the proposed Project.

The Avoidance of Donated and Acquired Lands Alternative would retain 85% of the proposed SunCatchers and would affect 85% of the land of the proposed 850-MW project. Forty-four cultural resource sites have been identified as part of the 25% re-survey for this alternative. Because the Avoidance of Donated and Acquired Lands Alternative would generate approximately 720 MW of power, it would (similar to the proposed project) require a 65-mile upgrade to the SCE Pisgah-Lugo transmission line and upgrades to the Pisgah Substation. This alternative is anticipated to have significant effect per NEPA, significant impact per CEQA, adverse effect per Section 106 of the NHPA. A Programmatic Agreement would be drafted and negotiated among all consulting parties, including interested Tribes. The agreement would stipulate the development of treatment plans, including the refinement and definition of mitigation measures.

Although the Avoidance of Donated and Acquired Lands Alternative would result in a reduction of impacts to cultural resources, it cannot be determined with the presently-available information whether impacts to historically-significant resources would occur, and if so, whether they could be avoided. Therefore, it is presumed that this alternative could also result in significant impacts under CEQA. While implementation of a Programmatic Agreement is anticipated to reduce the severity of impacts to cultural resources, it cannot be determined at this time whether impacts would be reduced to a level below significance under CEQA. Therefore, it is anticipated that this alternative has the potential to result in significant unavoidable impacts under CEQA. The severity of impacts would be less than with the proposed Project, but would likely be greater than the Reduced Acreage alternative.

Under the three No Action/No Project Alternatives, the impacts to cultural resources from the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM's California Desert Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

Facility Design

Staff conclude that the design, construction, and decommissioning of the project and its linear facilities would likely comply with applicable engineering LORS. The proposed Conditions of Certification in **Executive Summary Table 4** would ensure compliance with the applicable LORS. The Facility Design section is not intended to address environmental impacts under either CEQA or NEPA.

Alternatives. The same LORS and Conditions of Certification would also apply to the Reduced Acreage Alternative and the Avoidance of Donated and Acquired Lands Alternative. The Facility Design section is not intended to address environmental impacts under either CEQA or NEPA.

Under the three No Action/No Project Alternatives, the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM's California Desert Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

Geology, Paleontology, and Minerals

Staff believes that the potential is low for significant adverse impacts to the proposed project from geologic hazards during its design life and to potential geologic, mineralogic, and paleontologic resources from the construction, operation, and closure of the proposed project. The Calico Solar Project could be designed and constructed in accordance with all applicable LORS and in a manner that both protects environmental quality and assures public safety, to the extent practical.

Alternatives. Like the proposed project, the potential is low for significant adverse impacts to the Reduced Acreage Alternative from geological hazards during its design life and moderate to high paleontological resources from the construction, operation, and closure of the proposed project. Staff concludes that this alternative would be designed and constructed in accordance with all applicable LORS and in a manner that both protects environmental quality and assures public safety. The CEQA level of significance would remain unchanged from the proposed project.

Like the proposed project, the potential is low for significant adverse impacts to the Avoidance of Donated and Acquired Lands Alternative from geological hazards during its design life and moderate to high paleontological resources from the construction, operation, and closure of the proposed project. Staff concludes that this alternative will be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards and in a manner that both protects environmental quality and assures public safety. The CEQA level of significance would remain unchanged from the proposed project.

Under the three No Action/No Project Alternatives, the impacts to geology, paleontology and mineral resources from the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM's California Desert

Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site

Hazardous Materials

The staff's evaluation of the proposed project, along with staff's proposed mitigation measures, indicate that hazardous materials use at the proposed Calico Solar Project would not present a significant impact pursuant to CEQA on the public or environment. With adoption of the proposed Conditions of Certification, the proposed project would comply with all applicable LORS.

Alternatives. The Reduced Acreage alternative would not result in any significant change in the potential for impact associated with hazardous materials handling and storage. The proposed project would not pose a significant risk of public impact as a result of an accidental release of hazardous materials. This alternative would not significantly change the risk profile of the facility.

Like the proposed project, the construction and operation of the Reduced Acreage alternative would be in compliance with all applicable LORS. The significance criteria for the Reduced Acreage alternative are exactly the same as the criteria for the proposed project.

The Avoidance of Donated and Acquired Lands Alternative would not result in any significant change in the potential for impact associated with hazardous materials handling and storage. The proposed project would not pose a significant risk of public impact as a result of an accidental release of hazardous materials. This alternative would not significantly change the risk profile of the facility. Like the proposed project, the construction and operation of the Avoidance of Donated and Acquired Lands Alternative would be in compliance with all applicable LORS. The significance criteria for the Avoidance of Donated land alternative is exactly the same as the significance criteria for the proposed project.

Under the three No Action/No Project Alternatives, the use and generation of hazardous materials from the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM's California Desert Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

Hydrology, Water Use and Water Quality

Staff has determined that construction, operation, and decommissioning of the proposed Calico Solar Project could potentially impact soil and water resources. Where these potential impacts have been identified, staff has proposed mitigation measures to reduce identified impacts to levels that are less than significant. The mitigation measures, as well as specifications for laws, ordinances, regulations and standards (LORS) conformance, are included herein as Conditions of Certification. The Project would conform to all applicable LORS.

Alternatives. All of the potential impacts identified for the proposed project remain with the Reduced Acreage Alternative. However, due to the alternative's reduced physical size and reduction in number of SunCatchers, these potential impacts are proportionately reduced. There would be no change in the CEQA Level of Significance of impacts between the proposed project and the Reduced Acreage alternative.

The portion of the Avoidance of Donated and Acquired Lands Alternative in the northeastern corner of the originally proposed Calico Solar site occupies the area where flood intercept debris collection and flow detention basins were designed by the applicant to mitigate the 100-year flood impact to the site. Should the Avoidance of Donated and Acquired Lands Alternative be constructed, flood intercept debris collection and flow detention basins would need to be similarly designed and constructed downstream from the southern boundary of that donated parcel. Another donated parcel is located near the center of the original site. Should the Avoidance of Donated and Acquired Lands Alternative be constructed, onsite drainage control structures will need to be redesigned to avoid that donated parcel, while maintaining site erosion/sedimentation control. Provided the redesign of the flood control and erosion/sedimentation control structures meet the same standards as for the Calico Solar Project, no change to the CEQA Level of Significance of impacts would occur between the proposed project and the Avoidance of Donated and Acquired Lands Alternative.

Under the three No Action/No Project Alternatives, the impacts to hydrology, water use, and water quality from the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM's California Desert Conservation Area (CDCA) Plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

Land Use and Recreation

Implementation of the proposed Calico Solar Project would not result in adverse impacts to agricultural lands, rangeland resources, or horses and burros. The conversion of approximately 8,230 acres of land to support the proposed project's components and activities could disrupt wilderness resources and recreational activities in established federal, state, and local recreation areas; however, due to the abundance of wilderness and recreation sites surrounding the project area, potential impacts from the proposed project would affect a small fraction of these lands and would not be adverse. For purposes of CEQA compliance, impacts to agricultural lands and rangelands would be less-than-significant, and there would be no impacts related to Williamson Act contracts. Impacts to recreation and wilderness resources would be less-than-significant. Impacts to horses and burros would be less-than-significant. Impacts related to LORS compliance would be significant and unavoidable because the proposed project boundary contains donated and acquired lands which, pursuant to a BLM interim policy memorandum, are to be managed as avoidance/exclusion areas for land use authorizations that could result in surface disturbing activities. Although the development of renewable resources is in compliance with federal and state mandates, the conversion of thousands of acres of open space would result in a significant and unavoidable cumulative land use impact. The land conversion impacts would preclude numerous existing land uses including recreation, wilderness, rangeland, and open space, and therefore, result in a significant and unavoidable cumulative land use impact. No Conditions of Certification are proposed.

Alternatives. The Reduced Acreage Alternative would occupy 2,600 acres of lands, 33% of what would be impacted by the proposed project. Similar to the proposed project, there would be no impacts on horses or burros, farmlands or rangelands. The affected lands would be entirely under BLM jurisdiction and would not contain donated or acquired lands. Accordingly this alternative would be consistent with the BLM interim policy memorandum and all applicable LORS. Impacts to wilderness, recreation and open space would be proportionately less, but the conversion of the affected open space lands to renewable energy development would preclude numerous existing land uses including recreation, wilderness, rangeland, and open space, and therefore, result in a significant cumulative land use effect. The CEQA level of significance would be less than significant for all other land use resources.

The Avoidance of Donated and Acquired Lands Alternative would occupy 7,050 acres of lands, 85% of what would be impacted by the proposed project. Similar to the proposed project, there would be no impacts on horses or burros, farmlands or rangelands. Similar to the proposed project, the Avoidance of Donated and Acquired Lands Alternative would indirectly disrupt current wilderness areas and recreational activities in established federal and state areas which would result in adverse effects on recreational users of these lands, but the impact would be proportional compared to the proposed project. The affected lands would be entirely under BLM jurisdiction and would not contain donated or acquired lands. Accordingly this alternative would be consistent with the BLM interim policy memorandum and all applicable LORS. Impacts to wilderness, recreation and open space would be proportionately less, but the conversion of the affected open space lands to renewable energy development would preclude numerous existing land uses including recreation, wilderness, rangeland, and open space, and therefore, result in a significant cumulative land use effect. The CEQA level of significance would be less than significant for all other land use resources.

Under the three No Action/No Project Alternatives, the impacts to land use and recreation from the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM's California Desert Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

Noise and Vibration

The staff concludes that the Calico Solar Project can be built and operated in compliance with all applicable noise and vibration LORS. If the proposed project is built in accordance with Conditions of Certification **NOISE-1** through **NOISE-7**, it would produce no significant adverse noise impacts under CEQA on people within the affected area, either direct, indirect, or cumulative.

Alternatives. Given the nature of the operational noise produced by the chosen project technology, the Reduced Acreage Alternative would most likely correspond to lower operational noise impacts at noise receptors located east of the project (SR2), a receptor that faces significant, though mitigable noise impacts from the proposed project. Operational noise impacts at the receptors south of the project would likely be the same as that of the proposed 850-MW project. The CEQA level of significance of the Reduced Acreage Alternative would be unchanged from the proposed project.

The Avoidance of Donated and Acquired Lands Alternative would not substantively change the noise and vibration impacts from those of the proposed project.

Under the three No Action/No Project Alternatives, the noise and vibration impacts from the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM’s California Desert Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

Power Plant Efficiency

The CEC staff has analyzed the potential efficiency in energy associated with construction and operation of the Calico Solar Project. The project would decrease reliance on fossil fuel due to increased availability of renewable energy resources. It would not create significant adverse effects on fossil fuel energy supplies or resources under CEQA, would not require additional sources of energy supply, and would not consume fossil fuel energy in a wasteful of inefficient manner. No efficiency standards apply to this project. The CEC staff concludes that this project would present no significant adverse impacts on fossil fuel energy resources under CEQA. If constructed and operated as proposed, the Calico Solar project would occupy nearly 9 acres per MW of power output, a figure double that of some other solar power technologies. It has not been determined how great a difference in land use would constitute a significant impact.

Alternatives. The Reduced Acreage Alternative would produce 275 MW while occupying 2,300 acres, resulting in a power-based land use efficiency of 0.12 MW/acre. If the Reduced Acreage Alternative were constructed, the CEQA Level of Significance as measured by land use (occupied acreage) would amount to approximately 28% of the levels described for the proposed project.

The Avoidance of Donated and Acquired Lands Alternative would produce approximately 720 MW while occupying 7,050 acres, resulting in a power-based land use efficiency of 0.102 MW/acre, about the same as the proposed project, and about half as efficient as other solar thermal technologies. The CEQA level of significance would not change from the levels described for the proposed project. No Conditions of Certification would apply.

Under the three No Action/No Project Alternatives, the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM’s California Desert Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

POWER PLANT RELIABILITY

Staff cannot determine whether the predicted power plant availability factor of 99%, as supplied by the Applicant, is achievable. Further, staff cannot predict what the actual availability might be, given the demonstration status of the SunCatcher technology and limited data on large-scaled deployments of SunCatchers. The availability factor of a power plant is the percentage of time it is available to generate power; both planned and unplanned outages subtract from this availability. Staff believes it possible that the project may face challenges from considerable maintenance demands, reducing its availability. No Conditions of Certification are proposed.

Alternatives. The Reduced Acreage power plant would produce only 275 MW (32% of the proposed project's 850 MW) so its impacts on the SCE grid would be proportionately less. The CEQA Level of Significance would not change from the levels described for the proposed project if the Reduced Acreage alternative were constructed.

The Avoidance of Donated and Acquired Lands Alternative power plant would produce 720 MW (85% of the proposed project's 850 MW) so its impacts on the SCE grid would be only slightly less. The CEQA Level of Significance would not change from the levels described for the proposed project if this alternative were constructed.

Under the three No Action/No Project Alternatives, the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM's California Desert Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

Public Health and Safety

Staff have analyzed potential public health and safety risks associated with construction and operation of the Calico Solar Project and do not expect any substantial adverse cancer or short- or long-term noncancerous health effects from project toxic emissions under CEQA. According to the results of staff's health risk assessment, emissions from the Calico Solar Project would not contribute substantially to morbidity or mortality in any age or ethnic group residing in the project area.

Alternatives. The Reduced Acreage Alternative would likely result in reduced emission which would decrease the cancer risk and chronic and acute health hazard indices predicted for the proposed project. However, the public health analysis has determined that these indices are far below the level of significance at the point of maximum impact for the project as proposed. Therefore, with respect to public health impacts, the Reduced Acreage Alternative is not preferable over the project as proposed. Similar to the proposed project, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts would occur as a result of waste management associated with the Reduced Acreage Alternative.

The Avoidance of Donated and Acquired Lands Alternative would result in similar types of public health and safety issues from construction, demolition and operation as the proposed project. Staff has analyzed potential public health risks associated with construction and operation of the Calico Solar Project and does not expect any significant adverse cancer or long-term health effects to any members of the public, including low income and minority populations, from project toxic emissions. The Avoidance Alternative would reduce the project by approximately 15%, but otherwise represent the same impacts. The results of staff's health risk assessment indicate that emissions from the Calico Solar Project would not contribute significantly or cumulatively to morbidity or mortality in any age or ethnic group residing in the project area. Similar to the proposed project, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts would occur to public health and safety associated with the construction or operation of the Avoidance Alternative.

Under the three No Action/No Project Alternatives, the public health and safety impacts from the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM's California Desert Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

Socioeconomics and Environmental Justice

Staff conclude that the 850-megawatt Calico Solar Project would cause neither a significant adverse direct or indirect impact nor contribute to a cumulative socioeconomic impact on the area's housing, schools, parks and recreation, police, emergency medical services, or hospitals, since most of the project's construction and operation workforce currently resides in the regional or local labor market area. Gross public benefits from the project include capital costs, construction and operation payroll, and sales taxes.

Alternatives. The Reduced Acreage Alternative would eliminate approximately 67% of the proposed project area, would not require an upgraded transmission line, and would consist of fewer (11,000) SunCatchers than the proposed project (34,000). Accordingly, the Reduced Acreage Alternative would require less construction with the above mentioned infrastructure and operation of the solar facility. This would result in a smaller fiscal impact than the proposed project, with a reduced need for housing, schools, parks and recreation, law enforcement and emergency medical services. The Reduced Acreage Alternative would have a smaller impact than the proposed project on substantial population growth, impact housing supply, displace existing housing or substantial numbers of people or result in substantial physical impacts to government facilities. In addition, this alternative would have a smaller impact than the proposed project with respect to project cost, payroll, and local construction materials/supplies. Similar to the proposed project, this alternative would not a cause adverse significant socioeconomic impact from construction or operation. Similar to the proposed project, the Reduced Acreage Alternative would not require socioeconomic Conditions of Certification.

The 720-MW Avoidance of Donated and Acquired Lands Alternative would require installation of 28,000 SunCatchers. Accordingly, this alternative would require a smaller construction and operation workforce, which would require less housing, schools, parks and recreation, law enforcement and medical services. Reduced construction would result in smaller fiscal effects from construction and operation sales tax. Total project costs, payroll costs, and local construction materials/supplies would have a smaller non-fiscal effect. Similar to the proposed project, the Avoidance of Donated and Acquired Lands Alternative would not cause an adverse significant impact from construction or operation. The benefits of the project to the local economy would be reduced because of the reduced acreage and construction requirements, the construction and operation staff would be decreased, and there would be fewer impacts to socioeconomic resources. Similar to the proposed project, the Avoidance of Donated and Acquired Lands Alternative would not require socioeconomic Conditions of Certification.

Under the three No Action/No Project Alternatives, the socioeconomic benefits from the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM's California Desert Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

Traffic and Transportation

With implementation of recommended Conditions of Certification, Calico Solar Project would be consistent with applicable LORS. As a result, it would not have a significant adverse impact on the local and regional roadway network. With implementation of recommended Conditions of Certifications, local roadway and highway demand resulting from daily movement of workers would not increase beyond significance thresholds established by San Bernardino County and the State of California. Presently open routes that traverse the project area would be closed if any of the Action Alternatives or CDCA Plan amendments are approved.

Alternatives. Implementation of the Reduced Acreage Alternative would not significantly affect the number of workers needed for the construction and operation of this project because it does not change the setting of the project or the necessity of the workers to travel on I-40. Workers required for this project is relatively small and even each worker traveling alone in one vehicle would not exceed acceptable levels of service on I-40. However, staff has proposed mitigation to encourage car-pooling or other methods of reducing traffic impacts. Similar to the proposed project, staff considers project compliance with LORS and staff's Conditions of Certification to be sufficient to ensure that no significant impacts would occur as a result of waste management associated with the Reduced Acreage Alternative.

The Avoidance of Donated and Acquired Lands Alternative would generate similar types of hazardous and non-hazardous wastes from construction, demolition and operation of the project. However, the quantities of waste would be reduced by 15%. The amount of non-hazardous and hazardous solid wastes generated under a 720-MW Alternative that would require landfill/treatment would be approximately 7,100 and 191 cubic yards, respectively. Similar to the proposed project, wastes requiring off-site disposal would be significantly less than the remaining capacity of off-site disposal facilities. Similar to the proposed project, staff will not require investigation and remediation of soil and groundwater contamination. Disposal methods would remain the same as for the proposed project and the same Conditions of Certification (**WASTE-1** through **-8**) would apply. Similar to the proposed project, staff considers project compliance with LORS and staff's Conditions of Certification to be sufficient to ensure that no significant impacts would occur as a result of waste management associated with the 720-MW Alternative.

Under the three No Action/No Project Alternatives, the impacts to traffic and transportation from the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM's CDCA Plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

Transmission Line Safety and Nuisance

The applicant, Calico Solar, LLC, proposes to transmit the power from the two phases of the proposed Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) to Southern California Edison's existing Pisgah Substation from which it would be delivered to the California Independent Operator-controlled power grid. Since the line would be operated within the Southern California Edison service area, it would be constructed, operated, and maintained according to Southern California Edison's guidelines for line safety and field management which conform to applicable laws, ordinances, regulations and standards. Also, the route would traverse undisturbed desert land with no nearby residents thereby eliminating the potential for residential electric and magnetic field exposures. With the proposed Conditions of Certification, any safety and nuisance impacts from construction and operation of the proposed line would be less than significant.

Alternatives. The Reduced Acreage Alternative would have fewer (11,000) SunCatchers than with the proposed alternative (34,000), but the system of aggregation and method of power transmission would be the same as the proposed project. Because the staff finds the safety and nuisance impacts of the proposed 850-MW project to be less than significant under CEQA, staff would expect the design's implementation for the 275-MW Reduced Acreage Alternative (as required by the Conditions of Certification) to result in impacts that would be less than significant as well.

The Avoidance of Donated and Acquired Lands Alternative would consist of 28,800 solar collectors occupying the entire footprint of the proposed project but avoiding use of any donated or acquired lands. Like the proposed project, the power from this alternative would be transmitted to the grid through the Pisgah Substation and would require infrastructure similar to that of the proposed 850 MW including water storage tanks, transmission line, and substation. Like the proposed project, this alternative would require the SCE Full Build-out Option upgrade, which would be constructed, operated, and maintained according to SCE's guidelines for line safety and field management which conform to applicable LORS and traverse undisturbed desert land with no nearby residents, eliminating the potential for residential electric and magnetic field exposures. With the Conditions of Certification recommended for the proposed project, any safety and nuisance impacts from the line for the Avoidance of Donated and Acquired Lands Alternative would be less than significant.

Under the three No Action/No Project Alternatives, the impacts pertaining to transmission line safety and nuisance from the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM's California Desert Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

Transmission System Engineering

The proposed Calico Solar Project outlet lines and termination are acceptable and would comply with the NERC/WECC planning standards, California ISO reliability criteria, and all applicable LORS with implementation of the Conditions of Certification. The analysis of project transmission lines and equipment, both from the power plant up to the point of interconnection with the existing transmission network as well as upgrades beyond the interconnection that are attributable to the project have been evaluated by staff and are included in the environmental sections of this Staff Assessment/Draft Environmental Impact Statement.

Commission staff relies on the responsible interconnecting authority for analysis of impacts on the transmission grid, as well as for the identification and approval of new or modified facilities required downstream from a proposed interconnection for mitigation purposes. The proposed Calico Solar Project would connect to Southern California Edison's (SCE's) existing 230-kV transmission network and would require both analysis by SCE and the approval of the California Independent System Operator (California ISO).

Alternatives. The Reduced Acreage Alternative would require 11,000 SunCatchers to generate approximately 275 MW. This alternative was developed because it could be constructed without upgrading the existing SCE Lugo-Pisgah transmission line and Pisgah Substation. Therefore, the 275-MW Alternative would require fewer distribution facilities and a smaller substation to be built within the project site. Because this alternative would require fewer transformers, fewer collector distribution feeders and other electrical components, it would also result in fewer impacts to the environment and triggers less CEQA level analysis.

The Avoidance of Donated and Acquired Lands Alternative would consist of 28,800 SunCatchers with a net generating capacity of approximately 720 MW occupying the entire proposed project footprint except for the donated or acquired lands. Like the proposed project, this alternative would transmit power to the grid through the SCE Pisgah Substation and would require infrastructure similar to the entire proposed 850-MW project, including water storage tanks, transmission line, road access, main services complex, and substation. Additionally, like the proposed project, the Avoidance of Donated and Acquired Lands Alternative would require the 65-mile upgrade to the SCE Lugo-Pisgah transmission line. If the Avoidance of Donated and Acquired Lands Alternative were approved, other renewable projects may be developed on other sites in the in San Bernardino County, the Mojave Desert, or in adjacent states to fill the 130-MW gap not supplied by the proposed project as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

Under the three No Action/No Project Alternatives, the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM's California Desert Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

Visual Resources

Staff concludes that the proposed project would substantially degrade the existing visual character and quality of the site and its surroundings, including motorists on Interstate 40 and National Trails Highway/Route 66. With staff recommended Conditions of Certification, these impacts could be greatly reduced but would remain significant and unavoidable. The BLM is in the process of establishing visual resource management classifications for the proposed project and surrounding areas.

Alternatives. The Reduced Acreage Alternative is 31% of the size the proposed project with a south project boundary that is 1 mile from Interstate 40, and in most cases, nearly 2 miles south of the Cady Mountains WSA. These setbacks would eliminate the foreground impacts as seen from these two locations. Middle-ground impacts would also be reduced, as less of the landscape in the middle-ground would be occupied. Likewise, the increased setback of this alternative would eliminate the possibility of obstructing scenic views of the background mountains. Given the moderate level of existing scenic quality of the viewshed, although the level of overall viewer sensitivity of these viewpoints is considered to be moderately high, the moderate level of overall visual change and the greatly reduced level of nuisance glare of the Reduced Acreage Alternative could be considered acceptable, and less-than-significant.

The Avoidance of Donated and Acquired Lands Alternative avoids donated and acquired lands, altering the eastern boundary of the project area and reducing the number of solar dishes. However, with regard to visual setting and existing conditions, this alternative would be very similar to the proposed project. This is because the areas withdrawn by this alternative are remote from the highway and affect only a portion of the boundary with the Cady Mountains WSA. The solar arrays would occupy most of the same surface as in the proposed project. Accordingly, the visual impacts of Avoidance of Donated and Acquired Lands Alternative would not differ in a meaningful way from those described for the proposed project. The vast size of the site would be reduced, but not in a way that would be readily perceptible to most viewers, in particular those on the highways. Because there would be no readily perceptible reduction in visual impact, the CEQA level of significance would remain as described for the proposed project.

Under the three No Action/No Project Alternatives, the impacts to visual resources from the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM's California Desert Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

Waste Management

Staff concludes that management of the waste generated during construction and operation of the Calico Solar Project would not generate a significant impact under the CEQA. There is sufficient landfill capacity, and the project would be consistent with the applicable waste management LORS if the measures proposed in the Application for Certification and staff's proposed Conditions of Certification are implemented.

Alternatives. The Reduced Acreage Alternative would generate similar types of hazardous and non-hazardous wastes from construction, demolition and operation of the project. However, the quantities of waste would be reduced by 66%. The amount of non-hazardous and hazardous solid wastes generated under a Reduced Acreage Alternative that would require landfill/treatment would be approximately 3,000 and 74 cubic yards, respectively. Similar to the proposed project, wastes requiring off-site disposal would be significantly less than the remaining capacity of off-site disposal facilities. Similar to the proposed project, staff would not require investigation and remediation of soil and groundwater contamination. Disposal methods would remain the same as for the proposed project and the same Conditions of Certification would apply. Similar to the proposed project, staff considers project compliance with LORS and Conditions of Certification to be sufficient to ensure that no significant impacts would occur as a result of waste management associated with the Reduced Acreage Alternative.

The Avoidance of Donated and Acquired Lands Alternative would generate similar types of hazardous and non-hazardous wastes from construction, demolition and operation of the project. However, the quantities of waste would be reduced by 15%. The amount of non-hazardous and hazardous solid wastes generated under a 720-MW Alternative that would require landfill/treatment would be approximately 7,100 and 191 cubic yards, respectively. Similar to the proposed project, wastes requiring off-site disposal would be significantly less than the remaining capacity of off-site disposal facilities. Similar to the proposed project, staff would not require investigation and remediation of soil and groundwater contamination. Disposal methods would remain the same as for the proposed project and the same Conditions of Certification would apply. Similar to the proposed project, staff considers project compliance with LORS and staff's Conditions of Certification to be sufficient to ensure that no significant impacts would occur as a result of waste management associated with the Avoidance of Donated and Acquired Lands Alternative.

Under the three No Action/No Project Alternatives, the waste management impacts from the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM's California Desert Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

Worker Safety and Fire Protection

Staff concludes that the proposed project would have a significant impact under CEQA on local fire protection services which are currently provided by the San Bernardino County Fire Department (SBCFD). If the Applicant for the proposed Calico Solar Project provides project construction safety and health and project operations and maintenance safety and health programs, as required by the Conditions of Certification, the project would incorporate sufficient measures to both ensure adequate levels of industrial safety and comply with applicable LORS. The Conditions of Certification would reduce these risks to less than significant. They also ensure that these programs, proposed by the Applicant, would be reviewed by the appropriate agencies before they are implemented.

Alternatives. Since the proposed project impacts are found to be less than significant under CEQA with the incorporation of Conditions of Certification, the impacts of the Reduced Acreage Alternative would be smaller due to the smaller extent of construction disturbance and the fewer number of SunCatchers under this alternative. Like the proposed project, the construction and operation of the Reduced Acreage Alternative would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of worker safety and fire protection with adoption of the same proposed Conditions of Certification.

The types of construction and operational impacts of the Avoidance of Donated and Acquired Lands Alternative would be the same as those of the proposed project. The proposed project impacts are found to be less than significant under CEQA with the incorporation of Conditions of Certification, and impacts of this alternative would be smaller due to the smaller extent of construction disturbance and the smaller number of SunCatchers of the alternative. Like the proposed project, the construction and operation of the Avoidance of Donated and Acquired Lands Alternative would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of worker safety and fire protection with the adoption of the same proposed Conditions of Certification.

Under the three No Action/No Project Alternatives, the impacts pertaining to worker safety and fire protection from the proposed project would not occur. However, the land on which the project is proposed could become available to other uses, including another renewable energy project, if the proposal is consistent with BLM’s California Desert Conservation Area (CDCA) land use plan. This would occur under the No Action/No Project Alternative (2) which includes a CDCA Plan Amendment allowing for future renewable energy development on this project site.

NOTEWORTHY PUBLIC BENEFITS

Staff has identified the following public benefits.

1) Greenhouse gas (GHG) related noteworthy public benefits include the construction and operation of renewable and low-GHG emitting generation technologies and the potential for successful integration into the California and greater WECC electricity systems. Additionally, the Calico Solar Project would contribute to meeting the state’s Assembly Bill (AB) 32 goals.

2) The science of paleontology is advanced by the discovery, study and duration of new fossils. These fossils can be substantial if they represent a new species, verify a known species in a new location and/or if they include structures of similar specimens that had not previously been found preserved. In general, most fossil discoveries are the result of excavations, either purposeful in known or suspected fossil localities or as the result of excavations made during earthwork for civil improvements or mineral extraction. Proper monitoring of excavations at the proposed Calico Solar facility, in accordance with an approved Paleontological Monitoring and Mitigation Plan, could result in a benefit to the

science of paleontology and should minimize the potential to damage a substantial paleontological resource.

3) The proposed project would help in reducing greenhouse gas emissions from gas-fired generation. Both State and Federal law support the increased use of renewable energy and any resultant decreases in the use of riskier hazardous materials for power production at other facilities.

4) It is noteworthy that a solar electric generating facility such as the proposed Calico Solar Project would emit substantially less toxic air containment (TACs) to the environment than other energy sources available in California such as natural gas or biomass, thereby reducing the health risks that would otherwise occur with these non-renewable energy sources. At the same time, the proposed Calico Solar Project would provide much needed electrical power to California residences and businesses, and would contribute to electric reliability. Electrical power is not only necessary to maintain a functioning society, but it also benefits many individuals who rely on powered equipment for their health (such as dialysis equipment and temperature control equipment). For example, it is documented that during heat waves in which elevated air-conditioning use causes an electrical blackout, hospitalizations and deaths due to heat stroke are increased.

5) Noteworthy socioeconomic public benefits include the direct, indirect an induced impacts of a proposed power plant. Direct impacts include permanent jobs and wages. Indirect and induced economic impacts from construction and operations and maintenance would also result.

6) Staff believes that there would be some positive transmission system impacts from the proposed project because the Calico Solar Project would supplement local solar generation and import of power to the SCE system, helping to meet the increasing load demand in San Bernardino County.

INTRODUCTION

A – INTRODUCTION

Jim Stobaugh and Christopher Meyer

INTRODUCTION

The proposed action evaluated within this Staff Assessment (SA)/Draft Environmental Impact Statement (DEIS) is the construction and operation of the Calico Solar Project, a proposed solar thermal electricity generation facility located public lands managed by the Bureau of Land Management (BLM) in San Bernardino County, California. The SA/DEIS represents a joint environmental review document developed by the California Energy Commission (Energy Commission) and BLM to evaluate potential impacts associated with the proposed action.

When considering an energy project for licensing, the Energy Commission is the lead state agency for evaluating environmental impacts of a proposed licensing action under the California Environmental Quality Act (CEQA). The SA, the result of the Energy Commission staff's environmental evaluation process, is functionally equivalent to the preparation of an Environmental Impact Report (EIR).

Because the proposed project is located on public lands managed by the BLM, BLM is the lead federal agency for evaluating environmental impacts of the proposed right-of-way grant under the National Environmental Policy Act (NEPA). The DEIS is the BLM's environmental evaluation of the potential impacts that could result from the authorization of the requested right-of-way. The Department of Energy (DOE) and BLM signed an MOU to have the DOE as a cooperating agency on this project. The applicant has applied to the DOE for a loan guarantee under Title XVII of the Energy Policy Act of 2005 (EPAct 05), as amended by Section 406 of the American Recovery and Reinvestment Act of 2009, P.L. 111-5 (the "Recovery Act"). Should DOE decide to enter into negotiation of a possible loan guarantee with the Applicant, DOE would become a cooperating agency in developing the final EIS. The purpose and need for action by DOE is to comply with its mandate under EPAct by selecting eligible projects that meet the goals of the Act.

In August 2007, the Energy Commission and BLM California Desert District (CDD) entered into a Memorandum of Understanding (MOU) to jointly develop the environmental analysis documentation for solar thermal projects which are under the jurisdiction of both agencies. The purpose of the MOU is to avoid duplication of staff efforts, share staff expertise and information, promote intergovernmental coordination, and facilitate public review. This document represents the Energy Commission's SA, as well as the BLM's DEIS. Following a 90-day public comment period, the BLM and Energy Commission staff will issue a Supplemental SA (SSA)/Final EIS (FEIS).

This SA/DEIS is a staff document. It is neither a document of the California Energy Commission Siting Committee, a draft decision by the Siting Committee, nor a decision document approving the right-of-way grant by BLM. The SA/DEIS describes and evaluates the following:

- the proposed project;
- the existing environment;

- whether the facilities can be constructed and operated safely and reliably in accordance with applicable laws, ordinances, regulations, and standards (LORS);
- the environmental consequences of the proposed project including potential public health and safety impacts;
- the potential cumulative impacts of the proposed project in conjunction with other existing and known planned developments;
- mitigation measures proposed by the applicant, staff, interested agencies, local organizations, and interveners which may lessen or avoid potential impacts;
- the proposed conditions under which the project should be constructed and operated, if it is certified (known as “conditions of certification”); and
- alternatives to the proposed project.

The analyses contained in this SA/DEIS are based upon information from the: 1) Application for Certification (AFC), 2) responses to data requests, 3) supplementary information from local, state, and federal agencies; interested organizations; and individuals, 4) existing documents and publications, 5) independent research, and 6) comments at workshops. The SA/DEIS presents conclusions about potential environmental impacts and conformity with LORS, as well as proposed conditions of certification/mitigation measures that apply to the design, construction, operation, and closure of the facility. Each proposed condition of certification/mitigation measure is followed by a proposed means of verification that the condition has been met.

BACKGROUND

Calico Solar, LLC’s business model includes the development and deployment of the Stirling solar dish systems (referred to as SunCatchers) technology. It has formed the limited liability corporation Calico Solar (referred to as applicant or Calico Solar, LLC hereafter) for the purposes of filing ROW applications with the BLM for the use of public land and for filing an AFC with the Energy Commission. Calico Solar, LLC has executed Power Purchase Agreements and interconnection agreements with Southern California Edison (SCE) to deliver renewable energy to the California market.

The applicant has applied for a ROW grant from the BLM to construct the Calico Solar Project that will occupy 8,230 acres of public land managed by the BLM, use approximately 32 acre feet of water per year, produce a nominal 850 MW of electricity, and operate for a term of 40 years. Calico Solar, LLC has also filed an AFC with the Energy Commission. Under California law, the Energy Commission has regulatory authority for certifying applications for thermal power generating facilities in excess of 50 MW in size.

Additionally, the applicant has applied to the DOE for a loan guarantee pursuant to Title XVII of the Energy Policy Act of 2005 (EPAct). The application for a loan guarantee for the Calico Solar Project was filed with the DOE and is currently under review. The EPAct established a Federal loan guarantee program for eligible energy projects that employ innovative technologies. Title XVII of EPAct authorizes the Secretary of Energy to make loan guarantees for a variety of types of projects, including those that “avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and employ new or significantly improved technologies as compared to commercial technologies in service in the U.S. at the time the guarantee is issued.” The two principal goals of the loan guarantee program are to encourage commercial use in the U.S. of new or significantly improved energy-related technologies and to achieve substantial environmental benefits. DOE can comply with the requirements under EPAct by selecting eligible projects that meet the goals of the Act. DOE is using this NEPA process to assist in determining whether to issue a loan guarantee to Calico Solar, LLC to support the proposed project.

The proposed project could help meet the explicit policy goals of the State of California and the Federal goals of producing 10% of the nation’s electricity from renewable sources by 2012 and 25% by 2025. Authorities include:

- Executive order 13212, dated May 18, 2001, which mandates that agencies act expediently and in a manner consistent with applicable laws to increase the “production and transmission of energy in a safe and environmentally sound manner.”
- The EPAct, which requires the Department of the Interior (BLM’s parent agency) to approve at least 10,000 MW of renewable energy on public lands by 2015.
- Secretarial Order 3285, dated March 11, 2009, which "establishes the development of renewable energy as a priority for the Department of the Interior.”

A.1 AGENCY AUTHORITIES AND RESPONSIBILITIES

The Energy Commission has the exclusive authority to certify the construction, modification, and operation of thermal electric power plants 50 MW or larger. The Energy Commission certification is in lieu of any permit required by state, regional, or local agencies and by federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). The Energy Commission must review power plant AFCs to assess potential environmental impacts including potential impacts to public health and safety, and potential measures to mitigate those impacts (Pub. Resources Code, § 25519), and compliance with applicable governmental laws or standards (Pub. Resources Code, § 25523 (d)). The Energy Commission staff’s analyses were prepared in accordance with Public Resources Code, section 25500 et seq.; Title 20, California Code of Regulations, section 1701 et seq.; and CEQA (Pub. Resources Code, § 21000 et seq.).

The BLM’s authority for the proposed action includes Federal Land Policy and Management Act (FLPMA) of 1976 [43 United States Code (U.S.C.) 1701 et seq.], Section 211 of the EPAct (119 Stat. 594, 600), and BLM’s Solar Energy Development Policy of April 4, 2007. The FLPMA authorizes BLM to issue right-of-way (ROW) grants for renewable energy projects. Section 211 of the EPAct states that the Secretary of the Interior should seek to have approved a minimum of 10,000 MW of renewable energy generating capacity on public lands by 2015.

Title XVII of EPAct authorizes the Secretary of Energy to make loan guarantees for eligible projects, including those that “avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and employ new or significantly improved technologies as compared to commercial technologies in service in the U.S. at the time the guarantee is issued.” Calico Solar, LLC has applied to the DOE for a loan guarantee pursuant to

Title XVII of the EPAct. DOE is participating in the review of this NEPA document as a cooperating agency (40 CFR §1508.5) to ensure that analyses needed to support its decision-making on whether to provide a loan guarantee to Calico Solar, LLC are provided in the EIS.

A.2 PROJECT DESCRIPTION (CASE AND PROPERTY DESCRIPTION)

The proposed action is designated by BLM as ROW serial number CACA-049537 and CACA-049539.

The following sections or portions of sections in Townships 8 and 9 identify the project site and the planned boundary for development of the Calico Solar Project.

PHASE ONE

Within Township 8 North, Range 5 East:

- the portion of the northeast quarter section of Section 11 north of the railroad ROW, and
- the portion of Section 12 north of the railroad ROW.

Within Township 8 North, Range 6 East:

- the portion of Section 7 north of the railroad ROW,
- the portion of Section 8 west of the SCE Transmission ROW,
- the portion of Section 9 west of the SCE Transmission ROW
- the portion of Section 17 west of the SCE Transmission ROW and north and south of the railroad ROW,
- the portion of Section 18 north of the railroad ROW,
- the southwest and southeast quarter sections of Section 6, and
- the southwest quarter of Section 5,

Within Township 9 North, Range 6 East:

- the northeast quarter and the portion of the northeast quarter-quarter section of the northwest section of Section 32, and
- the northwest quarter and the portion of the northwest and southwest quarter-quarter section of the northeast section of Section 33.

PHASE TWO

Within Township 8 North, Range 5 East:

- eastern half of Section 2,

- the southwest, northeast, southeast quarter of Section 10,
- the portion of Section 14 north of the I-40 ROW,
- the portion of the northeast and northwest quarter sections and the northeast quarter-quarter sections of the southeast quarter section of Section 8 south of the railroad ROW and north of the I-40 ROW,
- the portion of Section 11 south of the railroad ROW,
- the portion of Section 12 south of the railroad ROW, and
- the portion of Section 15 north of the I-40 ROW.

Within Township 8 North, Range 6 East:

- the portion of Section 4 west of the SCE Transmission ROW,
- the northeast, northwest, southeast quarter sections of Section 5,
- the northwest and northeast quarter sections of Section 6,
- the portion of Section 7 south of the railroad ROW, and
- the portions of Section 18 west of the SCE Transmission ROW, south of the railroad ROW and north of the I-40 ROW.

Within Township 9 North, Range 5 East:

- the eastern half of Section 35.

Within Township 9 North, Range 6 East:

- all of Section 31,
- the southwest and southeast quarters and the portion of the southwest quarter-quarter sections of the northwest quarter of Section 32, and
- the southwest quarter and the portion of the northwest and southwest quarter-quarter sections of the southeast quarter of Section 33.

A.3 LAND USE PLAN CONFORMANCE AND AMENDMENT

The principal land use plan affecting this proposed project is the U.S. Bureau of Land Management's California Desert Conservation Area (CDCA) Plan of 1980, as amended. In the CDCA Plan, the location of the proposed Calico Solar facility includes land that is classified as Multiple-Use Class L (Limited Use). The Plan states that solar power facilities may be allowed within Limited Use areas after NEPA requirements are met. This DEIS acts as the mechanism for complying with those NEPA requirements.

Because solar power facilities are an allowable use of the land as it is classified in the CDCA Plan, the proposed action does not conflict with the Plan. However, Chapter 3, "Energy Production and Utility Corridors Element" of the Plan also requires that newly proposed power facilities that are not already identified in the Plan be considered through the Plan Amendment process. The proposed Calico Solar facility is not currently identified within the Plan, and therefore a Plan Amendment is required to include the facility as a recognized element within the Plan.

Planning Criteria (BLM)

The CDCA Plan planning criteria are the constraints and ground rules that guide and direct the development of the Plan Amendment. They ensure that the Plan Amendment is tailored to the identified issues and ensure that unnecessary data collection and analyses are avoided. They focus on the decisions to be made in the Plan Amendment, and will achieve the following:

"Sites associated with power generation of transmission not identified in the Plan will be considered through the Plan Amendment process."

Because the proposed facility is not currently identified within the CDCA Plan, an amendment to identify the proposed facility within the Plan is hereby proposed. As specified in Chapter 7, Plan Amendment Process, there are three categories of Plan Amendments, including:

- Category 1, for proposed changes that will not result in significant environmental impact or analysis through an EIS;
- Category 2, for proposed changes that would require a significant change in the location or extent of a multiple-use class designation; and
- Category 3, to accommodate a request for a specific use or activity that will require analysis beyond the Plan Amendment Decision.

Based on these criteria, approval of the proposed project would require a Category 3 amendment. This section summarizes the procedures necessary to evaluate the proposed Plan Amendment, as well as the procedures required to perform the environmental review of the ROW application.

Statement of Plan Amendment. The Implementation section of the Energy Production and Utility Corridors Element of the CDCA Plan lists a number of Category 3 amendments that have been approved since adoption of the Plan in 1980. An additional amendment is proposed to be added to this section of the Plan, and would read "Permission granted to construct solar energy facility (proposed Calico Solar Project)."

Plan Amendment Process. The Plan Amendment process is outlined in Chapter 7 of the Plan. In analyzing an applicant's request for amending or changing the Plan, the BLM District Manager, Desert District, will:

1. Determine if the request has been properly submitted and if any law or regulation prohibits granting the requested amendment.
2. Determine if alternative locations within the CDCA are available which would meet the applicant's needs without requiring a change in the Plan's classification, or an amendment to any Plan element.
3. Determine the environmental effects of granting and/or implementing the applicant's request.

4. Consider the economic and social impacts of granting and/or implementing the applicant's request.
5. Provide opportunities for and consideration of public comment on the proposed amendment, including input from the public and from federal, State, and local government agencies.
6. Evaluate the effect of the proposed amendment on BLM management's desert-wide obligation to achieve and maintain a balance between resource use and resource protection.

Decision Criteria for Evaluation of Proposed Plan Amendment. The Decision Criteria to be used for approval or disapproval of the proposed amendment require that the following determinations be made by the BLM Desert District Manager:

1. The proposed amendment is in accordance with applicable laws and regulations;
2. The proposed amendment will provide for the immediate and future management, use, development, and protection of the public lands within the CDCA.

The BLM Desert District Manager will base the rationale for these determinations on the principles of multiple uses, sustained yield, and maintenance of environmental quality as required in FLPMA.

Decision Criteria for Evaluation of Application. In addition to defining the required analyses and Decision Criteria for Plan Amendments, the Plan also defines the Decision Criteria to be used to evaluate future applications in the Energy Production and Utility Corridors Element of Chapter 3. These Decision Criteria include:

1. Minimize the number of separate rights-of-way by utilizing existing rights-of-way as a basis for planning corridors;
2. Encourage joint-use of corridors for transmission lines, canals, pipelines, and cables;
3. Provide alternative corridors to be considered during processing of applications;
4. Avoid sensitive resources wherever possible;
5. Conform to local plans whenever possible;
6. Consider wilderness values and be consistent with final wilderness recommendations;
7. Complete the delivery systems network;
8. Consider ongoing projects for which decisions have been made; and
9. Consider corridor networks which take into account power needs and alternative fuel resources.

Factors to be Considered. The Plan also states that, in the evaluation of proposed power plants, BLM will use the same factors affecting the public lands and their resources as those used by the Energy Commission. These factors are the environmental information requirements defined in the California Code of Regulations (CCR) Title 20, Appendix B, and include:

- General (Project Overview)
- Cultural Resources
- Land Use
- Noise
- Traffic and Transportation
- Visual Resources
- Socioeconomics
- Air Quality
- Public Health
- Hazardous Materials Handling
- Worker Safety
- Waste Management
- Biological Resources
- Water Resources
- Soils
- Paleontological Resources
- Geological Hazards and Resources
- Transmission System Safety and Nuisance
- Facility Design
- Transmission System Design
- Reliability
- Efficiency

The specific determinations required for the Plan Amendment evaluation are discussed in detail below. This DEIS acts as the mechanism for evaluating both the proposed project application, and the proposed Plan Amendment. The factors specified in CCR Title 20, Appendix B are included within the scope of the analysis presented in the DEIS.

<u>Results of CDCA Plan Amendment (BLM)</u>

Required Determinations

1. Determine if the request has been properly submitted and if any law or regulation prohibits granting the requested amendment.

    The applicant's request for a ROW was properly submitted, and this DEIS acts as the mechanism for evaluating and disclosing environmental impacts associated with that applications. No law or regulation prohibits granting the amendment.

2. Determine if alternative locations within the CDCA are available which would meet the applicant's needs without requiring a change in the Plan's classification, or an amendment to any Plan element.

    The CDCA Plan does not currently identify any sites as solar generating facilities. Therefore, there is no other location within the CDCA which could serve as an alternative location without requiring a Plan Amendment. The proposed project does not require a change in the Multiple-Use Class classification for any area within the CDCA.

3. Determine the environmental effects of granting and/or implementing the applicant's request.

    This DEIS acts as the mechanism for evaluating the environmental effects of granting the ROW and the Plan Amendment.

4. Consider the economic and social impacts of granting and/or implementing the applicant's request.

    This DEIS acts as the mechanism for evaluating the economic and social impacts of granting the ROW and the Plan Amendment.

5. Provide opportunities for and consideration of public comment on the proposed amendment, including input from the public and from federal, State, and local government agencies.

   A Notice of Intent (NOI) to amend the CDCA Plan was published in the Federal Register October 17, 2008, Vol. 73, No. 202 Fed. Reg.61902-61903. The U.S. Environmental Protection Agency provided comments during the 30-day NOI scoping period. In accordance with the NOI, issues identified during the scoping period are placed in the comment categories below.

6. Issues to be resolved in the plan amendment:

   Several comments were received with concerns over the loss of open space and recreational lands if the plan was amended to allow industrial use. This comment is being resolved through this Plan Amendment.

7. Issues to be resolved through policy or administrative action:

   All other comments received addressed specific environmental impacts and mitigation measures that each commenter requested be analyzed in the SA/DEIS. These comments are being resolved by being considered within this DEIS.

8. Issues beyond the scope of this plan amendment:

   No comments were received which were outside of the scope of this Plan Amendment.

9. Evaluate the effect of the proposed amendment on BLM management's desert-wide obligation to achieve and maintain a balance between resource use and resource protection.

   The balance between resource use and resource protection is evaluated within the DEIS. Title VI of the FLPMA, under CDCA, provides for the immediate and future protection and administration of the public lands in the California desert within the framework of a program of multiple use and sustained yield, and maintenance of environmental quality. Multiple use includes the use of renewable energy resources, and through Title V of FLPMA, the BLM is authorized to grant ROWs for generation and transmission of electric energy. The acceptability of use of public lands within the CDCA for this purpose is recognized through the Plan's approval of solar generating facilities within Multiple-Use Class L. The purpose of the DEIS is to identify resources which may be adversely impacted by approval of the proposed project, evaluate alternative actions which may accomplish the purpose and need with a lesser degree of resource impacts, and identify mitigation measures and Best Management Practices (BMPs) which, when implemented, would reduce the extent and magnitude of the impacts and provide a greater degree of resource protection.

Conformance of ROW Application with Decision Criteria (BLM)

1. Minimize the number of separate ROWs by utilizing existing ROWs as a basis for planning corridors:

    The proposed project assists in minimizing the number of separate ROWs by being proposed largely within existing Corridor N. Electrical transmission associated with the proposed project will occur within these existing corridors, and placement of the facility adjacent to these corridors minimizes the length of new corridors necessary for transmission of natural gas to the site.

2. Encourage joint-use of corridors for transmission lines, canals, pipelines, and cables:

    Placement of the proposed project within existing Corridor N maximizes the joint-use of this corridor for natural gas and electrical transmission.

3. Provide alternative corridors to be considered during processing of applications:

    This decision criterion is not applicable to the proposed project. Placement of the proposed facility adjacent to existing corridors does not require designation of alternative corridors to support the proposed project.

4. Avoid sensitive resources wherever possible:

    The extent to which the proposed project has been located and designed to avoid sensitive resources is addressed throughout the DEIS. BLM and other Federal regulations that restrict the placement of proposed facilities, such as the presence of designated Wilderness Areas or Desert Wildlife Management Areas were considerations in the original siting process used by the applicant to identify potential project locations. The project location and configurations of the boundaries were modified in consideration of mineral resources. The alternatives analysis considered whether the purpose and need of the proposed project could be achieved in another location, but with a lesser effect on sensitive resources.

5. Conform to local plans whenever possible:

    The extent to which the proposed project conforms to local plans is addressed within the Land Use section of the DEIS. The proposed project is in conformance with the Imperial County General Plan.

6. Consider wilderness values and be consistent with final wilderness recommendations:

    The proposed project is not located within a designated Wilderness Area or Wilderness Study Area.

7. Complete the delivery systems network:

    This decision criterion is not applicable to the proposed project.

8. Consider ongoing projects for which decisions have been made:

This decision criterion is not applicable to the proposed project. Approval of the proposed project would not affect any other projects for which decisions have been made.

9. Consider corridor networks which take into account power needs and alternative fuel resources:

    This decision criterion is not applicable to the proposed project. The proposed project does not involve the consideration of an addition to or modification of the corridor network. However, it does utilize facilities located within Corridor N, which were designed with consideration of both power needs and locations of alternative fuel resources.

A.4 PROJECT OBJECTIVES (CEQA)

APPLICANT OBJECTIVES

The applicant's project objectives are set forth below. The fundamental objective is to build a solar project that generates 850 MW of renewable solar energy that will help the State meet its Renewable Portfolio Standard (RPS) goals for new renewable electric generation. To assist in meeting the requirement for additional generating capacity, the applicant has developed solar technology which requires commercial-scale development to demonstrate its technical and commercial viability, and has entered into power purchase agreements to provide power from renewable sources into the California Independent System Operator (CAISO) system.

- Provide up to 850 MW of renewable electric capacity under a PPA to SCE,
- Contribute to the 20% renewables RPS target set by California's governor and legislature,
- Assist in reducing greenhouse gas emissions from the electricity sector,
- contribute to California's future electric power needs, and
- Assist the CAISO in meeting its strategic goals for the integration of renewable resources, as listed in its Five-Year Strategic Plan for 2008-2012 (CAISO 2007).

CEQA OBJECTIVES

State Objectives

Senate Bill 1078, passed on 2002, established the California RPS, which requires utilities to increase their sale of electricity produced by renewable energy sources, including solar facilities, by a minimum of 1% per year with a goal of 20% of their total sales by 2017. However, the California Public Utilities Commission (CPUC), Energy Commission, and the California Power Authority adopted the Energy Action Plan (EAP), which pledged that the agencies would meet an accelerated goal of 20% by the year 2010. As a result, the California Senate passed Senate Bill 107 to be consistent with the EAP, and accelerated the implementation of RPS, requiring utilities to meet the goal of 20% renewable energy generation by 2010. In November 2008, California's Governor instituted Executive Order S-14-08 which establishes an updated RPS goal that all retail sellers of electricity shall serve 33% of their load with renewable energy by 2020. The project would allow California utilities to increase the percentage of renewable resources in their energy portfolio, and aid the utilities in reaching the goals set forth by the RPS.

CEQA guidelines require a clearly written statement of objectives to guide the lead agency in developing a reasonable range of alternatives and aid decision-makers in preparing findings or a statement of overriding considerations. CEQA specifies that the statement of objectives should include the underlying purpose of the project (Section

15126.6(a)).These objectives reflect the applicant's objectives and the BLM's stated purpose and need of the project and will be considered in the comparison of alternatives, as required under both NEPA and CEQA. The Energy Commission developed the following objectives for the project:

1. to safely and economically construct and operate an up to 750 MW, renewable power generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities;
2. to locate the facility in areas of high solarity with ground slope of less than 5%;
3. to complete the impact analysis of the project so that if approved, construction could be authorized in 2010 and beyond.

A.5 PURPOSE AND NEED (NEPA)

BLM PURPOSE AND NEED

NEPA guidance published by the Council on Environmental Quality (CEQ) states that environmental impact statements' Purpose and Need section "shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action" (40 CFR §1502.13). The following discussion sets forth the purpose of, and need for, the project as required under NEPA.

The BLM's purpose and need for the Calico Solar Project is to respond to Calico Solar, LLC's application under Title V of FLPMA (43 U.S.C. 1761) for a ROW grant to construct, operate, and decommission a solar thermal facility on public lands in compliance with FLPMA, BLM ROW regulations, and other Federal applicable laws. The BLM will decide whether to approve, approve with modification, or deny issuance of a ROW grant to Calico Solar, LLC for the proposed Calico Solar Project. The BLM's actions will also include consideration of amending the CDCA Plan concurrently. The CDCA Plan (1980, as amended), while recognizing the potential compatibility of solar generation facilities on public lands, requires that all sites associated with power generation or transmission not identified in that plan be considered through the plan amendment process. If the BLM decides to approve the issuance of a ROW grant, the BLM will also amend the CDCA Plan as required.

In conjunction with FLPMA, BLM authorities include:

- Executive order 13212, dated May 18, 2001, which mandates that agencies act expediently and in a manner consistent with applicable laws to increase the "production and transmission of energy in a safe and environmentally sound manner."

- The EPAct, which requires the Department of the Interior (BLM's parent agency) to approve at least 10,000 MW of renewable energy on public lands by 2015.
- Secretarial Order 3285, dated March 11, 2009, which "establishes the development of renewable energy as a priority for the Department of the Interior."

DOE PURPOSE AND NEED

The EPAct of 2005 established a Federal loan guarantee program for eligible energy projects that employ innovative technologies. Title XVII of the EPAct authorizes the Secretary of Energy to make loan guarantees for a variety of types of projects, including those that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and employ new or significantly improved technologies as compared to commercial technologies in service in the U.S. at the time the guarantee is issued."

The two purposes of the loan guarantee program are to encourage commercial use in the U.S. of new or significantly improved energy-related technologies and to achieve substantial environmental benefits. The purpose and need for action by DOE is to comply with its mandate under EPAct by selecting eligible projects that meet the goals of the Act.

USACE PURPOSE AND NEED

The USACE uses two purpose and need statements to identify and analyze a reasonable range of alternatives under Section 404(b)(1). These include the basic project purpose and the overall project purpose.

The basic project purpose is used to determine whether a proposed project is water dependent (i.e., whether it requires a location that affects waters of the U.S.). The basic project purpose comprises the fundamental, essential, or irreducible purpose of the Preferred Action Alternative, and is used by the USACE to determine whether the applicant's project is water dependent.

The *basic project purpose* for the Preferred Plan Alternative is: "***Energy Production**."*

The basic project purpose is not water dependent but will affect waters of the U.S. in the form of ephemeral streams and therefore, the applicant has the burden of rebutting the presumption that there is a less damaging alternative for the proposed activity that would not affect waters of the U.S. {§40 CFR 230.10(a)(3.)}.

The *overall project purpose* is the basic project purpose with consideration of costs and technical and logistical feasibility.

The overall project purpose is ***"To provide a renewable energy facility in Southern California.***"

A.6 PROJECT EVALUATION AND DECISION PROCESS

Energy Commission Process

The Energy Commission's siting regulations require staff to independently review the AFC and assess whether the list of environmental impacts contained is complete and whether additional or more effective mitigation measures are necessary, feasible, and available (Cal. Code Regs., tit. 20, §§ 1742 and 1742.5(a)).

In addition, staff must assess the completeness and adequacy of the measures proposed by the applicant to ensure compliance with health and safety standards and the reliability of power plant operations (Cal. Code Regs., tit. 20, § 1743(b)). Staff is required to develop a compliance plan (coordinated with other agencies) to ensure that applicable laws, ordinances, regulations, and standards are met (Cal. Code Regs., tit. 20, § 1744(b)).

Staff conducts its environmental analysis in accordance with the requirements of the CEQA. No additional EIR is required because the Energy Commission's site certification program has been certified by the California Resources Agency as meeting all requirements of a certified regulatory program (Pub. Resources Code, § 21080.5 and Cal. Code Regs., tit. 14, § 15251 (j)).

Staff's impact assessment, including the recommended conditions of certification, is only one piece of evidence that the Siting Committee will consider in reaching a decision on the proposed project and making its recommendation to the full Energy Commission. At the public hearings, all parties will be afforded an opportunity to present evidence and to rebut the testimony of other parties, thereby creating a hearing record on which a decision on the project can be based. The hearing before the Siting Committee also allows all parties to argue their positions on disputed matters, if any, and it provides a forum for the Committee to receive comments from the public and other governmental agencies.

Following the hearings, the Siting Committee's recommendation to the full Energy Commission on whether or not to approve the proposed project will be contained in a document entitled the Presiding Members' Proposed Decision (PMPD). Following its publication, the PMPD is circulated in order to receive written public comments. At the conclusion of the comment period, the Siting Committee may prepare a revised PMPD. At the close of the comment period for the revised PMPD, the PMPD is submitted to the full Energy Commission for a decision.

BLM Process

The DEIS is available for a 90-day public comment period. Following completion of that period, BLM will review and develop responses to comments provided by the public and other agencies. The responses to the comments, and other information identified during this period, will be incorporated into a FEIS, which will make a recommendation regarding the preferred alternative. A Notice of Availability (NOA) of the FEIS will be published when the FEIS becomes available for public review. The FEIS will be available for public review for a minimum of 30-days before the BLM issues a Record of Decision (ROD). The decision regarding the ROW grant is in full force and effect; however, it is appealable to the Interior Board of Land Appeals upon issuance of the ROD. The FEIS will also contain a proposed decision to amend the BLM Plan. Proposed plan amendment decisions may be protested within 30-days of the proposed decision. BLM cannot make a final decision regarding issuance of a ROW grant or amending the Plan until any Plan protest is resolved.

Under the NEPA process, the significance of the impacts is developed based on the definition of “significantly” provided in NEPA regulations Section 1508.27. This evaluation includes both the context of the action with respect to the affected resources, as well as the intensity of the effect on those resources. The following are considered in evaluating the intensity:

- Whether the impact is beneficial or adverse;
- The degree to which the proposed action affects public health or safety;
- Unique characteristics of the geographic area, including parks, farmlands, wetlands, wild and scenic rivers, or ecologically critical areas;
- The degree to which the effects are likely to be highly controversial;
- The degree to which the effects are highly uncertain or involve unique or unknown risks;
- The degree to which the action may establish a precedent for future actions;
- Whether the action may be individually insignificant, but cumulatively significant when combined with other actions;
- The degree to which the action may adversely affect significant scientific, cultural, or historical resources;
- The degree to which the action may adversely affect an endangered or threatened species or its habitat; and
- Whether the action threatens a violation of federal, State, or local law or requirements imposed for the protection of the environment.

As outlined in NEPA regulations Section 1502.16, the analysis also includes a discussion of both direct and indirect effects and their significance, adverse environmental effects which cannot be avoided, whether impacts are short-term or long-term, and any irreversible or irretrievable commitments of resources.

The decisions to be made by the agencies (licensing by the Energy Commission, and ROW grant by BLM) are independent of each other.

DOE Process

When the FEIS is completed and made available to the public by BLM, DOE will carry out an independent review to ensure that DOE comments have been addressed and that the proposed action is substantially the same as the action described in the EIS. If these conditions are met, DOE will adopt the FEIS without having to recirculate it pursuant to CEQ NEPA regulations at 40 CFR 1506.3(c).

While the FEIS is being developed, DOE will also be carrying out a detailed technical and legal evaluation of the proposed project pursuant to its procedures for loan guarantees set out at 10 CFR Part 609. DOE may reach agreement on a conditional commitment for a loan guarantee prior to completion of the FEIS and the BLM ROW grant; however, in this case a condition precedent will be included in the conditional commitment requiring that the NEPA review and the BLM ROW grant process be completed before DOE closes the loan guarantee transaction.

Following conclusion of the NEPA process and the BLM decision on issuance of the ROW grant, DOE will issue a Record of Decision (ROD) and proceed to close the loan guarantee transaction provided that the applicant has satisfied all the detailed terms and conditions contained in the conditional commitment and other related documents, and all other contractual, statutory, and regulatory requirements.

A.7 AGENCY AND PUBLIC COORDINATION

As noted previously, the Energy Commission certification is in lieu of any permit required by state, regional, or local agencies and by federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). However, both the Energy Commission and BLM typically seek comments from and work closely with other regulatory agencies that administer LORS that may be applicable to the proposed project. The following paragraphs describe the agency coordination that has occurred through this joint SA/EIS process.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) has jurisdiction to protect threatened and endangered species under the Endangered Species Act (ESA). Formal consultation with the USFWS under Section 7 of the ESA is required for any federal action that may adversely affect a federally-listed species. The desert tortoise, federally listed as threatened, occurs on the project site, and formal consultation has been initiated by the BLM through the preparation and submittal of a Biological Assessment (BA) which describes the proposed project to the USFWS. Following review of the BA, the USFWS is expected to issue a Biological Opinion (BO) for the desert tortoise, which will specify mitigation measures which must be implemented for the protection of the species.

The USFWS is the primary federal authority charged with the management of migratory birds in the United States, including golden eagles. A permit for take of golden eagles, including take from disturbance such as loss of foraging habitat, may be required for this project. USFWS guidance on the applicability of current Eagle Act statutes and mitigation is currently under review. On November 10, 2009 the U.S. Fish and Wildlife Service (USFWS) implemented new rules (74 FR 46835) governing the “take” of golden and bald eagles. The new rules were released under the existing Bald and Golden Eagle Act which has been the primary regulation protection unlisted eagle populations since 1940. All activities that may disturb or incidentally take an eagle or its nest as a result of an otherwise legal activity must be permitted by the USFWS under this act. Staff is awaiting guidance from USFWS on this subject as to whether an Eagle Act permit would be required for this and other renewable energy projects. If a permit is required, due to the current uncertainty on the status of golden eagle populations in western United States, it is expected permits would only be issued for safety emergencies or if conservation measures implemented in accordance with a permit would result in a reduction of ongoing take or a net take of zero (USFWS, 2009a).

State Water Resources Control Board/Regional Water Quality Control Board

The Lahontan Regional Water Quality Control Board (RWQCB) has the authority to protect both surface water and groundwater resources at the proposed project location. Throughout the SA/DEIS process, the Energy Commission, BLM, and the applicant have invited the RWQCB to participate in public scoping and workshops, and have provided information to assist the agency in evaluating the potential impacts and permitting requirements of the proposed project. Staff has specified conditions to satisfy anticipated requirements of dredge and fill permit/waste discharge requirements. Staff will work with the RWQCB during the comment period to address any necessary changes to the requirements. These requirements will be included as a recommended Condition of Certification/Mitigation Measure.

California Department of Fish and Game

The California Department of Fish and Game (CDFG) have the authority to protect water resources of the state through regulation of modifications to streambeds, under Section 1602 of the Fish and Game Code. The Energy Commission, BLM, and the applicant have provided information to CDFG to assist in their determination of the impacts to streambeds, and identification of permit and mitigation requirements. The applicant has submitted a preliminary draft jurisdictional delineation identifying the State jurisdictional waters on the project site. Staff concurs with the delineation, and it is expected that the applicant will submit a formal application to the CDFG that contains Best Management Practices designed to minimize the potential effects to State waters. Staff has proposed a Condition of Certification/Mitigation Measure that contains recommendations and guidance consistent with CDFG Streambed Alteration Agreement requirements. This condition fulfills requirements of CDFG's Lake and Streambed Alteration Agreement program pursuant to Fish and Game Code Section 1600 et seq.

The CDFG also has jurisdiction to protect species listed as threatened or endangered under the California Endangered Species Act of 1984 (CESA). An Incidental Take Permit is required for any action that may adversely impact a State-listed species. The only State-listed species that occurs onsite is the desert tortoise, listed as threatened under the CESA. The Energy Commission, BLM, and the applicant have consulted with CDFG regarding impacts and appropriate mitigation for the desert tortoise, and staff has proposed Conditions of Certification/Mitigation Measures that contain recommendations and guidance consistent with a CDFG Incidental Take Permit.

Tribal Relationships

The BLM has notified affected Indian Tribes regarding the proposed project, has sought their comments, and has invited them to consult on the project on a government-to-government basis. The affected Indian Tribes are currently working with the BLM, Energy Commission, and the State Historic Preservation Officer's office on the development of the Programmatic Agreement.

Public Coordination

Both the Energy Commission's CEQA-equivalent process and the BLM's NEPA process provide opportunities for public participation in the scoping of the environmental analysis, and in the evaluation of the technical analyses and conclusions of that analysis. For the Energy Commission, this outreach program is primarily facilitated by the Public Adviser's Office (PAO). As part of the coordination of the environmental review process required under the Energy Commission/BLM California Desert District MOU, the agencies have jointly held public meetings and workshops which accomplish the public coordination objectives of both agencies. This is an ongoing process that to date has involved the following efforts:

Libraries

The AFC was sent to the county libraries in Barstow, Vacaville, Needles, Fresno, and Eureka; the main branches of the San Diego and San Francisco public libraries; the University Research Library at UCLA; the California State Library; and the Energy Commission's library in Sacramento.

Outreach Efforts

The PAO's public outreach is an integral part of the Energy Commission's AFC review process. The PAO reviewed information provided by the applicant and also conducted its own outreach efforts to identify and locate local elected and certain appointed officials, as well as "sensitive receptors" (including schools, community, cultural and health facilities, and daycare and senior-care centers, as well as environmental and ethnic organizations). There were not any sensitive receptors identified within a 6-mile radius of the proposed site for the project.

Notices for workshops and hearings have been and will continue to be distributed to those agencies, individuals, and businesses that are currently on or request to be placed on the project's mailing list. Notices were distributed for the Informational Hearing and Site Visit, which was conducted on June 22, 2009, in Barstow, California.

Coincident with the PAO's outreach efforts, BLM solicited interested members of the public and agencies through the NEPA scoping process. BLM published a NOI to develop the EIS and amend the CDCA Plan in the Federal Register, Vol. 74, No. 108 Fed. Reg. 27176-27177, dated June 8, 2009. The Energy Commission's June 22, 2009 Informational Hearing also acted as the Public Scoping meetings for the EIS, as required by NEPA.

Throughout the process, the Energy Commission and BLM have held additional joint Issue Resolution, alternatives identification, and data response workshops which were announced and made available to the public. These workshops were held on September 16, 2009 in Barstow, California, and on December 22, 2009 in Sacramento, California. The Energy Commission has also continued to accept and consider public comments, and has issued orders granting petitions to intervene to the California Unions for Reliable Energy.

Those agencies and individuals that have provided comments concerning the project have been considered in staff's analysis. This SA/DEIS provides agencies and the public with an opportunity to review the Energy Commission staff's analysis of the proposed project. Comments received on this SA/DEIS will be taken into consideration in preparing the subsequent project documents, including the Supplemental SA/FEIS.

Energy Commission regulations require staff to notice, at a minimum, property owners within 1,000 feet of a project and 500 feet of a linear facility under its jurisdiction. This was done for the Calico Solar Project. Staff's ongoing public and agency coordination activities for this project are discussed under the Public and Agency Coordination heading in the **EXECUTIVE SUMMARY**.

The AFC, this SA/DEIS, and other project documents are located on the Energy Commission's website at http://www.energy.ca.gov/sitingcases/calicosolar/index.html.

Summary of Public and Agency Comments

The BLM and Energy Commission processes include soliciting comments regarding the scope of the analysis from other government agencies, the public and non-governmental organizations. The persons and organizations which provided scoping comments, and the general issues addressed within their comments, are provided in **Introduction Table 1** below.

Introduction Table 1
Summary of Written Comments Received by the Energy Commission

Name and Agency of Commenter (and Date of Comment)	Comment Number	Summary of Comments by Environmental Parameter or Topic	Where the Comments will be Addressed in the Environmental Document
Comment Letters From Public Agencies			
United States Environmental Protection Agency (EPA) (letter dated 7/7/2009)	EPA-1	EPA supports the use of renewable energy resources.	See Note 1
	EPA-2	Purpose and Need: Provide a clear and objective statement of the project's purpose and need.	Purpose and Need
	EPA-3	Alternatives: Provide a robust range of alternatives; explain why some alternatives were eliminated; look at alternative sites, capacities, technologies.	Alternatives
	EPA-4	Water Resources: Estimate the quantity of water required, the source, and the potential effects on other water users and natural resources in the area of influence.	Hydrology, Water Use, and Water Quality
	EPA-5	Groundwater: Direct, indirect, and cumulative effects on groundwater.	Hydrology, Water Use, and Water Quality
	EPA-6	Water Quality: Potential effects of project discharges on surface water quality	Hydrology, Water Use, and Water Quality
	EPA-7	Water Quality: Potential need for a Section 404 permit.	Hydrology, Water Use, and Water Quality
	EPA-8	Water Quality: Discuss any Section 303(d) impaired waters in the project area.	Hydrology, Water Use, and Water Quality
	EPA-9	Biological Resources: Address threatened and endangered species in detail, including baseline conditions; how avoidance, minimization, and mitigation measures will protect species, and long-term management and monitoring efforts	Biological Resources and Areas of Critical Environmental Concern
	EPA-10	Invasive species: Address potential for project to introduce invasive species; how they will be controlled; development of an invasive species management plan; and restoration, as appropriate, of native species.	Biological Resources
	EPA-11	Indirect and Cumulative Impacts: Identify the resources that may be cumulatively impacted and the geographic area that will be impacted by the project; look at past impacts on resources; identify opportunities to avoid and minimize cumulative impacts.	Cumulative Impacts (in sections by environmental parameter)
	EPA-12	Climate change: Quantify and disclose the anticipated climate change benefits of solar energy; climate change's potential influence.	Air Quality
	EPA-13	Air Quality: Detailed discussion of ambient air quality; quantify project emissions; specify emission sources by pollutant (mobile, stationary, ground disturbance); identify the need for an Equipment Emissions Mitigation Plan (EEMP) and Fugitive Dust Control Plan.	Air Quality

Name and Agency of Commenter (and Date of Comment)	Comment Number	Summary of Comments by Environmental Parameter or Topic	Where the Comments will be Addressed in the Environmental Document
	EPA-14	Consultation with Tribal Governments: Describe process and outcome of government-to-government consultation; address the existence of Indian sacred sites in the project area; provide a summary of all coordination with Tribes and SHPO/THPO including identification of NRHP eligible sites and development of Cultural Resources Management Plan	Cultural Resources and Native American Values
	EPA-15	Environmental Justice: Identify environmental justice populations in the project area and potential impacts of the project on those populations; identify whether the impacts are disproportionate on those populations; discuss any coordination with environmental justice populations.	Socioeconomics and Environmental Justice
	EPA-16	Recreation: Address effects of the project on recreational users in the project area, including potential hazards to those users associated with the project facilities; identify appropriate safety precautions	Land Use
	EPA-17	Hazardous Materials and Wastes: Address potential indirect, direct, and cumulative impacts of hazardous wastes generated during project construction and operation; identify types and volumes of wastes; identify handling, storage, disposal, and management plans; alternative industrial processes using less toxic materials should be considered.	Hazardous Materials Management
	EPA-18	Land Use: Identify how the proposed action would support or conflict with objectives of federal, state, tribal, or local land use plans, policies, and controls in the project area.	Land Use
Comment Letters from Groups and Organizations			
Michael J. Conner, Ph.D., California Director, Western Watersheds Project (Undated letter)	WWP-1	Alternatives: Present environmental impacts of proposed action and alternatives in comparative form; consider “No Action Alternative” and “Alternative Site” alternatives	Alternatives
	WWP-2	Desert Tortoise: Describe, clearly characterize, and identify the impacted desert tortoise populations; ensure genetic connectivity among Desert Tortoise populations; fully document genetic background and provide a firm estimate of population size; frank estimates of expected losses; and provide a review of direct, indirect, and cumulative impacts on the West Mojave Recovery Unit.	Biological Resources
	WWP-3	Desert bighorn sheep: Review all direct, indirect, and cumulative impacts to bighorn sheep including linkage to habitat and connectivity issues.	Biological Resources
	WWP-4	Other Sensitive Animals and Plants: Fully analyze impacts to other sensitive species (i.e. Mojave fringe-toed lizard) and ensure compliance with West Mojave Plan’s conservation strategy and other applicable governing plans.	Biological Resources
	WWP-5	Wilderness Values: Provide a review of the direct, indirect, and cumulative impacts on the Cady Mountain Wilderness Study Area (WSA).	Cumulative Impacts

Name and Agency of Commenter (and Date of Comment)	Comment Number	Summary of Comments by Environmental Parameter or Topic	Where the Comments will be Addressed in the Environmental Document
	WWP-6	Climate Change: Use the recently released USGS desert tortoise habitat model to determine likely changes in desert tortoise habitat quality in the area and the importance of connectivity between populations.	Biological Resources
	WWP-7	Monitoring: Explain monitoring programs to monitor short and long term impacts of the project area.	
Defenders of Wildlife (letter dated 7/11/2009)	DW-1	Biological Resources: Concerned that the proposed project will reduce populations of certain wildlife, particularly Desert tortoise, bighorn sheep, and birds of prey.	Biological Resources
	DW-2	Does not believe the project area is in a degrading condition due to mining, livestock grazing, and off-road vehicle use as suggested.	
	DW-3	CEC and BLM should study and disclose the magnitude of development on wildlife movement, specifically the Desert tortoise and Desert bighorn sheep.	Biological Resources
	DW-4	Catalogue and discuss sensitive species populations and habitats present in the area and those cumulatively affected by this project and others in the area; articulate and implement a monitoring plan for sensitive species.	Biological Resources
	DW-5	Alternatives: Consideration of alternatives that include different sites or a reduction of project size.	Alternatives
	DW-6	Cumulative Impacts: Examine and disclose environmental effects of projects and human activities in the area	Cumulative Impacts (in sections by environmental parameter)
	DW-7	Interagency consultation for endangered and threatened species, specifically the Desert tortoise.	Biological Resources
Meg Grossglass, Off-Road Business Association (ORBA) and EcoLogic Partners, Inc. (undated letter)	ORBA-1	Recreation: Potential indirect, direct, and cumulative impacts to recreational uses in the area.	Land Use
	ORBA-2	Inclusion of a “Reclamation Plan”.	
	ORBA-3	Water Quality: Impact on available water supplies.	Hydrology, Water Use, and Water Quality
	ORBA-4	Visual Impacts: Evaluate the project’s aesthetic and visual impacts on the region.	Visual Resources
	ORBA-5	Biological Resources: Evaluate the project’s direct, indirect, and cumulative impact on endangered and threatened species.	Biological Resources
	ORBA-6	Land Use: Evaluate project’s consistency with existing land use and regulatory plans.	Land Use
	ORBA-7	Environmental Justice: Evaluate whether the project’s environmental burdens are disproportionately placed on individuals and/or groups who, due to their socioeconomic status, have insufficient resources to challenge the project.	Socioeconomics and Environmental Justice
	ORBA-8	Cultural Resources: Evaluate potential impacts on archaeological, cultural, and historic resources.	Cultural Resources

Name and Agency of Commenter (and Date of Comment)	Comment Number	Summary of Comments by Environmental Parameter or Topic	Where the Comments will be Addressed in the Environmental Document
	ORBA-9	Alternatives: Evaluate and analyze feasible alternatives to the proposed project; public access to the Cady Mountains will be lost if approved as proposed; suggests four alternatives that would minimize the impact to public access of the area.	Alternatives
George C. Kerr, Wildlife & Habitat Coordinator, Society for the Conservation of Bighorn Sheep (letter dated 6/22/2009)	SCBS-1	Biological Resources: Concerned about the loss of habitat for bighorn sheep and the fragmentation of metapopulations; must maintain access through and/or around the area for wildlife management.	Biological Resources
	SCBS-2	Full and complete reclamation.	Project Description
The Wilderness Society and The National Resources Defense Council (letter dated 7/7/2009)	WS-1	Biological Resources: Prioritize protection of species in the project area by further analyzing potential impacts and developing Best Management Practices and steps to minimize and mitigate any unavoidable impacts.	Biological Resources
	WS-2	Cultural Resources: BLM should prioritize protection of area's outstanding cultural resources, including study of the area's resources, development of strategies to minimize and mitigate impacts, and ongoing engagement in consultation with local Native American tribes.	Cultural Resources
	WS-3	Soil Resources: Dedicate adequate time and resources early in the process to addressing soil resources issues adequately, including through the preparation of a detailed drainage, erosion and sediment control plan that addresses these potential impacts and provides mitigation measures that will render these hazards to a level less than significant.	Hydrology
	WS-4	Water Resources: Gather additional information to confirm that the water needed for the project will be available as well as that the source of the needed water will conform to existing California Energy Commission policy and all laws, ordinances, regulations, and standards.	Hydrology, Water Use, and Water Quality
	WS-5	Visual Resources: BLM and CEC should continue to collaborate on a visual analysis conforming to BLM regulations to address concerns identified in the IIR.	Visual Resources
	WS-6	Alternatives: Consider a project boundary alternative that avoids the Catellus parcels.	Alternatives
	WS-7	Land Use: Plan Amendment must fully analyze the impacts of this scale of industrial development on public lands of a largely undisturbed nature.	Land Use
	WS-8	Phased Development: BLM should consider granting a ROW only for the area necessary to support development for TE1 upgrades at this time. When TE2 upgrades have been approved, then BLM can consider granting ROW for the area necessary for the remaining 575 MW; because of technological challenges, BLM should consider establishing requirements for demonstration of technological/economic viability of the project within the first 3–5 years before extending the term of the ROW.	Project Description

Name and Agency of Commenter (and Date of Comment)	Comment Number	Summary of Comments by Environmental Parameter or Topic	Where the Comments will be Addressed in the Environmental Document
	WS-9	Should comprehensively analyze the project's net reductions to GhG emissions, including GhG emissions during manufacture, construction, operation, decommissioning, and reclamation of the area. Analysis should consider both the potential for the project to reduce GhG emissions as well as potential for the project to increase these emissions. The results should then be compared to the same type of analysis for fossil-fuel based energy production, including combined-cycle natural gas fired and coal fired power plants.	Project Description
	WS-10	Agencies should do a thorough analysis of the anticipated costs of decommissioning and restoring the area. The agencies should also require bonds be purchased before development.	Project Description
	WS-11	Agencies must thoroughly consider and present the public with a true range of alternatives. Agencies should also compare the project and its impacts with all other identified "fast-track" projects on BLM land in order to identify the least environmentally harmful projects among the applicants that have been selected for expedited permitting.	Alternatives
April Sall, Conservation Director, The Wildlands Conservancy (letter dated 7/7/2009)	TWC-1	The Wildlands Conservancy supports the use of renewable energy resources.	See Note 1
	TWC-2	Phase 1 of the project lies on the boundary of the Pisgah Area of Environmental Concern (ACEC), Cady Mountains WSA, and proposed Mojave National Monument boundary (which includes the Catellus lands). This is of high concern because of the cumulative impacts the site would have on this highly environmentally sensitive area.	Cumulative Impacts
	TWC-3	Development of Phase 2 of the project should begin before Phase 1 because Phase 2 is closer to the Pisgah substation, closer to several existing transmission ROWs, closer to I-40, and provides better acreage to megawatt production ratio	Project Description
	TWC-4	If Phase 1 must proceed first, shift the site to the west so as to eliminate encroachment onto BLM-managed Catellus sections, the proposed national monument, Cady Mountains WSA, several Desert Wildlife Management Areas, and sensitive plant species.	Project Description
	TWC-5	The mock-up of the site during the site tour does not match that in the document.	Project Description
	TWC-6	Because of the nature of the soil in the area, more impactful drilling methods will be required.	Project Description
	TWC-7	Carbon emissions will increase with the loss of critical cryptobiotic soil crusts and caliche layers which help stabilize the ground and sequester carbon; contributing to climate change, lessening the benefits of renewable energy generated.	Project Description
	TWC-8	Habitat and microhabitat impact assessments are necessary before any further developments.	Biological Resources

Name and Agency of Commenter (and Date of Comment)	Comment Number	Summary of Comments by Environmental Parameter or Topic	Where the Comments will be Addressed in the Environmental Document
	TWC-9	Phase 1 will block access to historical trails and open routes on public land in this area.	Land Use
	TWC-10	Water Resources: Utilize technology that is “dry-cooled” instead of “wet-cooled”; how much water will be used during each phase of the project; how will wastewater be managed;	Hydrology, Water Use, and Water Quality
	TWC-11	Consider using private and public lands that have been previously degraded or disturbed and closer to existing transmission.	Alternatives
Loulena A. Miles, California Unions for Reliable Energy (letter dated 6/22/2009)	CURE-1	Does not provide adequate information or analysis in the following biological areas: (1) baseline information regarding desert tortoise; (2) mitigation for impacts to desert tortoise; (3) impacts to burrowing owl; (4) rare plants survey methods and baseline data; (5) rare plant impact assessment; (6) rare plant mitigation; (7) impacts to the Mojave fringe-toed lizard; (8) impacts to Nelson’s bighorn sheep; (9) impacts to wildlife corridors; (10) impacts to nesting bird species; (11) collision hazards; (12) wildlife mortality from evaporation ponds.	Biological Resources
	CURE-2	Does not provide adequate information or analysis regarding impacts to potential jurisdictional waters.	Hydrology, Water Use, and Water Quality
	CURE-3	Does not provide adequate information or analysis regarding cumulative impacts of the project.	Cumulative Impacts
	CURE-4	Does not provide adequate information or analysis regarding compliance with laws, ordinances, rules, and standards.	Project Description
Kevin Emmerich and Laura Cunningham, Basin and Range Watch (email dated 6/8/2009)	BRW-1	Concerned the BLM is intentionally streamlining the approval of the project.	Project Description
		Comment Letters from Members of the General Public	
David Beaumont (emails dated 7/7/2009 and 7/10/2009)	DB-1	Proposed fencing along project boundary will cut off vehicular access to a guzzler maintained by the California Department of Fish and Game.	Biological Resources
	DB-2	What design criteria will be utilized to continue wildlife migration routes through the fenced area?	Biological Resources
	DB-3	Wildlife habitat and recreational access will be lost with the building of the boundary fence; What will be done to mitigate these losses?	Biological Resources and Land Use
	DB-4	Will the damage to the area be reclaimed after the project is over?	Project Description
	DB-5	Suggests leaving a corridor open between Solar 1 and Solar 3 for animal and vehicle traffic.	Alternatives
	DB-6	Suggests moving proposed boundaries back in order to allow vehicular traffic along the fencelines in order to connect routes which have been isolated.	Alternatives
	DB-7	Concerned with the number of miles of access roads needed for the project and the closure of existing roads used for recreational and wildlife care purposes.	Land Use

Name and Agency of Commenter (and Date of Comment)	Comment Number	Summary of Comments by Environmental Parameter or Topic	Where the Comments will be Addressed in the Environmental Document
Joachim Falkenhagen (email dated 7/8/2009)	JF-1	Local climate consequences of solar thermal generation should be assessed in the future.	Cumulative Impacts
	JF-2	Stirling dishes are less suitable to water cooling than parabolic trough solar power stations; the cumulative number of solar projects in the area might make it possible to bring water from the Pacific for cooling, though that would need to be established with a feasibility study.	Project Description
Joe Orawczyk (email received 6/23/2009)	JO-1	Water Resources: Concerns with transmission of water from groundwater wells (what type of underground pipelines); Will there be water towers or evaporative coolers on site and how much water will these use?; What is the total number of groundwater wells that will be dug for the project?; Water tank size will hold larger quantity than stated.	Hydrology, Water Use, and Water Quality
	JO-2	How will SES accommodate visitors?; Will there be public parking?; Will there be a Welcome Center or museum?; Are there safety plans for visitors?; How will increase in local traffic and trash be mitigated?; What effect will visitors have on water resources; Will an observation point be built for visitors?	Project Description
	JO-3	What are the hazards of flood paths within the project area?; has the delineation been done, if not, when will it be available and will it be publicly available?	Hydrology, Water Use, and Water Quality
	JO-4	What effect will nighttime light pollution have on wildlife and travelers?; Will there be light along the perimeter fence?; How will light pollution be mitigated?; Would night vision security cameras be an option after construction?	Visual Resources
	JO-5	Has there been any coordination with Homeland Security?; How quickly could Solar 1 recover from a potential terrorist attack?; Who will pay for security and repair if subject to a terrorist attack?	Project Description
	JO-6	Will the total dissolved solids in the evaporative ponds from washing mirrors be hazardous?; Could the brine be filtered and used for dust control, fire suppression, and flushing commodes?	Hazardous Materials
	JO-7	How often will the mirrors be washed? There is some discrepancy in different parts of the AFC. Will the washing be done manually or automatically?	Project Description
	JO-8	Some conflicting data in amount of potable water used.	Water Use and Water Quality
	JO-9	Of the 182 workers, how many will be work construction and how many non-construction? What will their work schedules be? What will workforce fluctuations be for the life of the project and what will their effect be on the environment and water resources?	Project Description
	JO-10	Size of the aquifer and does it recharge?; What is the risk of the depleted aquifer creating a sinkhole?	Hydrology, Water Use, and Water Quality

Name and Agency of Commenter (and Date of Comment)	Comment Number	Summary of Comments by Environmental Parameter or Topic	Where the Comments will be Addressed in the Environmental Document
	JO-11	Why was data on pump and water quality tests insufficient? What are the level of nitrates, fluoride, pharmaceuticals, and endocrine disrupters in the water? How will the water be treated? If chemicals are used, what (if any) health risks or hazards to people do they pose? How will that be mitigated/controlled?	Water Use and Water Quality
	JO-12	Will secondary wells be capped and abandoned or removed and backfills after construction?	Project Description
	JO-13	Will workforce be permitted to drink deionized water to mitigate effects of excessive fluoride?	Water Use and Water Quality
	JO-14	What further evaluation will be done for the various options that may be available to treat, store, and distribute the water?	Water Use and Water Quality
	JO-15	Will reverse osmosis be used?; If so, how much energy will this consume?; If not, why the need for evaporative ponds?	Water Use and Water Quality
	JO-16	If bottled water and/or soda will be available, what recycling program will be implemented? Which bottling companies are being considered and are they local?	Project Description
	JO-17	Will the use of waterless urinals and compost toilets be considered? If not, what approved off-site disposal facility will receive the waste?	Project Description
	JO-18	Concerned with lack of closure plan.	Project Description

A.8 ORGANIZATION OF THE DOCUMENT

The SA/DEIS begins with an Executive Summary, Introduction, Proposed Action Alternative/Project Description, Alternatives, and Cumulative Scenario. The environmental, engineering, and public health and safety analyses of the proposed project are contained in 20 separate chapters. They include the following: Air Quality, Biological Resources, Cultural Resources and Native American Values, Hazardous Materials Management, Land Use Recreation and Wilderness, Noise and Vibration, Public Health and Safety, Socioeconomics and Environmental Justice, Soil and Water Resources, Traffic and Transportation, Transmission Line Safety and Nuisance, Visual Resources, Waste Management, Worker Safety and Fire Protection, Geology Soils and Paleontological and Mineral Resources, Geologic Stability, Facility Design, Power Plant Efficiency, Power Plant Reliability, and Transmission System Engineering. These chapters are followed by the general project conditions and a summary of agency and public comments. This is followed by a list of staff who contributed to the document and a reference list.

Each of the 20 technical area assessments includes a discussion of:

- laws, ordinances, regulations and standards (LORS);
- the regional and site-specific setting;
- project direct and indirect impacts;
- mitigation measures;
- closure and decommissioning impacts and mitigation;
- no project/no action alternative;
- cumulative impacts;
- noteworthy public benefits;
- response to public and agency comments on the PSA;
- conclusions and recommendations; and
- mitigation measures/conditions of certification for both construction and operation (as applicable).

DESCRIPTION OF THE PROPOSED PROJECT AND ALTERNATIVES

B.1 – PROPOSED PROJECT

B.1.1 INTRODUCTION

On December 2, 2008, Stirling Engine Systems Solar One, LLC, (SES Solar Three, LLC and SES Solar Six, LLC) submitted an Application for Certification (AFC) to the California Energy Commission to construct and operate the Stirling Energy Systems Solar One Project (SES Solar One) on public land managed by the Bureau of Land Management (BLM) in San Bernardino County, California. On May 6, 2009, the Energy Commission accepted the AFC as complete. In January 2010, the project formally changed its name to the Calico Solar Project. The applicant, SES Solar Three, LLC, was merged into SES Solar Six, LLC, and that surviving entity was re-named Calico Solar, LLC. Calico Solar is a subsidiary of Tessera Solar™. The applicant's development plans have been updated several times since filing its original right-of-way (ROW) application with the BLM and/or AFC applications with the Energy Commission. The most substantial revisions are summarized as follows in the **Project Description Table 1**.

Project Description Table 1
Summary of Applicant's Updates to the Calico Solar Development Plans

Posted Date	Reference Document	Revisions to Proposed Project
07/21/2009	Data Response #49-70, 74-45, 80, 82-84, 86-91	Additional information regarding evaporation pond design.
08/25/2009	Data Response #113-127	Removes Satellite Services Complex from project scope
09/03/2009	Data Response #1-48, 81, 109-112	Reduction in Project roads, vehicle type changes, fuel type changes, revisions to construction practices, sequencing and schedule, revision to placement of support facilities, vehicle travel pattern changes
12/01/2009	Data Response #71-73, 76-79, 85, 128-141	Removal of access road alternative options 2 through 4 as discussed in the AFC; hydrogen gas to be produced on site and brought to SunCatchers via a distributed system.
12/16/2009		Updated project map
01/11/2010	Submittal	CAISO reports
01/12/2010	Submittal	Geotechnical engineering report
01/28/2010		Change of project name and applicant name
02/08/2010	Supplemental Analysis for the AFC	Cadiz Water provided as primary water source for the Project
02/17/2010		Drainage layout figure and project layout figure
02/26/2010		Drainage layout figure; depicts Project phases and other layout changes resulting from agency and public input

B.1.2 PROJECT LOCATION

The Calico Solar Project site is proposed to be located on public land managed by the BLM. The proposed project site is approximately 37 miles east of Barstow, California, 17 miles east of Newberry Springs, 57 miles northeast of Victorville, and approximately 115 miles east of Los Angeles (straight line distances). The following sections or portions of sections in Townships 8 and 9 North, Ranges 5 and 6 East of the San Bernardino Meridian identify the project site and the planned boundary for development of the Calico Solar Project (see **Project Description Figure 1**).

The project is proposed for development in two phases. Phase I is located on approximately 2,320 acres (3.6 square miles). Phase II is located on approximately 5,910 additional acres (9.2 square miles). The total area required for both phases is approximately 8,230 acres.

PHASE ONE (BLM ADMINISTERED LAND)

Within Township 8 North, Range 5 East:

- the portion of the northeast quarter section of Section 11 north of the railroad ROW, and
- the portion of Section 12 north of the railroad ROW.

Within Township 8 North, Range 6 East:

- the portion of Section 7 north of the railroad ROW,
- the portion of Section 8 west of the SCE Transmission ROW,
- the portion of Section 9 west of the SCE Transmission ROW,
- the portion of Section 17 west of the SCE Transmission ROW and north and south of the railroad ROW,
- the portion of Section 18 north of the railroad ROW,
- the southwest and southeast quarter sections of Section 6, and
- the southwest quarter of Section 5,

Within Township 9 North, Range 6 East:

- the northeast quarter and the portion of the northeast quarter-quarter section of the northwest section of Section 32, and
- the northwest quarter and the portion of the northwest and southwest quarter-quarter section of the northeast section of Section 33.

PHASE TWO (BLM ADMINISTERED LAND)

Within Township 8 North, Range 5 East:

- eastern half of Section 2,

- the southwest, northeast, southeast quarter of Section 10,
- the portion of Section 14 north of the I-40 ROW,
- the portion of the northeast and northwest quarter sections and the northeast quarter-quarter sections of the southeast quarter section of Section 8 south of the railroad ROW and north of the I-40 ROW,
- the portion of Section 11 south of the railroad ROW,
- the portion of Section 12 south of the railroad ROW, and
- the portion of Section 15 north of the I-40 ROW.

Within Township 8 North, Range 6 East:

- the portion of Section 4 west of the SCE Transmission ROW,
- the northeast, northwest, southeast quarter sections of Section 5,
- the northwest and northeast quarter sections of Section 6,
- the portion of Section 7 south of the railroad ROW, and
- the portions of Section 18 west of the SCE Transmission ROW, south of the railroad ROW and north of the I-40 ROW.

Within Township 9 North, Range 5 East:

- the eastern half of Section 35.

Within Township 9 North, Range 6 East:

- all of Section 31,
- the southwest and southeast quarters and the portion of the southwest quarter-quarter sections of the northwest quarter of Section 32, and
- the southwest quarter and the portion of the northwest and southwest quarter-quarter sections of the southeast quarter of Section 33.

The proposed Calico Solar Project also includes a new 230-kilovolt (kV) Calico Solar Substation, 2.0 miles of electrical transmission line, an administration building, maintenance complex, onsite routes interior to the project boundaries, a site access road and bridge over the Burlington Northern Santa Fe railroad tracks. Approximately 739 feet of the 2-miles of single-circuit, 230-kV generation interconnection transmission line would be constructed off the project site but still on BLM managed land. The transmission line would connect the proposed Calico Solar Substation to the existing Southern California Edison (SCE) Pisgah Substation. The main access for traffic to the project site during construction will be from Interstate 40 (I-40) to the project entrance on Hector Road through an existing at-grade crossing of the Burlington Northern Santa Fe (BNSF) Railroad tracks. This at-grade crossing will be used during the initial phases of construction until a bridge is constructed that will span the railroad. Traffic will exit the project site at Hector Road and the existing Hector Road crossing during the initial phases of construction. Once the bridge is completed, all traffic will use the bridge for ingress egress (see **Project Description Figure 2**).

B.1.3 PROCESS DESCRIPTION

The SunCatcher™ is a 25-kilowatt-electrical (kW) solar dish Stirling system designed to automatically track the sun and collect and focus solar energy onto a power conversion unit (PCU), which generates electricity. The system consists of a 40-foot-high by 38-foot-wide solar concentrator in a dish structure that supports an array of curved glass mirror facets. These mirrors collect and concentrate solar energy onto the solar receiver of the PCU (see **Project Description Figure 3**).

The PCU converts the focused solar thermal energy into grid-quality electricity. The conversion process in the PCU involves a closed-cycle, 4-cylinder, 35-horsepower reciprocating Stirling Engine utilizing an internal working fluid of hydrogen gas that is recycled through the engine. The Stirling Engine operates with heat input from the sun that is focused by the SunCatcher's dish assembly mirrors onto the PCU's solar receiver tubes, which contain hydrogen gas. The PCU solar receiver is an external heat exchanger that absorbs the incoming solar thermal energy. This heats and pressurizes the hydrogen gas in the heat exchanger tubing, his gas in turn powers the Stirling Engine.

A generator is connected to the Stirling Engine; this generator produces the electrical output of the SunCatcher. Each generator is capable of producing 25 kW at 575 volts alternating current (VAC)/60 hertz (Hz) of grid-quality electricity when operating with rated solar input. Waste heat from the engine is transferred to the ambient air via a radiator system similar to those used in automobiles.

The hydrogen gas is cooled by a standard glycol-water radiator system and is continually recycled within the engine during the power cycle. The conversion process does not consume water. The only water consumed by the SunCatcher is for washing of the mirrors to remove accumulated dust and replenishing small losses to the cooling system radiator in a 50-50 ethylene glycol-water coolant.

B.1.3.1 SUNCATCHER COMPONENTS

This section provides an overview of the three major SunCatcher components: the foundation/pedestal, the dish assembly, and the PCU.

Foundation/Pedestal

The solar dish would typically be mounted on a foundation consisting of a metal pipe that is hydraulically driven into the ground. This foundation is preferred because no concrete is required, no spoils are generated, and the foundations can be completely removed when the project is decommissioned. When conditions are not conducive to the use of the metal pipe foundation, the foundation would consist of rebar-reinforced concrete constructed below grade. Both of these foundation designs meet all applicable structural design requirements and applicable LORS.

The SunCatcher pedestal on which the SunCatcher Dish Assembly would be secured is approximately 18 feet 6 inches in height and would be an integrated part of the metal pipe foundation or would be a separate structure fastened to the rebar-reinforced concrete foundation at ground level.

Dish Assembly

The SunCatcher Dish Assembly would be fitted with a trunnion that attaches to the pedestal. Each Dish Assembly would consist of a 38-foot wide by 40-foot high steel structure that supported an array of curved glass mirror facets. These mirrors would form a curved shape engineered to concentrate solar energy onto the solar receiver portion of the PCU. The Dish Assembly includes azimuth and elevation drives for tracking the sun and a PCU support boom.

The SunCatcher Dish Positioning Control System employs proprietary algorithms to track the sun. This system focuses the solar energy onto the solar receiver by controlling elevation and azimuth drives, and executes startup, shutdown, and de-track procedures. These procedures allow the dish to “wake up” from the night-stow position in the morning to focus the dish mirror facets on the solar receiver of the PCU, and then to track the sun during the daylight operating time of the project. The dish control system also communicates with and receives instructions from the central control room via the Supervisory Control and Data Acquisition (SCADA) system. The system is designed to place the dish into a “wind stow” position when sustained winds exceed 35 miles per hour to protect the system from wind damage. The system also places the dish into “wind stow” position on loss of communications with the central control room or on receipt of a fault signal from the PCU control system.

Power Conversion Unit

The SunCatcher PCU converts the solar energy into grid-quality electricity. Hydrogen gas is used in a closed-cycle heating/expansion – cooling/compression cycle to drive a high-efficiency, 380-cubic-centimeter displacement, 4-cylinder reciprocating Solar Stirling Engine. The Stirling Engine powers an electrical generator that produces 25 kWe net output after accounting for on-board parasitic loads at 575-volt alternating current, 60 Hz of grid-quality electricity. The PCU attaches to the end of the PCU boom.

The dimensions of the PCU are approximately 88 inches (7 feet) long by 63 inches (5 feet) wide by 37 inches (3 feet) high. The PCU weighs approximately 1,400 pounds.

The PCU consists of six subsystems: solar receiver, Stirling Engine, generator, cooling system, gas management system, and the PCU control system. Each subsystem is described below.

- **Solar Receiver:** The SunCatcher solar receiver consists of an insulated cavity with an aperture that allows the solar energy to enter. Within the cavity are 4 heater heads. Each heater head forms a tube network for one quadrant of the engine. The solar flux, radiant energy from the sun, heats the metal tubes and the heat is then transferred through the tubes to the working hydrogen gas. The heat absorbed at the solar receiver drives the Solar Stirling Engine.
- **Solar Stirling Engine:** The kinematic Stirling Engine has evolved from a Kockums kinematic Stirling Engine design. The Kockums kinematic Stirling Engine is used as a propulsion source for submarines and is highly reliable, low maintenance, and highly efficient. SES has further developed and improved the engine design specifically for use in the SunCatcher.

- **Generator:** A generator is connected to the Stirling Engine to produce the electrical output of the SunCatcher. The PCU generator attached to each Solar Stirling Engine is capable of producing up to 25 kW at 575 VAC, 60 Hz of grid-quality electricity when operating with a solar input of between 250 and 1,000 W/m^2. The generator output is connected to the power collection system.
- **Cooling System:** Waste heat from the hydrogen gas within the engine is transferred to the ambient air via a radiator system similar to the type used in automobiles. The SunCatcher cooling system is made up of ethylene glycol fluid, a cooler in the gas circuit, a radiator, a fluid circulation pump, and a cooling fan. The cooling fan and circulation pump are driven by electric motors.

  The system is used to cool the hydrogen gas before the compression portion of the cycle. The pump circulates the cooling fluid through the gas cooler and radiator. Waste heat from the hydrogen gas is transferred to the ethylene-glycol fluid in the cooler. The coolant is then pumped through the radiator where the fan forces ambient air over the cooling fins to remove heat. The heat is transferred to the atmosphere via the airflow over the radiator.
- **Gas Management System:** The gas management system controls the working pressure to ensure high efficiencies. The hydrogen gas is contained within a closed and sealed cycle, yet a very small amount of the hydrogen working fluid does leak (less than 200 cubic feet per dish per year) by the rod seals and is lost to the atmosphere. As a result, an on-site distributed hydrogen system has been proposed to replenish hydrogen lost to the atmosphere.
- **Control System:** The SunCatcher PCU control system monitors, controls, and communicates PCU performance. Thermal detectors are monitored by the PCU control system and the data are used to control the thermal balancing of the PCU. Alarms and faults monitored by the PCU control system are communicated to the Dish Positioning Control System and the Project SCADA system.

B.1.4 PROJECT DESCRIPTION

The proposed Calico Solar Project would be a nominal 850-megawatt (MW) Solar Stirling Engine project. The project is proposed for development in two phases. Phase I includes 11,000 SunCatchers located on approximately 2,320 acres (3.6 square miles) to produce 275 MW. Phase II would include an additional 23,000 SunCatchers on an additional approximately 5,910 acres (9.2 square miles) to produce an additional 575 MW for the total 850 MW planned production. The total area required for both phases, including the area for the operation and administration building, the maintenance building, and the substation building, is approximately 8,230 acres.

Construction is planned to begin in late 2010. Although construction would take approximately 44 months to complete, power would be available to the grid as each 60-unit group of SunCatchers is completed. The project includes construction of an on-site 230-kV Calico Substation near the center of the project area, and a 230-kV transmission line from the Calico Substation that would run southeast parallel to the north side of the BNSF railroad ROW inside the project area, then cross the railroad right of way (ROW) to run southwest and parallel the SCE transmission lines to the existing SCE Pisgah Substation.

The primary equipment for the generating facility would include approximately 34,000 SunCatchers, their associated equipment and systems, and their support infrastructure. The project site covers 8,230-acres (13 square miles) and is located on public land managed by the BLM. No private lands are located within the 8,230 acres under BLM application.

The applicant has applied for a right-of-way (ROW) grant for the project site from the BLM Barstow Field Office. Although the project is phased, it is being analyzed in this SA/DEIS as if all phases would be operational at the same time.

B.1.4.1 PROJECT SITE ARRANGEMENT

The basic building blocks for the project are 1.5-MW solar groups consisting of 60 SunCatchers. The 1.5-MW groups would be connected in series to create 3-, 6-, and 9-MW solar groups. The 3-, 6-, and 9-MW groups would be connected to overhead collection lines rated at 48 MW or 51 MW. The typical solar groups would be arranged as necessary to fit the contours of the site.

The entire project would be fenced for security, however the design of the fencing is being determined in coordination with regulatory and resource agencies to protect sensitive ecological areas and address storm flows in washes. The project would have a laydown area on 14 acres adjacent to the Main Services Complex.

During project construction and operation, the main access to the project site would be from the south, off of Interstate 40 from the Hector Road exit. The AFC proposed the development of the following roadways on the project site: approximately 25.2 miles of paved roadways, approximately 168 miles of north-south access routes, and approximately 102 miles of east-west access routes. The access routes would be surface-treated to reduce fugitive dust while allowing full access to all dishes and infrastructure. Polymeric stabilizers will be used in lieu of traditional road construction materials for paved roads and/or to stabilize unpaved roads. All access to the project site would be through controlled gates.

B.1.4.2 SOLAR POWER PLANT EQUIPMENT AND FACILITIES

Project Description Table 2, Significant Structures and Equipment, lists the major equipment and significant structures required for the Calico Solar Project.

Project Description Table 2
Significant Structures and Equipment

Description	Quantity	Length (feet)	Width (feet)	Height (feet)
SunCatcher power generating system	34,000	38 diameter		40
Main Services Complex administration building	1	200	150	14
Main Services Complex maintenance building	1	180	250	44
Main SunCatcher assembly buildings	3	170	211	78
Well water storage tank and Fire Water 230,000 gallons	1	40 diameter		20
Demineralized water tank, 17,000 gallons	2	18 diameter		10
Potable Water Tank, 5,000 gallons	1	40 diameter		20
230kV transmission line towers, double-circuit with upswept arms	12 to 15	--	32	90 to 110
Generator collection sub-panel; distribution panel, 42 circuit, 400A, 600V, with circuit breakers in a weatherproof enclosure	2,834	1	2.67	5
Generator collection power center, 2,000-A distribution panels with six 400-A circuit breakers	567	2	3.33	7.5
Collector group generator step-up unit transformer (GSU), 1,750kVA, 575 V to 34.5kV, with taps	567	6.67	7.5	6.67
Power factor correction capacitor, 600V, 1,000kVAR, switched in five, each 200kVAR steps	567	2.5	6.67	7.5
Open bus switch rack, 35kV, 7 bay with five 35kV, 1,200-A, 40kVA INT, circuit breakers, insulators, switches, and bus work	6	105	20	30
Shunt capacitor bank, 34.5kV, 90 MVAR switched in six each 15 MVAR steps	6	15	8	20
Dynamic VAR (DVAR) compensation system in coordination with shunt capacitor banks – size to be determined by studies	1	60	12	16
Disconnect switch, 35kV, 3,000 A, 200kV BIL, group-operated	6	3	11	16
Power transformer, three phase, 100/133/167 mega volt amp, 230/132.8-34.5/19.9kV, 750kV BIL, oil filled	6	15	35	23
Power circuit breaker, 242kV, 2000A, 40 kilo amp interrupting capacity	7	12	20	16
Coupling capacitor voltage transformer for metering, 242kV, 900kV BIL, 60 Hertz, Potential Transformer ratio 1,200/2,000:1	6	1	1	25
Disconnect switch, 242kV, 2000A	9	10	25	25

Source: Calico Solar, LLC

Notes: A = ampere (amp), BIL = basic impulse level, gpd = gallons per day, HP = horsepower, Hz = hertz, INT = international, kA = kilo amps kV = kilovolt, kVA = kilovolt amps, Kvar = kilovolt amp reactive, kW = kilowatt, kWe = kilowatt-electric, MVA = megavolt amps MVAR = megavolt amp reactive MW = megawatts, V = volts, VAR = volt amp reactive W = watts

B.1.4.3 SITE GRADING AND DRAINAGE

The original layout for the Calico Solar Project site was based on avoiding major washes and minimizing surface-disturbing activities. Following the completion of the 30% engineering in April 2009, the applicant determined that it would be necessary to place some SunCatcher units in washes to attain the proposed 850 MW yield.

Brush trimming would be conducted between alternating rows and would consist of cutting the top of the existing brush while leaving the existing native plant root system in place to minimize soil erosion. To minimize shading on SunCatchers and prevent potential brush fire hazards, natural vegetation trimmings would be cleared in the area of each SunCatcher as well as on either side of the surface-treated arterial roadways.

After brush has been trimmed, blading for roadways and foundations would be conducted between alternating rows to provide access to individual SunCatchers. Blading would consist of limited removal of terrain undulations. Although ground disturbance would be minimized wherever possible, the applicant proposes that localized rises or depressions within the individual 1.5-MW solar groups would be removed to provide for proper alignment and operation of the individual SunCatchers. Paved roadways would be constructed as close to the existing topography as possible, with limited cut-and-fill operations to maintain roadway design slope to within a maximum of 10%.

The layout of the proposed Calico Solar Project would maintain the local pre-development drainage patterns where feasible, and water discharge from the site would remain at the southern and western boundaries. The paved roadways would have a low-flow, unpaved swale or roadway dip as needed to convey nuisance runoff to existing drainage channels/. It is expected that storm water runoff would flow over the crown of the paved roadways, which are typically less than 6 inches from swale flow line to crown at centerline of roadway, thus maintaining existing local drainage patterns during storms. The applicant has proposed that unpaved roads would utilize low-flow culverts.

The applicant has proposed localized channel grading on a limited basis to improve channel hydraulics within the dry washes and to control flow direction where buildings and roadways are proposed. The Main Services Complex would be protected from a 100-year flood by berms or channels that would direct the flow around the perimeter of the building site, if required.

Arizona Crossings (roadway dips) would be placed along the roadways or low-flow culverts consisting of a small-diameter storm drain with a perforated stem pipe, as needed to cross the minor or major channels/swales. These designs would be based on Best Management Practices (BMPs) for erosion and sediment control.

Arizona Crossings (roadway dips) would be used for major washes where the channel cross section exceeds 8 feet in width and 3 feet in depth or exceeds 20 feet in width and 2 feet in depth. The roadway section at the channel flow line would be without a crown.

It is anticipated that roadway maintenance would be required after rainfall events. For minor storm events, it is anticipated that the unpaved roadway sections may need to be bladed to remove soil deposition, along with sediment removal from stem pipe risers at the culvert locations. For major storm events, in addition to the aforementioned maintenance, roadway repairs may be required due to possible damage to pavement where the roadways cross the channels and where the flows exceed the culvert capacity. Additional maintenance may be required after major storm events to replace soil eroded from around SunCatcher pedestals located in washes.

Building sites would be developed per San Bernardino County drainage criteria, with provision for soft bottom storm water retention basins. Rainfall from paved areas and building roofs would be collected and directed to the storm water retention basins. Volume on retention or detention basins should have a total volume capacity for a 3-inch minimum precipitation covering the entire site. Volume can be considered by a combination of basin size and additional volume provided within paving and/or landscaping areas.

The retention basins would be designed so that the retained flows would empty within 72 hours after the storm to provide mosquito abatement. This design can be accomplished by draining, evaporation, infiltration, or a combination thereof.

The post-development flow rates released from the project site are expected to be less than the pre-development flow rates, thus complying with BMPs. The expected flow reduction is based on the following factors.

- Except for the building sites, roads, and two evaporation ponds, the majority of the project site would remain pervious; only a negligible portion of the site would be affected by pavement and SunCatchers foundations.
- The increased runoff expected from the building sites would be over-mitigated by capturing 100% of the runoff in a retention basin, where the storm runoff would be infiltrated and/or evaporated to the atmosphere.
- The proposed perforated risers to be constructed upstream of the roadway culverts would provide for additional detention.

B.1.4.4 BUILDINGS

All buildings would be constructed in accordance with the appropriate edition of the California Building Code (CBC) and other applicable LORS.

The Main Services Complex would be located within the project site in a central location that provides for efficient access routes for maintenance vehicles servicing the SunCatcher solar field. The main control room would be located at the Main Services Complex.

Warehouse and shop spaces would provide work areas and storage for spare parts for project maintenance. The Main Services Complex would contain meeting and training rooms, maintenance and engineering offices, and administrative offices.

The project administration offices and personnel facilities will be located in a one-story operation and administration building. The operation and administration building will measure approximately 200 feet long by 150 feet wide by 14 feet high. This building will also contain meeting and training rooms, engineering offices, a visitor’s room, and support services.

The project maintenance facilities, shop, and warehouse storage will be located adjacent to the operation and administration building. The maintenance building will measure 180 feet wide by 250 feet long by 44 feet in height. This building will contain maintenance shops and offices, PCU rebuild areas, maintenance vehicle servicing bays, chemical storage rooms, the main electrical room, and warehouse storage for maintenance parts to service the SunCatchers.

The three assembly buildings will be located beside the Main Services Complex. Assembly buildings will be decommissioned after the project's SunCatchers are assembled and installed.

A water treatment shade structure will be located next to the Main Services Complex and to the northeast side of the Main Services Complex. The water treatment structure will house water treatment equipment and safe storage areas for water treatment chemicals. A motor control center for the water treatment equipment and pumps will be located within this structure. Two wastewater evaporative ponds designed for water treatment wastewater containment will be located just north of the water treatment structure. A control building will be located near the project substation. This building will contain relay and control systems for the substation in one room and the project operations control room in another room or rooms. A diesel-powered fire water pump and a diesel operated standby power generator will be located adjacent to the operation and administration building on the north side.

Electric service for the Main Services Complex will be obtained from SCE. Electric power will be provided via overhead service from an SCE overhead distribution line located on the north side of I-40. Communications service for the Main Services Complex will be obtained from the local phone company. Communications service will be provided via an overhead service from existing underground communications lines located on the north of I-40.

The operation and administration building, maintenance building, and Main Services Complex would be painted with a matching desert sand color and would be manufactured buildings. The water treatment building and the water holding tanks, including the potable water, raw water, and demineralized/fire protection water tanks located at the Main Services Complex would also be painted with a matching desert sand color.

SunCatcher assembly would be performed on-site in temporary structures. These buildings would be decommissioned after all project SunCatchers are assembled and installed. The assembly buildings would be located beside the Main Services Complex.

The primary purpose of the SunCatcher assembly buildings would be the assembly of the SunCatcher superstructure, the main beam assembly and trusses, the pedestal trunnion, mirrors, wire harnesses, control systems, drive position motors, and the calibration of the mirrors and control systems before field installation. Each assembly bay would be equipped with an automated platform on locating rails to move the SunCatcher through the assembly process.

The exterior material for the assembly buildings would be a fire retardant vinyl fluoride film with ultraviolet blocking characteristics and would be chemical and weather resistant. The exteriors would be painted desert sand to match the other structures.

Transport trailer storage would be located adjacent to the assembly building. The storage area would allow the project to maintain a supply of 3 to 5 days of inventory of SunCatcher parts during the assembly phase of construction.

These assembly buildings would be decommissioned and salvaged after all SunCatchers for the Project are installed.

B.1.4.5 WATER SUPPLY AND TREATMENT

The following types of water would be required for the project:

- equipment washing water,
- potable water,
- dust control water, and
- fire protection water.

When completed, the Calico Solar Project would require a total of approximately 36.2 acre-feet of raw water per year. SunCatcher mirror washing and operations dust control under regular maintenance routines will require an average of approximately 10.4 gallons of raw water per minute.

The applicant originally pursued the use of ground water from the Lavic Groundwater Basin. Calico initiated the drilling of four water wells adjacent to the project site, within the Lavic Groundwater Basin. As wells are drilled the flow rate (gallons per minute – gpm) were determined, concern over sufficiency of this water supply lead to the identification of a new primary water supply from Burlington Northern Santa Fe (BNSF). The Lavic Ground Basin wells may be used as a backup water source, but lack the capacity to provide for construction water needs.

The applicant has identified the water from BNSF owned and operated water well within the Cadiz Valley Groundwater Basin as the new primary source of water from the project. Data from the CA State Water Data Library shows several wells in the Cadiz Groundwater Basins. Some historical data of wells in Cadiz show that well depths were approximately 200 feet below water levels. With the recharge rate, the applicant does not believe that the project requirements would significantly impact the wells in the area.

Similar to the wells mentioned in the AFC, the water from the Cadiz well is characterized as raw water and will require treatment to remove dissolved solids for SunCatcher mirror wash water applications. The water will be required to be demineralized to prevent mineral deposits forming on the SunCatcher mirrors. Processes available for demineralization are Reverse Osmosis (RO) and ion exchange.

Calico believes that with these sources, the project would obtain the water to provide an appropriate quantity and quality for mirror washing.

Potable Water: Potable water to meet plant requirements would be delivered by truck or rail and stored in a 5,000-gallon tank in the water treatment area. This tank would be able to provide all required potable water for the operating facility for 2-3 days at which time it would need to be replenished.

Mirror Washing and Fire Protection Water: The Main Services Complex will include a location for an approximately 175,000-gallon tank that will be used to store water for SunCatcher mirror washing and fire protection applications. This volume of water will meet all LORS, including fire protection water for the Newberry Springs and the Harvard Station 46 (a County Fire Department staffed station), and for the San Bernardino Fire Department.

Dust Control Water: The water will be conveyed to the Main Services Complex via a 6 to 8-inch-diameter water line. The expected average well water consumption for the project during construction is approximately 50 acre-feet per year. Under normal operation (inclusive of mirror cleaning, dust control, and potable water usage), water required will be approximately 36.2 acre-feet per year. Emergency water may be trucked in from local municipalities. The Applicant would seek agreements at the time of the emergency.

The Calico Solar Project water supply requirements are tabulated in **Project Description Table 3**, Water Usage Rates for Operation. The table provides both the expected maximum water usage rates and the annual average usage rates.

Project Description Table 3
Water Usage Rates for Operation

Water Use	Daily Average (gallons per minute)	Daily Maximum (gallons per minute)	Annual Usage (acre feet)
Equipment Water Requirements			
SunCatcher Mirror Washing	11.8[1]	19.7[2]	16.1[3]
Water Treatment System Discharge			
Brine to Evaporation Ponds	6.0	11.1[4]	8.1
Potable Water Use			
For drinking and sanitary water requirements	3.8[5]	4.6[6]	5.2[7]
Dust Control			
Well water for dust control during operations	4.2[8]	8.3[9]	6.7[10]
Totals	**25.8**	**43.7**	**36.2**

Source: Stirling Energy Systems, Inc.

1 Based on 34,000 SunCatchers requiring a monthly wash with an average of 14 gallons of demineralized water per spray wash and a 5-day work week (21 work days per month).
2 During a 3-month period, all SunCatcher mirrors are given a scrub wash requiring up to three times the normal wash of 14 gallons per SunCatcher. Therefore, the Daily Maximum usage rate is based on 2/3 of the SunCatchers receiving a normal wash and one third receiving a scrub wash.
3 Based on every SunCatcher having approximately 8 normal washes per year with one additional scrub wash.
4 Based on the maximum amount of demineralized water required for mirror washing and assumes a decrease in raw water quality requiring an additional 20% of system discharge.
5 Assumes 30 gallons per person per day for 182 people. 6 Max. amount assumes a 20% contingency over the Daily Avg.
7 Assumes a 6-day work week and average daily usage. 8 Assumes 5,000 gallons per day.
9 Assumes up to 10,000 gallons per day. 10 Assumes daily average dust control operations.

B.1.4.5 WASTEWATER AND WASTE MANAGEMENT

The water treatment wastewater generated by the reverse osmosis (RO) unit would contain relatively high concentrations of total dissolved solids (TDS). Wastewater or brine generated by the RO unit would be discharged to a polyvinyl chloride (PVC)-lined concrete evaporation pond that meets the requirements of the local Regional Water Quality Control Board. Each pond would be sized to contain 1 year of discharge flow, approximately 2.44 million gallons. A minimum of 1 year is required for the water treatment waste to undergo the evaporation process. The second pond would be in operation while the first is undergoing evaporation. The two ponds would alternate their functions on an annual basis.

After the brine has gone through the evaporation process, the solids that settle at the bottom of the evaporation pond will be tested by the applicant and disposed of in an appropriate non-hazardous waste disposal facility. The solids would be scheduled for removal during the summer months, when the concentration of solids is at its greatest due to an increase in evaporation rates, in order to achieve maximum solids removal.

Sanitary wastewater generated at the facility cannot be conveyed to an existing sewage facility or pipeline as there are no public or private entities that manage sanitary wastewater flows for locations in the vicinity of the project site. The wastewater generated at the Main Services Complex will be discharged into a sub-surface wastewater disposal system with septic tanks and leach fields, and will be designed in accordance with the applicable LORS, including San Bernardino County, California State Regional Water Quality Board, and the Department of Health Services.

The general threshold limit for a standard approval process for septic tanks and leach fields through the local Regional Water Quality Control Board (RWQCB) is 500 gallons per acre per day. The expected daily sanitary wastewater flow from Calico Solar ranges from an average of 5,500 gallons to a peak of 6,600 gallons; the required set aside area given this flow is approximately 14 acres. Given the Project Site area is much greater than 14 acres, the threshold limit for septic tank and leachfield applications will be met. The required leachfield area is estimated to be approximately 1,100 square-feet (0.025 acre).

B.1.4.6 HAZARDOUS WASTE MANAGEMENT

Hazardous materials used during facility construction and operations would include paints, epoxies, grease, transformer oil, caustic electrolytes (battery fluid), and products that would be generated by the construction equipment, such as waste fuel and waste oil. Several methods would be used to properly manage and dispose of hazardous materials and wastes. Waste lubricating oil would be recovered and recycled by a waste oil recycling contractor. Chemicals would be stored in appropriate chemical storage facilities. Bulk chemicals would be stored in large storage tanks, while most other chemicals would be stored in smaller returnable delivery containers. All chemical storage areas would be designed to contain leaks and spills in concrete containment areas.

B.1.4.7 DISTRIBUTED HYDROGEN SYSTEM

The project described the hydrogen use, supply and storage in the AFC, filed December 2, 2008. The hydrogen system was described as a k-bottle of hydrogen on each Power Conversion Unit (PCU). One hydrogen gas cylinder would contain approximately 195 cubic feet of hydrogen, used to replenish lost hydrogen gas within the gas circuit. Each k-bottle was to be supported from the base of the PCU boom. Each PCU's k-bottle would either need to be removed and replaced or refilled at each dish site as required (approximately two times per year). The applicant reconsidered the plan for providing hydrogen to the PCUs and has proposed an on-site hydrogen gas supply, storage and distribution system that would eliminate the need for the delivery of hydrogen k-bottles.

As a response to a staff data request, the applicant filed a modified the original project description to propose having the hydrogen gas supply produced through electrolysis by one on-site hydrogen generator. It is important to note that the hydrogen will not be generated from natural gas. The generator is capable of producing 1065 standard cubic feet of hydrogen per hour (scfh) and requires 146 watts/scf of electricity and 2.58 cubic inches of water/scf/hour during operation. Approximately 184 gallons of water per day, or 0.0133 acre feet per year would be required for this generator.

Water for the generator would be obtained from the BNSF Cadiz Valley groundwater wells or from groundwater wells adjacent to the project site, processed through the on-site Water Treatment Plant to produce de-mineralized Water and fed to the electrolyzer mounted on the hydrogen generator skid. The electrolyzer would eliminate any final impurities in the water prior to processing. The annual power consumption to meet the hydrogen production needs is 100 KW per day, or 36.64 MW per year. Although the hydrogen generator could run full time if needed to support SunCatcher hydrogen requirements, the generator would normally be operated at off-peak electric hours using grid power. The hydrogen gas would be stored in a steel storage tank capable of storing approximately a 2-day supply of hydrogen gas. It would be piped through a 1.5-inch stainless steel piping system to 87 individual compressor groups. Each compressor group will be electrically operated and consist of a compressor, delivering gas at approximately 2,900 pounds-force per square inch gauge (psig), and a high pressure supply tank.

Initially, it would take 3.4 scf of hydrogen to charge the Stirling engine. Each PCU is estimated to lose about 200 scf per year. Each high pressure supply tank would supply hydrogen gas to 360 SunCatchers via a 0.25-inch stainless tubing. A low pressure dump tank would be installed with each compressor group utilizing a 0.25-inch stainless steel return line to recover hydrogen gas when the SunCatchers are not in-service. This would reduce hydrogen leaks through fittings and seals on the Stirling Engine. In the event that the hydrogen generator fails, an unloading station designed to receive and transfer hydrogen gas to the storage tank would be installed to allow for the delivery of hydrogen gas to the site by an outside supplier. The hydrogen gas storage tank would provide a few days of hydrogen supply as a back-up system. The applicant would complete all scheduled maintenance to the hydrogen generator, when the gas supply is adequate.

B.1.4.8 TRANSMISSION SYSTEM INTERCONNECTION AND UPGRADES

This section describes the on-site substation and the transmission interconnection between the Calico Solar Project and the existing SCE electric grid.

The proposed project would include the construction of a new 230-kV Calico Solar Substation approximately in the center of the project site. The proposed project substation would consist of an open air bus with 15, 35-kV collection feeder circuit breakers. Each feeder breaker would be connected to one of the 48-MW or 51-MW overhead collection lines. Additional 35-kV circuit breakers would connect to power factor correction capacitor banks located in the substation yard. This new substation would be connected to the existing SCE Pisgah Substation via an approximately 2-mile, single-circuit, 230-kV transmission line. Other than this interconnection transmission line, no new transmission lines or off-site substations would be required for the 275-MW Phase I construction.

For the 275-MW Phase I of the project, the first interconnection substation would initially consist of 2 power transformers rated at 120/160/200 megavolt amperes (MVA) each to convert the generation collection voltage from 34.5 kV to the transmission tie voltage of 230 kV. The substation would ultimately contain 6 120/160/200-MVA, 34.5-kV to 230-kV step-up power transformers. Each power transformer would serve 3 of the 15 overhead collection lines (one 48-MW line and 2 51-MW lines).

The power transformers would be protected by 230-kV power circuit breakers. Provisions would be made to expand the Calico Solar Substation from 275 to 850 MW with the addition of 3 power transformers in Phase II of the proposed project. Each transformer would collect 150 MW of generation via 3 overhead 34.5-kV collection circuits, each protected by a 35-kV power circuit breaker. The 34.5-kV feeders would be terminated on outdoor circuit breakers.

Control, metering, and protection systems for the line, substation, and collection systems would be contained within a control building located adjacent to the Calico Solar Substation. The control building would also contain the necessary communications equipment to meet owner, California ISO, and SCE requirements. Additional substation equipment would include a 34.5-kV power-factor correction capacitor control system designed to meet the power factor and zero and low-voltage ride-through requirements of the Interconnect Agreement.

The on-site portion of the interconnection transmission line would be installed in a 100-foot ROW from the Calico Solar Project substation southeast to point of intersection with the SCE transmission ROW, then southwest to parallel the transmission ROW to the Pisgah Substation.

The transmission line towers would consist of H-Frame towers at the undercrossing of the existing 500-kV transmission line and double-circuit lattice steel towers and/or steel poles elsewhere. Both circuits of the overhead 230-kV transmission line would be constructed with one 1,590-kilo circular miles/phase, aluminum steel-reinforced conductor per line, each thermally rated to carry full project output in emergency conditions and one-half of project output in normal conditions. Two fiber optic cables would be provided for communication with SCE and the California Independent System Operator (California ISO).

B.1.5 RELATED FACILITIES (REASONABLY FORESEEABLE FUTURE ACTIONS)

This section describes reasonably foreseeable future actions related to the Calico Solar Project, that are outside of the BLM ROW grant and Energy Commission Decision addressed in this SA/DEIS. A series of upgrades for transmission capability purposes are anticipated by SCE. These projects would require additional environmental review and permitting.

B.1.5.1 SCE RELIABILITY NETWORK UPGRADES

Construction of the 275-MW Phase I of the Calico Solar Project would require an upgrade of the existing Pisgah Substation to a 500/220 kV substation designed for four 500/220 kV transformer banks. An upgrade would also be required to implement the Reduced Acreage Alternative of the Calico Solar project.

Construction of the 575-MW Phase II of the Calico Solar project, and delivery of the additional renewable power to the SCE system, would require the construction of Phase 2 Reliability Network Upgrades by SCE. The California Public Utilities Commission (CPUC) is the lead agency for CEQA compliance and the BLM is the lead agency for NEPA compliance on the Phase 2 Reliability Network Upgrades project. The SCE will need a Certificate of Public Convenience and Necessity from the CPUC for these Network Upgrades.

The SCE Phase 2 Reliability Network Upgrades Project consists of expansion of the Pisgah Substation and installation of new power transmission facilities. The major components of the upgrades project include:

- Extension of the existing Lugo 500kV Substation East and West Buses to provide for a new 500 kV transmission line position
- Removal of 65 miles of the existing Lugo-Pisgah No. 2 220 kV transmission line between Lugo Substation and Pisgah Substation
- Construction of approximately 65 miles of new 500 kV transmission line between the Lugo and Pisgah Substations. Approximately 55 miles of the new transmission line will utilize the right-of-way (ROW) vacated by the removal of the existing 220 kV line, and approximately 10 miles will require new ROW
- Looping the existing Eldorado-Lugo 500 kV transmission line into the expanded Pisgah 500 kV Substation to form the Eldorado-Pisgah 500 kV transmission line and the Lugo-Pisgah No. 1 500 kV transmission line
- Obtaining required ROW as follows:
    i. New ROW to accommodate new 500/220 kV Pisgah Substation, estimated to require 0.6 acres adjacent to the existing substation location.

ii. Update existing ROW to support construction of the new Lugo-Pisgah No. 2 500 kV transmission line within the existing ROW

iii. Approximately 10 miles of new ROW (near Lugo, California) to support construction of the new Lugo-Pisgah No. 2 500 kV transmission line when use of the existing ROW is not feasible

The environmental review of SCE's Phase 2 Reliability Network Upgrades project by the BLM and CPUC has not yet been initiated although applications have been received by BLM. Therefore the discussion related to SCE network upgrades are being addressed in this document as reasonably foreseeable future actions per NEPA.

B.1.6 CONSTRUCTION

The project would be constructed in two phases. Phase I of the project would consist of up to 11,000 SunCatchers configured in 183 1.5-MW solar groups of 60 SunCatchers per group, and have a net nominal generating capacity of 275 MW. Phase II would add approximately 23,000 SunCatchers, expanding the project to a total of approximately 34,000 SunCatchers configured in 567 1.5-MW solar groups with a total net generating capacity of up to 850 MW (see **Project Description Figure 2)**.

Heavy construction for the project would be scheduled to occur between 0700 and 1900 Monday through Friday. Additional hours may be necessary to make up schedule deficiencies or to complete critical construction activities.

Some activities would continue 24 hours per day, 7 days per week. These activities include, but are not limited to, SunCatcher assembly, refueling of equipment, staging of materials for the next day's construction activities, quality assurance/control, and commissioning.

Project construction would be performed in accordance with plans and mitigation measures that would assure the project conforms to applicable LORS and would avoid significant adverse impacts. These plans that are to be developed by the applicant, for which some have already been prepared in draft and reviewed by staff to support this environmental analysis, and the necessary mitigation measures, are specified in the Conditions of Certification as appropriate of each technical area of this SA/DEIS.

B.1.7 OPERATION AND MAINTENANCE

The Calico Solar Project would be an "as-available" resource. Therefore, the project would operate anywhere between a minimum of approximately 18 MW net when the first units are interconnected to the grid during the construction period to 850 MW on completion of construction. The capability for independent operation of all 34,000 units would give maximum flexibility in operations. The applicant expects that the project would have an annual availability of 99%.

The project would be dispatched by the California ISO, through day-ahead, hour-ahead, and real-time scheduling, as required to meet the demands of the Southern California market. The market would dictate unit operations and total power requirements. The

Calico Solar Project would operate approximately 3,500 hours per annum and is expected by the applicant to have an overall availability of 99% or higher. The number of available operating hours is determined by the availability of the sun's energy at greater than 250 watts per square meter. SunCatchers would be unable to generate electricity when the sun's energy is below 250 watts per square meter in the early morning or late evening hours and when cloud cover limits the sun's energy for power generation. Also, SunCatchers would be unable to generate electricity during daylight hours when the wind speed exceeds 35 miles per hour, as SunCatchers would be stowed in a safe de-track position at this wind speed to prevent damage. SunCatchers are designed to withstand wind speeds of 50 miles per hour in the operating mode and 90 miles per hour in the stowed position. Because the SunCatchers move slowly, they start moving into stow position once winds reach 35 miles per hour in order to be in stow position by the time winds reach 50 miles per hour. Because of the geographical size of the project, cloud cover and/or wind conditions may only affect a portion of the project at any given time.

It is expected that the Calico Solar Project would be operated with a staff of approximately 182 full-time employees. The project would operate 7 days per week, generating electricity during normal daylight hours when the solar energy is available. Maintenance activities would occur 7 days a week, 24 hours a day to ensure SunCatcher availability when solar energy is available.

Mirror washing would be needed approximately once every month, requiring 14 gallons of water per dish with an average washing rate of 20 minutes per washed dish pair. In addition to monthly washing, seasonal scrubbing is anticipated. Seasonal scrubbing would occur prior to peak electricity demand season, June through September.

Maintenance of the PCU's and associated vehicle operations would be required every 6,000 hours of running time.

B.1.8 DECOMMISSIONING AND RESTORATION

Introduction

Project closure can be temporary or permanent. Temporary closure is defined as a shutdown for a period exceeding the time required for normal maintenance. Causes for temporary closure include inclement weather and/or natural hazards (e.g., winds in excess of 35 mph, or cloudy conditions limiting solar insolation values to below the minimum solar insolation required for positive power generation, etc.), or damage to the project from earthquake, fire, storm, or other natural acts. Permanent closure is defined as a cessation in operations with no intent to restart operations owing to project age, damage to the project that is beyond repair, adverse economic conditions, or other significant reasons.

Temporary Closure

In the unforeseen event that the project is temporarily closed, a contingency plan for the temporary cessation of operations will be implemented. The contingency plan will be followed to ensure conformance with applicable LORS and to protect public health, safety, and the environment. The plan, depending on the expected duration of the shutdown, may include the draining of chemicals from storage tanks and other equipment and the safe shutdown of equipment. Wastes will be disposed of according to applicable LORS, as discussed in the **WASTE MANAGEMENT** section.

Permanent Closure

The planned life of the Calico Solar Project is 40 years. However, if the project is still economically viable, it could be operated longer. It is also possible that the project could become economically noncompetitive before 40 years have passed, forcing early decommissioning. Whenever the project is permanently closed, the closure procedure will follow a plan that will be developed as described below.

The removal of the project from service, or decommissioning, may range from “mothballing” to the removal of equipment and appurtenant facilities, depending on conditions at the time. Because the conditions that would affect the decommissioning decision are largely unknown at this time, these conditions would be presented to the Energy Commission, the BLM, and other applicable agencies for review and approval as part of the decommissioning plan. The decommissioning plan would discuss the following:

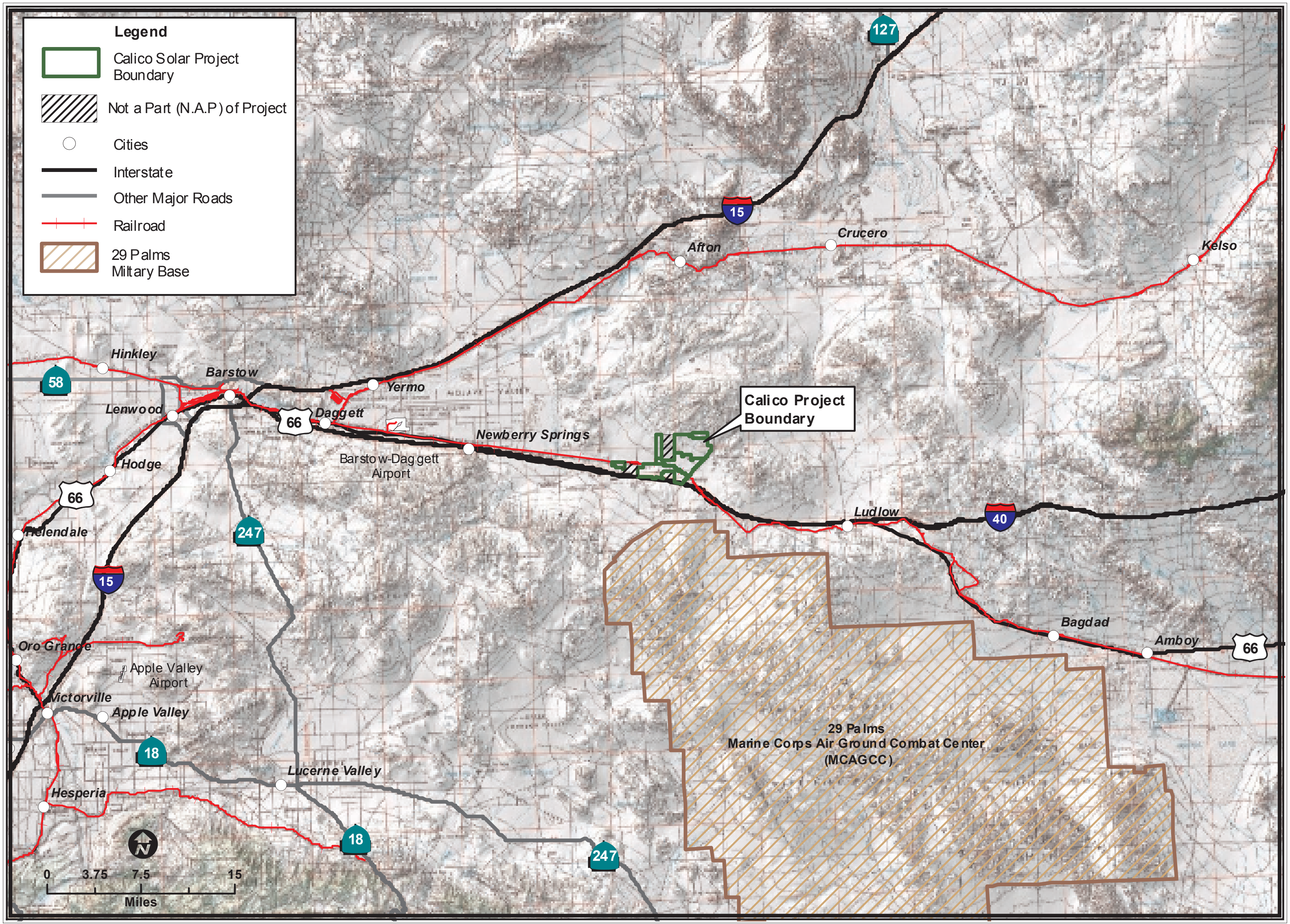
- proposed decommissioning activities for the project and appurtenant facilities constructed as part of the project,
- conformance of the proposed decommissioning activities with applicable LORS and local/regional plans,
- activities necessary to restore the project site if the plan requires removal of equipment and appurtenant facilities,
- decommissioning alternatives other than complete restoration to the original condition, and
- associated costs of the proposed decommissioning and the source of funds to pay for the decommissioning.

In general, the decommissioning plan for the project would attempt to maximize the recycling of project components. Calico Solar would attempt to sell unused chemicals back to the suppliers or other purchasers or users. Equipment containing chemicals would be drained and shut down to ensure public health and safety and to protect the environment. Nonhazardous wastes will be collected and disposed of in appropriate landfills or waste collection facilities. Hazardous wastes will be disposed of according to applicable LORS. The site will be secured 24 hours per day during the decommissioning activities, and Calico Solar will provide periodic update reports to the Energy Commission, the BLM, and other appropriate parties.

Similar to project construction and facility operations, decommissioning would be performed in accordance with plans and mitigation measures that would assure the project conforms to applicable LORS and would avoid significant adverse impacts. These plans that are to be developed by the applicant, for which some have already been prepared in draft and reviewed by staff to support this environmental analysis, and the necessary mitigation measures, are specified in the Conditions of Certification as appropriate for each technical area of this SA/DEIS. The BLM would also require mitigation and restoration as stipulated in the identified Plan of Development, as well as other federal agency requirements. The authorized project would be bonded consistent with agency policy.

PROJECT DESCRIPTION - FIGURE 1

Calico Solar Project - Regional Transportation Network

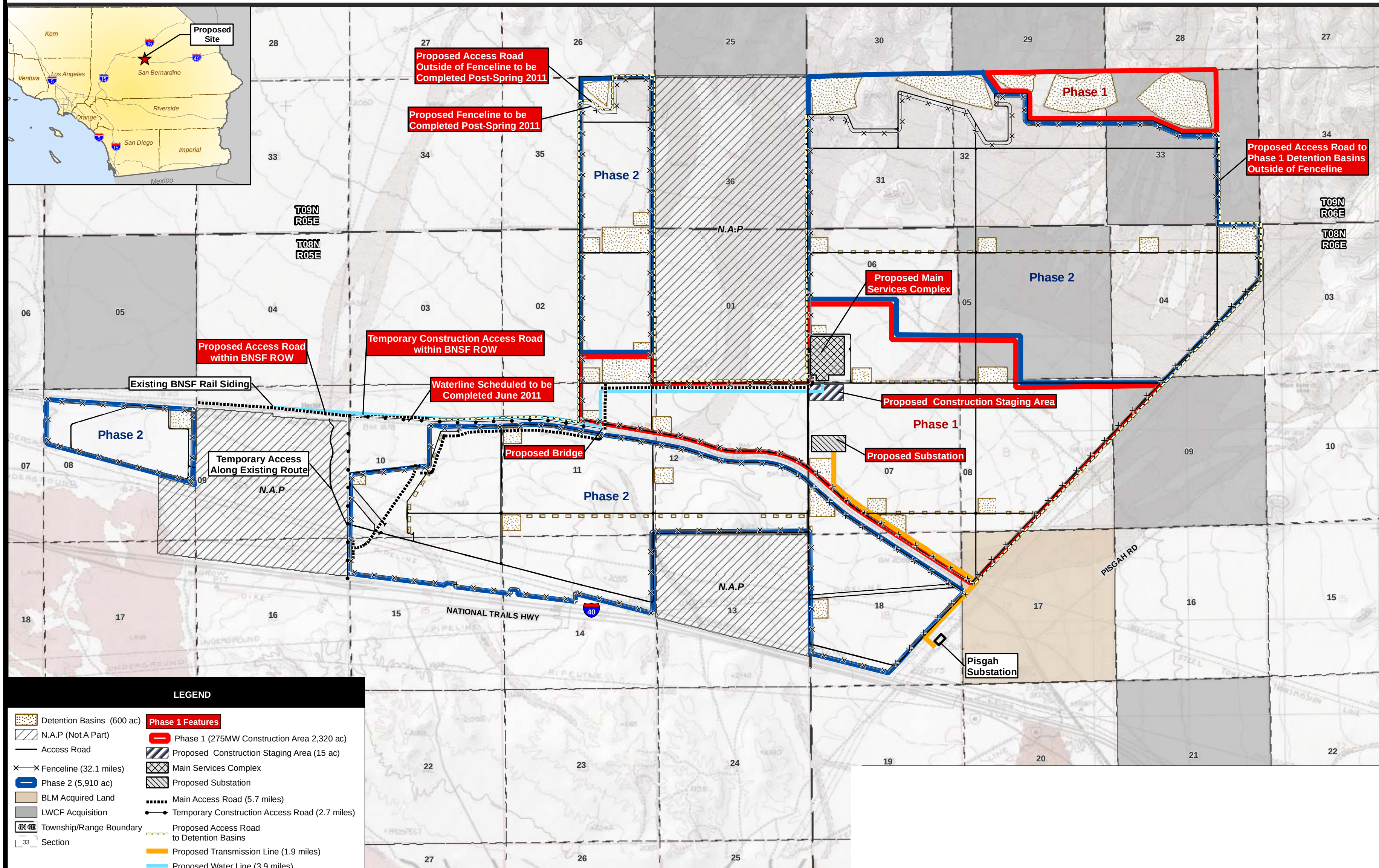


U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission - Tele Atlas Data - San Bernardino County

PROJECT DESCRIPTION - FIGURE 2

Calico Solar Project - Existing Projects - Project Layout

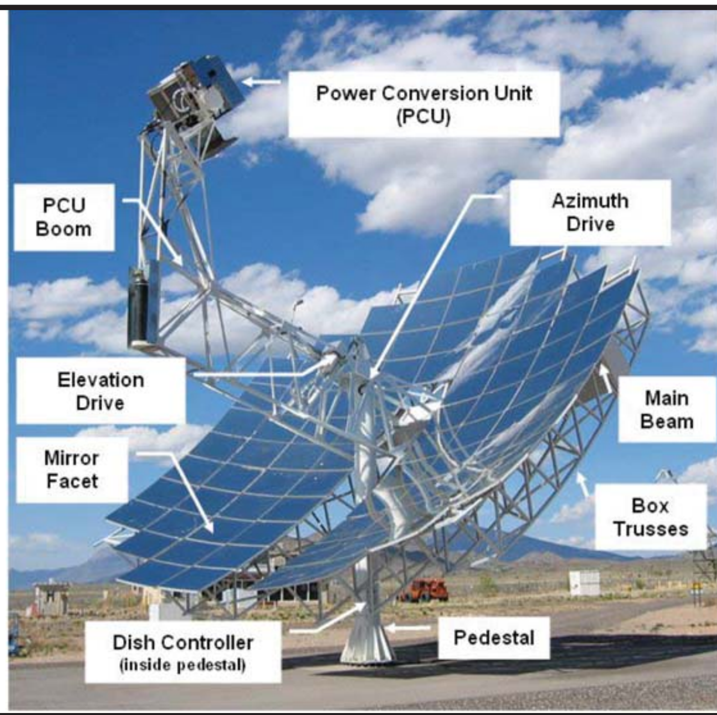


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: URS

PROJECT DESCRIPTION - FIGURE 3

Calico Solar Project - SunCatcher Details



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: SES Solar Two Project - AFC Photograph 1-1 and 1-2

B.2 – ALTERNATIVES

Testimony of Susan V. Lee

B.2.1 SUMMARY OF CONCLUSIONS

In this analysis of the Calico Solar Project (formerly the Stirling Energy Systems Solar One Project), 24 alternatives to the project were identified and evaluated. These include three alternative site locations or configurations, a range of different solar and renewable technologies, generation technologies using different fuels, and conservation/demand-side management. Of the 24 alternatives, two action alternatives were determined to be reasonable by the Bureau of Land Management because, as assessed, the two alternatives will avoid or minimize adverse effects of the proposed action. These two alternatives were also determined reasonable by the Energy Commission because they have the potential to result in reduced impacts in comparison with the proposed project: the Reduced Acreage Alternative and the Avoidance of Donated and Acquired Lands Alternative. In addition to the proposed action and the reasonable alternatives, the agencies considered the No Project/No Action Alternative.

The Reduced Acreage Alternative would be a 275 MW solar facility located within the central portion of the proposed 850 MW project. It would affect substantially less native vegetation, Mojave fringe toed-lizard, bighorn sheep, and desert tortoise, including east-west movement for desert tortoise. Additionally, the Reduced Acreage Alternative would avoid impacts to lands acquired by Land and Water Conservation Funds and would comply with all land use laws, ordinances, regulations, and standards. The alternative would also reduce impacts to visual resources to less than significant. However, as highlighted in the Section C.1 (Air Quality), the Reduced Acreage Alternative would reduce the benefits of the proposed Calico Solar Project in displacing fossil fuel fired generation and reducing associated criteria pollutant emissions. The extent to which the Reduced Acreage Alternative would be feasible or meet project objectives is uncertain.

The Avoidance of Donated and Acquired Lands Alternative would generate 720 MW. It was found to have impacts similar to the proposed project for most resource elements. The alternative avoids direct impacts to all lands within the Calico Solar Project boundary that were donated to or acquired by the Bureau of Land Management, but because a large parcel of lands purchased from Catellus would be entirely enclosed within the developed solar field, indirect impacts to this parcel would occur and the parcel would lose much of its value as wildlife habitat. The Avoidance of Donated and Acquired Lands Alternative would create the same general impacts to Mojave fringe-toed lizard, Nelson big-horn sheep, and other wide-ranging species as the proposed Calico Solar Project. However, the alternative would avoid impacts to lands acquired by Land and Water Conservation Funds and would comply with all land use laws, ordinances, regulations, and standards. The Avoidance of Donated and Acquired Lands Alternative would reduce the benefits of the proposed Calico Solar Project in displacing fossil fuel fired generation and reducing associated criteria pollutant emissions. The extent to which the Reduced Acreage Alternative would be feasible or meet project objectives is uncertain.

CEC staff has determined that the No Project/No Action Alternative is not superior to the proposed project because it would likely delay development of renewable resources or shift renewable development to other similar areas, and could lead to increased operation of existing power plants that use non-renewable technologies. However, the No Project/No Action Alternative is evaluated in detail in this SA/DEIS, as required by NEPA and CEQA.

One site alternative was evaluated in detail by the Energy Commission and evaluated under the California Environmental Quality Act only: the Private Lands Alternative. While the impacts of the site would be similar to those of the proposed site in many disciplines, the alternative site is likely to have less severe cultural, visual, and biological resources impacts than the proposed site, as it is located on disturbed lands used for agriculture. The Private Land Alternative presents an additional challenge: the Private Lands Alternative northern section is made up of approximately 64 parcels with 27 separate landowners and the Private Lands Alternative southern portion is made up of 45 parcels with 22 separate landowners. Due to the number of parcels that would have to be acquired, obtaining site control would be more challenging at this site. At the proposed site, BLM is the only land management entity. The Private Lands Alternative was not analyzed under NEPA because it is not consistent with the Federal agency's Purpose and Need statement for the proposed action.

Six alternative sites on federal lands were identified but were not evaluated in detail due to conflicting land use classifications and/or a greater potential for environmental impacts compared to the proposed project site. Alternative solar thermal technologies (solar trough, solar power tower, utility scale solar photovoltaics, and linear Fresnel) are also evaluated. As compared with the proposed solar trough technology, these technologies would not substantially change the severity of visual impacts, biological resources impacts and cultural impacts, though land requirements and water use vary among the technologies. Distributed solar photovoltaic facilities would likewise require extensive acreage, although distributed PV would minimize the need for undisturbed open space. However, increased deployment of distributed solar photovoltaics faces challenges in manufacturing capacity, cost, and policy implementation.

Other generation technologies (wind, geothermal, biomass, tidal, wave, natural gas, and nuclear) are also examined as possible alternatives to the project. These technologies would either be infeasible at the scale of the Calico Solar Project, or would not eliminate significant impacts caused by the Calico Solar Project without creating their own significant impacts in other locations. A natural gas plant would contribute to greenhouse gas emissions and would not meet the project's renewable generation objective. Construction of new nuclear power plants is currently prohibited under California law.

Conservation and demand side management programs would likely not meet the state's growing electricity needs that would be served by the Calico Solar Project. In addition, these programs would not provide the renewable energy required to meet the California Renewable Portfolio Standard requirements.

Staff's analysis of renewable energy technology options indicates that contributions from each commercially available renewable technology will be needed to meet SCE's

RPS requirements and to achieve the statewide RPS target for 2020 (between 45,000 gigawatt hours (GWhs) to almost 75,000 GWhs according to the 2009 IEPR). Wave and tidal technologies are not yet commercially available in the United States. Therefore, the combined contribution of the alternatives of wind, distributed solar photovoltaic, geothermal, and biomass is needed to complement rather than substitute for the Calico Solar Project solar thermal contribution to meeting SCE and statewide RPS requirements. The table below indicates that each of these four alternative technology options, when considered individually, is insufficient to meet the project objectives related to the RPS.

Alternatives Table 1 lists the alternatives retained for analysis in this SA/DEIS and those eliminated, and summarizes the rationale for each conclusion.

Alternatives Table 1
Summary of Alternatives Retained and Eliminated

Alternative	Rationale for Retention or Elimination
Alternatives Retained for CEQA and NEPA analysis	
Proposed Project/Action - 850 MW - 8,230 acres - 34,000 SunCatchers	Retained. Evaluated as the applicant's proposal.
Reduced Acreage Alternative - 275 MW - 2,600 acres (31% of proposed) - 11,000 SunCatchers	Retained. Evaluated in the SA/DEIS because it would substantially reduce impacts of the Calico Solar Project while meeting most or all of the project objectives.
Avoidance of Donated and Acquired Lands Alternative - 720 MW - 7,050 acres (85 % of proposed) - 28,800 SunCatchers	Retained. Evaluated in the SA/DEIS because it would substantially reduce impacts to acquired and donated lands from the Calico Solar Project while meeting most or all of the project objectives as required by CEQA. It is assessed as a reasonable alternative under NEPA because it will avoid or minimize adverse effects of the proposed action and would be consistent with BLM interim management policy.
No Project/No Action Alternative	Retained. Required under CEQA and NEPA. Note that additional NEPA No Action Alternatives are described below under Land Use Plan Amendment Alternatives.
CDCA Plan Amendment Actions with Alternatives Evaluated under NEPA	
Authorize Calico Solar Project through a CDCA Land Use Plan amendment	Retained as part of Proposed Action. Action would be required under the CDCA Plan of 1980, as amended, for BLM to authorize a ROW for the project location.
Authorize a reduced size project within the proposed project's boundaries through a CDCA Land Use Plan amendment (Reduced Acreage Alternative, Avoidance of Donated and Acquired Lands Alternative)	Retained as part of either action alternative. A smaller project reduces impacts; site location is an action for which an amendment to the CDCA Plan of 1980, as amended, would be required for BLM to authorize a ROW for this location.
Do not approve the ROW grant and do not amend the CDCA Land Use Plan of 1980, as amended.	Retained as the first NEPA No Action Alternative: deny the ROW application and do not amend the CDCA Land Use Plan of 1980.

Alternative	Rationale for Retention or Elimination
Do not approve the ROW grant and amend the CDCA Land Use Plan of 1980, as amended, to make the area unavailable for future solar development.	Retained as the second NEPA No Action Alternative: deny the ROW application and amend the CDCA Land Use Plan of 1980 to make the site unavailable for any future solar development.
Do not approve the ROW grant and amend the CDCA Land Use Plan of 1980 to make the area available for future solar development.	Retained as the third NEPA No Action Alternative: deny the ROW application but amend the CDCA Land Use Plan of 1980 to make the site available for future solar development.
Site Alternatives Evaluated under CEQA and not NEPA	
Private Land Alternative	Would substantially reduce impacts of the Calico Solar Project while meeting most project objectives.
Public Land Alternatives Eliminated from Detailed Analysis	
Camp Rock Road (AS1)	Would not substantially reduce impacts of the Calico Solar Project; located in Category I desert tortoise habitat, partially located in the Johnson Valley OHV area and would require use of LWCF acquisition lands.
Upper Johnson Valley (AS2)	Would not substantially reduce impacts of the Calico Solar Project; located entirely within the Upper Johnson Valley OHV Area and in study area for MCAGCC Twentynine Palms expansion.
West of Twentynine Palms Military Base (AS3)	Would not substantially reduce impacts of the Calico Solar Project; located entirely within the Upper Johnson Valley OHV Area and in study area for MCAGCC Twentynine Palms expansion, would require use of LWCF acquired lands.
I-40 South (AS4)	Would not substantially reduce impacts of the Calico Solar Project; located in desert tortoise critical habitat, would impact approximately 3 miles of the Pisgah Crater Lava Flow, would potentially impact access to three existing mines.
Broadwell Lake (AS5)	Would not substantially reduce impacts of the Calico Solar Project; potentially located within proposed national monument; pending right-of-way grant application for the site, therefore not considered a viable alternative.
SES Solar Three Alternative	Pending right-of-way grant application for the site, therefore not considered a viable alternative.
Technology Alternatives Evaluated	
Alternative	**Rationale for Retention or Elimination**
Parabolic Trough Technology	Would not substantially reduce impacts of the Calico Solar Project
Solar Power Tower Technology	Would not substantially reduce impacts of the Calico Solar Project
Linear Fresnel Technology	Would reduce area required by 40% but would not eliminate significant impacts of the Calico Solar Project
Solar Photovoltaic Technology – Utility Scale	Would not substantially reduce impacts of the Calico Solar Project

Alternative	Rationale for Retention or Elimination
Distributed Solar Technology	While it will very likely be possible to achieve 850 MW of distributed solar energy over the coming years, the limited numbers of existing facilities make it difficult to conclude with confidence that this much distributed solar will be available within the timeframe required for the Calico Solar Project. Barriers exist related to interconnection with the electric distribution grid. Solar PV is one components of the renewable energy mix required to meet the California Renewable Portfolio Standard requirements, and additional technologies like solar thermal generation, would also be required.
Wind Energy	While there are substantial wind resources in the region, environmental impacts could also be significant so wind would not reduce impacts in comparison to the Calico Solar Project. Also, wind is one of the components of the renewable energy mix required to meet the California Renewable Portfolio Standard requirements, so additional technologies like solar thermal generation, would also be required.
Geothermal Energy	Despite the encouragement provided by Renewable Portfolio Standards and ARRA funding, few new geothermal projects have been proposed in the California and no geothermal projects are included on the Renewable Energy Action Team list of projects requesting ARRA funds. Therefore, the development of 850 MW of new geothermal generation capacity within the timeframe required for the Calico Solar Project is considered speculative.
Biomass Energy	Most biomass facilities produce only small amounts of electricity (in the range of 3 to 10 MW) and so could not meet the project objectives related to the California Renewable Portfolio Standard. In addition, between 85 and 250 facilities would be needed to achieve 850 MW of generation, creating substantial adverse impacts.
Tidal Energy	Tidal fence technology is commercially available in Europe. However, it has not been demonstrated and proven at the scale that would be required to replace the proposed project, particularly with Pacific tides. Therefore, it would not substantially reduce impacts of the Calico Solar Project.
Wave Energy	Unproven technology at the scale that would be required to replace the proposed project; it may also result in substantial adverse environmental impacts
Natural Gas	Would not attain the objective of generating renewable power meeting California’s renewable energy needs
Coal	Would not attain the objective of generating renewable power meeting California’s renewable energy needs and is not a feasible alternative in California
Nuclear Energy	The permitting of new nuclear facilities in California is not currently allowable by law

Alternative	Rationale for Retention or Elimination
Conservation and Demand-side Management	Conservation and demand-management alone are not sufficient to address all of California's energy needs, and would not provide the renewable energy required to meet the California Renewable Portfolio Standard requirements

B.2.2 INTRODUCTION

Calico Solar, LLC proposes to build the Calico Solar Project on BLM land, which is under the jurisdiction of the federal government. Since the Bureau of Land Management (BLM) is a federal agency, the Calico Solar Project power plant is subject to review under the National Environmental Policy Act (NEPA) in addition to CEQA. The purpose of this alternatives analysis is to identify range of reasonable alternatives which, under CEQA, would feasibly attain most of the basic objectives of the project but would substantially lessen or avoid any potentially significant adverse impacts of the proposed project, or under NEPA, would inform decision-makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment [40 CFR 1502.1]. This section summarizes the potentially significant adverse impacts of the proposed project and analyzes different technologies and alternative sites that may reduce or avoid some or all of those significant adverse impacts.

Of the 24 alternatives, two alternatives in addition to the proposed project were determined to be feasible by both the BLM and Energy Commission: the Reduced Acreage Alternative and the Avoidance of Donated and Acquired Lands Alternative. These alternatives and the no project/no action alternatives are described in Section B.2.6 and are analyzed in detail within each of the technical sections of this document. Any of these alternatives – the proposed action, one of the action alternatives, or one of the no action alternatives – may be selected by either BLM or the Energy Commission as that agency's respective Preferred Alternative.

Section B.2.7 presents analysis of the site alternatives that are evaluated under CEQA only and presents the plan amendment alternatives evaluated under NEPA only. The section also presents the discussion and analysis of all alternatives eliminated from consideration by both the Energy Commission and the BLM.

B.2.3 ALTERNATIVES DEVELOPMENT AND SCREENING PROCESS

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Calico Solar, LLC proposes to build the Calico Solar Project on federal land within the jurisdiction of the BLM. Since the BLM is a federal agency and the California Energy Commission has State authority to license thermal power plants, the Calico Solar Project power plant is subject to review under both NEPA and CEQA.

California Environmental Quality Act Criteria

The *Guidelines for Implementation of the California Environmental Quality Act*, Title 14, California Code of Regulation, section 15126.6(a), provides direction by requiring an evaluation of the comparative merits of "a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project." In addition, the analysis must address the No Project Alternative (Cal. Code Regs., tit. 14, § 15126.6(e)).

The range of alternatives is governed by the "rule of reason" which requires consideration only of those alternatives necessary to permit informed decision making and public participation. CEQA states that an environmental document does not have to consider an alternative of which the effect cannot be reasonably ascertained and of which the implementation is remote and speculative (Cal. Code Regs., tit. 14, § 15125(d)(5)).

National Environmental Policy Act Criteria

NEPA requires that the decision-makers and the public be fully informed of the impacts associated with the proposed project. The intent is to make decisions based on an understanding of environmental consequences, and to take actions to protect, restore, and enhance the environment.

Regulations promulgated by the Council on Environmental Quality require that an EIS rigorously explore and objectively evaluate all reasonable alternatives to a proposed action. Reasonable alternatives are those for which effects can be reasonably ascertained, whose implementation is not remote or speculative, that are feasible, effective, are not remote from reality, and those that are consistent with the basic policy objectives for management of the area. (40 CFR 1502.14; CEQ Forty Questions, No. 1A; Headwaters , Inc. v. BLM, 914 F.2d. 1174 (9th Cir. 1990)). Reasonable alternatives are dictated by the nature and scope of the proposed action. To determine reasonable alternatives, an agency must define the purpose and need of the proposal. The purpose and need of the proposed action is to be evaluated under a reasonableness standard. CEQ regulations state that an agency should include reasonable alternatives not within the jurisdiction of the lead agency [40 CFR 1502.14(c)]. BLM interprets this to apply to exceptional circumstances and limits its application to broad, programmatic EISs that would involve multiple agencies. For most actions, the purpose and need statement should be constructed to reflect BLM's discretion consistent with its decision space under its statutory and regulatory requirements. Thus, alternatives that are not within BLM jurisdiction would not be considered reasonable. Further, "[i]n determining the scope of alternatives to be considered, the emphasis is on what is 'reasonable' rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative..." (CEQ Forty Questions, No. 2a.)

Consideration of a No Action Alternative is mandated by NEPA. As with the CEQA No Project Alternative, this is the scenario that would exist if the proposed project were not constructed and no land use plan amendment were undertaken. Under the first NEPA No Action Alternative, the land would continue to be managed by BLM under the existing management plan as defined in the California Desert Conservation Area plan.

This SA/DEIS also evaluates two other NEPA No Action Alternatives. The second No Action Alternative would not approve the project and would approve a plan amendment to allow other solar projects on the proposed project site. The third No Action Alternative would not approve the project and would approve a plan amendment to prohibit solar or renewable project development at the site.

B.2.4 SCREENING METHODOLOGY

To prepare the alternatives analysis, the following methodology was used:

1. Develop an understanding of the project, identify the basic objectives of the project, and describe its potentially significant adverse impacts.
2. Identify and evaluate technology alternatives to the project such as increased energy efficiency (or demand-side management) and the use of alternative generation technologies (e.g., solar or other renewable or nonrenewable technologies).
3. Identify and evaluate alternative locations.
4. Evaluate potential alternatives to select those qualified for detailed evaluation. Under NEPA, explore and evaluate all reasonable alternatives, and of those reasonable alternatives, identify those that would avoid or minimize adverse impacts or enhance the quality of the human environment
5. Evaluate the impacts of not constructing the project, known as the No Project Alternative under CEQA and the No Action Alternative under NEPA.

Based on this methodology, each potential alternative was evaluated according the following criteria for its ability to:

- for CEQA purposes, avoid or substantially lessen one or more of the potential significant adverse effects of the project as described above;
- for CEQA purposes, meet most or all of the project objectives;
- for NEPA purposes, be consistent with BLM's purpose and need, and be otherwise reasonable.

B.2.4.1 APPLICANT'S PROJECT OBJECTIVES AND PURPOSE

Two primary objectives are set forth by the applicant (SES 2008a):

- to provide clean, renewable, solar-powered electricity and to assist Southern California Edison (SCE) in meeting its legislatively mandated obligations under California's Renewable Portfolio Standard Program;
- to assist SCE in reducing its greenhouse gas emissions as required by the California Global Warming Solutions Act of 2006.

Additionally, the applicant states the purpose of the project as:

- to provide up to 850 MW of renewable electric capacity under a 20-year power purchase agreement (PPA) to SCE;
- to contribute to the achievement of the 20% renewables RPS target set by California's governor and legislature;

- to assist in reducing greenhouse gas emissions from the electricity sector;
- to contribute to meeting California's future electric power needs, and
- to assist the California Independent System Operator (CAISO) in meeting its strategic goals for the integration of renewable resources, as listed in its Five-Year Strategic Plan for 2008-2012.

B.2.4.2 PROJECT OBJECTIVES OF THE ENERGY COMMISSION (CEQA)

After considering the objectives set out by the applicant, the Energy Commission has identified the following basic project objectives, which are used to evaluate the viability of alternatives in accordance with CEQA requirements:

- to construct and operate an up to 850 MW renewable power generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities;
- to locate the facility in areas of high solarity with ground slope of less than 5%.

In addition, when considering retention or elimination of alternative renewable technologies, in addition to evaluating the likelihood of reducing or eliminating the potential impacts of Calico Solar Project at its proposed site, staff evaluated whether alternative technologies could meet the following key project objectives:

- to provide clean, renewable electricity and to assist Southern California Edison in meeting its obligations under California's Renewable Portfolio Standard Program (RPS);
- to assist SCE in reducing its greenhouse gas emissions as required by the California Global Warming Solutions Act; and
- to contribute to the achievement of the 33% RPS target set by California's governor and legislature.

B.2.2.3 PURPOSE AND NEED FOR PROPOSED PROJECT AND PLAN AMENDMENT (BLM)

Bureau of Land Management. Federal orders and laws require government agencies to expedite the review of energy related projects to the extent allowed by law, evaluate energy generation projects and facilitate the development of renewable energy sources. The Energy Policy Act of 2005 (EPAct) encourages the United States Department of the Interior (DOI) to approve at least 10,000 MW of renewable energy on public lands by 2015. Executive Order 13212, dated May 18, 2001, mandates that agencies expedite their "review of permits or take other actions as necessary to accelerate the completion of such projects, while maintaining safety, public health, and environmental protections" in the "production and transmission of energy in a safe and environmentally sound manner." .

Secretarial Order 3283, *Enhancing Renewable Energy Development on the Public Lands*, requires the BLM to ensure that processing and permitting of renewable energy projects complies with the requirements of the National Environmental Policy Act, Endangered Species Act, National Historic Preservation Act, and all other laws and regulations; improve efficiencies in the processing of renewable energy applications and the consistent application of renewable energy policies; and develop Best Management Practices for renewable energy projects on public lands to ensure the most environmentally responsible development of renewable energy, among other things.

Secretarial Order 3285, *Renewable Energy Development by the Department of the Interior* requires BLM to encourage the development of environmentally responsible renewable energy generation. Both of these Secretarial Orders will be considered in responding to the Calico Solar, LLC application for the proposed Calico Solar Project.

Calico Solar, LLC has filed an application with BLM for a land use right-of-way (ROW) grant pursuant to the Federal Land Policy and Management Act (FLPMA, 43 USC 1761). Under FLPMA Title V Section 501 (a)(4) (Rights-of-Way), the United States Secretary of the Interior, as delegated to the BLM, is authorized to grant ROW on lands under the jurisdiction of the BLM for the purpose of allowing systems for generation, transmission, and distribution of electric energy.

BLM Purpose and Need Statement: The BLM's purpose and need for action is to respond to the application under Title V of FLPMA for a ROW grant to construct, operate and decommission the Calico Solar Project and associated infrastructure in compliance with FLPMA, BLM ROW regulations, and other applicable federal laws. The BLM will decide whether to approve, approve with modification, or deny issuance of a ROW grant to Calico Solar for the proposed Calico Solar Project. BLM's actions will also include concurrent consideration of amending the California Desert Conservation Area (CDCA) Plan of 1980. The decision the BLM will make is whether or not to grant a ROW and, if so, under what terms and conditions, and whether or not to amend the land use plan.

As discussed in Section A, solar power facilities are an allowable use of lands under BLM jurisdiction in Multiple Use Class (MUC) L (limited use) areas. Since the site for the proposed Calico Solar Project is currently classified within an MUC L area, solar power facilities are generally allowed. However, Chapter 3, the “Energy Production and Utility Corridors Element” of the CDCA Plan requires that newly proposed sites associated with power generation or transmission facilities not already identified in the Plan will be considered through the plan amendment process. The proposed Calico Solar Project site is not currently identified in the proposed power facility and transmission line element within the Plan. As such, a plan amendment is required in order to approve the site location consistent with the CDCA Plan.

Department of Energy. Calico Solar has also applied to the United States (US) Department of Energy (DOE) for a loan guarantee pursuant to Title XVII of the EPAct. Title XVII of EPAct authorizes the United States Secretary of Energy to make loan guarantees for a variety of types of projects, including those that “avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued.” The two principal goals of the loan guarantee program are to encourage commercial use in the United States of new or significantly improved energy-related technologies and to achieve substantial environmental benefits. The purpose and need for action by DOE is to comply with their mandate under EPAct by selecting eligible projects that meet the goals of the Act.

B.2.4.4 SUMMARY DESCRIPTION OF THE PROPOSED PROJECT AND PROJECT IMPACTS

Section B.1 of the SA/EIS provides a detailed description of the proposed project, and a summary is presented here as context for the alternatives analysis. The proposed Calico Solar Project is a nominal 850 MW solar plant located on approximately 8,230 acres. Due to limitations in the SCE transmission system, the project is proposed for development in two phases, as follows:

- Phase I would include 11,000 SunCatchers located on approximately 2,320 acres and would create 275 MW of solar energy;
- Phase II would include 23,000 SunCatchers located on approximately 5,910 acres and would create 575 MW of solar energy.

Each phase is divided into groups consisting of 60 SunCatchers that would create 1.5 MW and be connected in series of 3, 6, and 9 MW. These groups would be clustered and connected to overhead collection lines at 48 or 51 MWs.

For Phase I, the project would include a new on-site Calico electrical substation and an approximately 2 mile long transmission line interconnection with SCE’s Pisgah substation and would require an expansion and upgrade to the existing Pisgah substation increasing the voltage to 500 kV. Phase I would also require installation of a fiber optics link on SCE’s Pisgah to Lugo and Pisgah to Gale transmission lines.

Phase II of the project would require upgrading approximately 65 miles of the existing Lugo-Pisgah No. 2 220 kV transmission line to 500 kV with new infrastructure. Either additional expansion of the Pisgah Substation or a newly located substation would be required. Ten miles of new transmission route may be required.

Based on the analysis presented in the technical sections of this Staff Assessment/Draft Environmental Impact statement (SA/DEIS), the issues defined below have been identified as issues of greatest concern the proposed Calico Solar Project. These are the issues that most drive the development of alternatives.

- Cultural Resources: The proposed Calico project would have a significant direct impact on historically significant archaeological resources. Mitigation for project impacts to cultural resources will be handled in a Programmatic Agreement (PA) negotiated among all stakeholders-federal, state, and private. Development of the PA by the BLM is underway, but will not be completed until mid-summer
- Biological Resources: The Calico Solar Project would have major impacts to the biological resources of the Newberry Springs/Ludlow area of the Mojave Desert, affecting many sensitive plant and wildlife species and eliminating a broad expanse of relatively undisturbed Mojave Desert habitat. Implementation of the Calico Solar Project will result in adverse effects to desert tortoise. Construction of the proposed project would result in the permanent loss of approximately 8,230 acres of occupied desert tortoise habitat (5,829 acres of good quality habitat north of the Burlington

Northern Santa Fe (BNSF) Railroad and 2,390 acres of less suitable habitat below the BNSF tracks). In addition, the applicant has indicated that approximately 100 desert tortoises would need to be translocated outside of the Calico Solar Project site. The project would interfere with both aeolian and fluvial sand deposits on and near the site, which would result in habitat loss and degradation for the Mojave fringe-toed lizard and other sand-associated species and would result in direct impacts to occupied habitat. Golden eagles are known to nest within 5 miles of the project site and have been observed foraging over the project area. The large scale land use conversion for the Calico Solar project would in essence remove approximately 8,230 acres of foraging habitat for this species. The project would directly or indirectly affect numerous ephemeral washes that occur on the Calico Solar site. Cumulative effects to the watershed streams, desert tortoise, Mojave fringe-toed lizard, and white-margined beardtongue from the project in combination with future projects would be significant.

- Visual Resources: The proposed project would substantially degrade the existing visual character and quality of the site and its surroundings, resulting in potentially significant impacts to motorists on Highway Interstate 40 and National Trails Highway/Route 66. The anticipated visual impacts of the Calico Solar Project in combination with past and foreseeable future local projects in the immediate project viewshed, and past and foreseeable future region-wide projects in the southern California desert are considered cumulatively considerable, potentially significant, and unavoidable.
- Land Use: In an Interim policy dated May 28, 2009, the State Director of the BLM issued an Instruction Memorandum regarding management of donated land and lands acquired by Land and Water Conservation Funds (LWCF), which requires LWCF lands to be managed as avoidance/exclusion areas for land use authorizations that could result in surface disturbing activities (BLM 2009a). Construction and operation of the proposed project would not comply with this policy. Additionally, for purposes of CEQA compliance Impacts related to laws, ordinances, regulations, and standards compliance would be significant and unavoidable.

The alternatives analysis focuses on the consideration of these impacts and the extent to which they could be reduced or eliminated by alternatives to the proposed project as required by CEQA, and the extent to which the alternatives would avoid or minimize adverse effects or enhance the quality of the environment pursuant to NEPA.

B.2.5 SUMMARY OF SCOPING AND SCREENING RESULTS

The public scoping comment period, which occurred from June 8, 2009 to July 9, 2009, allowed the public and regulatory agencies an opportunity to comment on the scope of the SA/DEIS, comment on the alternatives considered, and identify issues that should be addressed in the SA/DEIS. An information hearing and public site visit and BLM public scoping meeting was held in Barstow, California on June 22, 2009.The discussion below presents the key issues identified from the written and oral comments received during the scoping process on the Calico Solar Project. The specific issues regarding alternatives that were raised during the public scoping process are:

- Concerns regarding alternatives, suggestions for a reduced alternative, alternative sites, continued recreational access alternative, degraded lands, and smaller sites, alternative technologies, and distributed rooftop solar (See Section B.2.6.1, Section B.2.6.2, B.2.7.2, and B.2.8.2)
- Concerns regarding the viability of the proposed technology
- A reconfigured alternative was suggested by the Defenders of Wildlife that would removed portions northeastern part of the project and incorporate some land that is immediately west of the proposed Calico Solar Project and north of the railroad (DW 2010b) (See Section B.2.6.1 and B.2.8.1 SES Solar Three Alternative)

Scoping comments are also listed in **Introduction Table 1** of the **INTRODUCTION** section of this SA/DEIS and in the BLM's Final Scoping Report, which is available for review at BLM's Barstow Field Office as part of the EIS administrative record.

B.2.6 ALTERNATIVES EVALUATED UNDER BOTH CEQA AND NEPA

Section B.2.1 describes the requirements for evaluation of alternatives under NEPA and CEQA. This section describes the three alternatives to the proposed project that are retained for analysis: the Reduced Acreage Alternative, the Avoidance of Donated and Acquired Lands Alternative, as well as the No Project/No Action Alternative. The proposed project is described in Section B.1. The proposed project and the retained alternatives are evaluated under both NEPA and CEQA in Sections C and D (Environmental and Engineering Analysis).

B.2.6.1 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would be a 275 MW solar facility located within the boundaries of the proposed project as defined by Calico Solar. This alternative is analyzed because (1) it eliminates about 67% of the proposed project area so all impacts are reduced, especially those related to desert washes, biological resources, and cultural resources, and (2) it could transmit the power generated without requiring an upgrade to 65 miles of the existing 220 kV SCE Pisgah-Lugo transmission line.

The Reduced Acreage Alternative would consist of 11,000 SunCatchers with a net generating capacity of approximately 275 MW occupying approximately 2,600 acres of land. This alternative would retain 31% of the proposed SunCatchers and would affect 33% of the land of the proposed 850 MW project.

The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**. This area was designed to avoid sensitive cultural resources and areas that were mapped as occupied tortoise habitat (live tortoise and/or active burrows and sign). It also excludes all donated lands and lands acquired by BLM with conservation funds. The boundaries of the Reduced Acreage Alternative do not coincide with the Applicant's Phase I project boundaries.

Similar to the proposed project, the Reduced Acreage Alternative would transmit power to the grid through the SCE Pisgah Substation and would require infrastructure including water storage tanks, transmission line, road access, main services complex, and substation (SES 2008a). However, as stated above, the Reduced Acreage alternative would not require the 65-mile upgrade to the SCE transmission line. SCE would complete system upgrades within existing substation boundaries to accommodate the 275 MW, and the 220 kV transmission line would be used. The main services complex, primary water well, and substation and onsite transmission line for the Reduced Acreage Alternative would remain at the location proposed for the proposed project.

As stated above, the Reduced Acreage Alternative is evaluated in this SA/DEIS because it would substantially reduce the impacts of the project. Additionally, the Reduced Acreage Alternative would allow the applicant to demonstrate the success of the Stirling engine technology and construction techniques, while minimizing impacts to the desert environment. A scaled-down project was suggested in numerous scoping comments.

B.2.6.2 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed project. This alternative is analyzed because (1) it eliminates about 15% of the proposed project area so all impacts are reduced, and (2) it would not require use of any lands that were donated to BLM or acquired by BLM through the Land and Water Conservation Fund program. This alternative would be consistent with the May 27, 2009 BLM Interim Policy Memorandum (CA-2009-020) on donated and acquired lands. The Interim Policy Memorandum (CA-2009-020) states the following.

- *Lands acquired by BLM under donation agreements, acquired for mitigation/compensation purposes and with LWCF funds, are to be managed as avoidance/exclusion areas for land use authorizations that could result in surface disturbing activities.*
- *Should BLM –California managers have use authorizations applications pending, or receive new applications on lands that meet the above criteria, they are required to notify the State Director and set up a briefing to address how to respond to those applications.*
- *Should managers have inquiries related to pre-application activities for any land use authorizations on lands that meet the above criteria, please notify applicants regarding the location of these lands as soon as possible and advise them to avoid these lands or provide details on how they would plan to operate or mitigate their project in a manner consistent with the values of the lands donated or acquired for conservation purposes.*

The Avoidance of Donated and Acquired Lands Alternative would contain approximately 28,800 SunCatchers with a net generating capacity of approximately 720 MW occupying approximately 7,050 acres of land. This alternative would retain 85% of the proposed SunCatchers and would affect 85% of the land of the proposed 850 MW project.

The boundaries of the Avoidance of Donated and Acquired Lands Alternative are shown in **Alternatives Figure 2**. The easternmost parcel of the alternative is bordered by LWCF acquired lands to the north, south, and west. Because this parcel could not be reached via project lands, access to this section would be limited to use of the existing transmission line access road that forms the eastern boundary of the parcel, therefore avoiding any new direct impacts to LWCF lands.

The Avoidance of Donated and Acquired Lands Alternative would transmit power to the grid through the SCE Pisgah Substation and would require infrastructure including water storage tanks, transmission line, road access, main services complex, and substation. Because the Avoidance of Donated and Acquired Lands Alternative would generate approximately 720 MW of power, it would require a 65-mile upgrade to the SCE Pisgah-Lugo transmission line. The main services complex, primary water well, and substation, and transmission line for the Reduced Acreage Alternative would be at the same locations as for the proposed project.

B.2.6.3 NO PROJECT/NO ACTION ALTERNATIVE

CEQA No Project Alternative

The No Project Alternative under CEQA defines the scenario that would exist if the proposed Calico Solar Project were not constructed. The CEQA Guidelines state that “the purpose of describing and analyzing a ‘no project’ alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project” (Cal. Code Regs., tit. 14 § 15126.6(i)). The No Project analysis in this SA/DEIS considers existing conditions and “what would be reasonably expected to occur in the foreseeable future if the project were not approved…” (Cal. Code Regs, tit. 14 § 15126.6(e)(2)).

If the No Project Alternative were selected, the construction and operational impacts of the Calico Solar Project would not occur. There would be no grading of the site, no loss of resources or disturbance of approximately 8,230 acres of desert habitat, and no installation of power generation and transmission equipment. The No Project Alternative would also eliminate contributions to cumulative impacts on a number of resources and environmental parameters in San Bernardino County and in the Mojave Desert as a whole.

In the absence of the Calico Solar Project, however, other power plants, both renewable and non-renewable, may have to be constructed to serve the demand for electricity and to meet RPS. The impacts of these other facilities may be similar to those of the proposed project because these technologies require large amounts of land like that required for the Calico Solar Project. The No Project/No Action Alternative may also lead to siting of other non-solar renewable technologies to help achieve the California RPS.

Additionally, if the No Project/No Action Alternative were chosen, additional gas-fired power plants may be built, or that existing gas-fired plants may operate longer. If the proposed project were not built, California would not benefit from the reduction in greenhouse gases that this facility would provide, and SCE would not receive the 850 MW contribution to its renewable state-mandated energy portfolio.

NEPA No Action Alternatives

Under NEPA, the No Action Alternative is used as a benchmark of existing conditions by which the public and decision makers can compare the environmental effects of the proposed action and the alternatives. Like the No Project Alternative described above, under the No Action Alternative, the impacts of the Calico Solar Project would not occur.

BLM is considering two separate actions (whether to approve a plan amendment and whether to approve the proposed project or an alternative). The "proposed action" includes amending the CDCA Plan to include Calico Solar Project (850 MW), and to approve the project as proposed (850 MW). The Calico Solar Project 850 MW project and ancillary facilities would be approved, a ROW grant would be issued, and the CDCA Plan would be amended to include the Calico Solar Project power generation facilities and transmission line as an approved site under the Plan. Similarly, BLM could amend the CDCA Plan to include one of the action alternatives fully analyzed in this Draft EIS (the Reduced Acreage or Avoidance of Donated and Acquired Lands alternatives), and approve the construction and operation of those alternatives. The alternative and ancillary facilities would be approved, a ROW grant for the appropriate acreage would be issued, and the CDCA Plan would be amended to include the alternative power generation facilities and transmission line as an approved site under the Plan.

BLM's alternatives related to the No Action Alternative and the Plan amendment are the following.

NO PROJECT/NO ACTION ALTERNATIVE #1

No Action on the Calico Solar Project Application and on CDCA Land Use Plan Amendment

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur.
- The land on which the project is proposed may or may not become available to other uses (including another solar project), depending on BLM's actions with respect to the amendment of the California Desert Conservation Area Plan.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

Under this alternative, the proposed Calico Solar Project would not be approved and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no new ground disturbance. As a result, no loss or degradations to cultural resources from construction or operation of the proposed project would occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

If this project is not approved, renewable projects would likely be developed on other sites in the California Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are large solar and wind projects proposed on BLM land along the Interstate 40 corridor within a few miles of the Calico Solar Project site. In addition, there are currently over 70 applications for solar projects covering over 650,000 acres pending with BLM in California.

NO PROJECT/NO ACTION ALTERNATIVE #2

No Action on Calico Solar Project and Amend the CDCA Land Use Plan to Make the Area Available for Future Solar Development

Under this alternative, the proposed Calico Solar Project would not be approved and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with a different solar technology. As a result, ground disturbance would result from the construction and operation of the facility providing different solar technology and would likely result in a loss or degradation to cultural resources. Different solar technologies require different amounts of grading and maintenance; however, it is expected that all solar technologies require some grading and ground disturbance. As such, this No Project/No Action Alternative could result in impacts to cultural resources similar to the impacts under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3

No Action on the Calico Solar Project Application and Amend the CDCA Land Use Plan to Make the Area Unavailable for Future Solar Development

Under this alternative, the proposed the Calico Solar Project would not be approved and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no corresponding land disturbance. As a result, the cultural resources of the site are not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in impacts to cultural resources. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

The potential impacts of each of the No Action Alternatives are addressed under each resource element of Sections C and D.

B.2.7 CEQA-ONLY ALTERNATIVES RETAINED

One site alternative is evaluated by the Energy Commission under CEQA only. The BLM considers the Private Lands Alternative in the category of "considered but eliminated from detailed analysis" because it would be inconsistent with BLM's purpose and need for the action under consideration or is otherwise an unreasonable alternative under NEPA. An unreasonable alternative under NEPA is one whose effects cannot be reasonably ascertained, whose implementation is remote or speculative, which is infeasible, ineffective, and remote from reality; which is inconsistent with basic policy objectives for management of the area. Reasonable alternatives are dictated by the nature and scope of the proposed action and are defined by the purpose and need.

CEQ regulations require that an alternatives analysis present the environmental impacts of the proposal and the alternatives in comparative form, sharply defining issues and providing a clear basis for choice among options by the decision-maker and the public (43 CFR 1502.14). They further require an analysis of reasonable alternatives that are not within the jurisdiction of the lead agency, and an analysis of the no action alternative.

While a project to be located on private land is not within the approval jurisdiction of the BLM as lead agency, if otherwise reasonable, it is still required to be analyzed by the BLM. A Private Land Alternative is not a reasonable alternative to the BLM since analysis of such an alternative, over which BLM has no discretionary approval authority, would not present impacts in a form that would define issues or provide a basis for choice in a manner any different than the no action alternative, which is fully considered in this document. Impact to public land resources would not occur if the project was located on private land just as impact to public land resources would not occur if the no action alternative was approved (and the project was denied). In addition, since the proposed actions under review in this document are whether to approve or deny, or approve with modification an application for the Calico Solar project to be sited on public land, analysis of a private land alternative would not be consistent with the stated purpose and need of the proposal. Finally, approval of a private land alternative is remote and speculative since BLM has no approval jurisdiction over such an alternative and no such application is before the private land project permitting authority, the CEC, and/or the County of San Bernardino, and the private land owners.

The alternative site evaluated in this section (Private Land Alternative) is located on private lands. The Energy Commission does not have the authority to approve an alternative or require Calico Solar to move the proposed project to another location, even if it identifies an alternative site that meets the project objectives and avoids or substantially lessens one or more of the significant adverse effects of the project. Implementation of an alternative site would require the applicant to submit a new Application for Certification (AFC), including revised engineering and environmental analyses. This more rigorous AFC-level analysis of any of the alternative sites could reveal environmental impacts; nonconformity with laws, ordinances, regulations, and standards; or potential mitigation requirements that were not identified during the more general alternatives analysis presented herein. Preparation and review of a new AFC for the Calico Solar Project on an alternative site would require substantial additional time.

Alternatives sites for the Calico Solar Project were suggested in scoping comments as means to reduce the project impacts to undisturbed land and desert environments. The Private Land Alternative was suggested by scoping comments, and numerous scoping comments suggested consideration of a private/disturbed land alternative. Scoping comments stated that because the Stirling technology is developed in clusters, it is not necessary for the solar facility site to be on a single contiguous parcel.

The Private Land Alternative site considered in the analysis in this SA/EIS is illustrated on **Alternatives Figure 3** at the end of this section.

B.2.7.1 SITE SELECTION CRITERIA

The following site selection criteria identified in the Calico Solar AFC were used to choose the proposed site (SES 2008a):

- facility should be located in an area of long hours of sunlight (low cloudiness), insolation should be at a level of 7 kilowatt-hours per square meter per day;
- the site should be relatively flat, site grade may be up to 5%;
- wind speed of less than 35 miles per hour 98% of the time;
- land must be available for sale or use, landowner must be willing to negotiate a long-term option agreement so that site control does not require a large capital investment until license is obtained;
- site should have ease of access and close proximity to access roads and railroads is preferred;
- site should have few or no environmentally sensitive areas (particularly biological and cultural resources) and should allow development with minimal environmental impacts;
- site should be located out of environmentally excluded areas (such as State and National Parks or areas of critical environmental concern);

- proposed use should be consisted with existing laws, ordinances, regulations, and standards;
- site should be located on property currently available at a reasonable cost.

The site criteria do not state a minimum acreage required for an 850 MW Stirling engine system facility. Within the 8,230 acres proposed for Calico Solar Project, approximately 3,270 acres would be graded for the project, including access roads and infrastructure (SES 2008a). It is assumed that additional acreage (approximately 5,000) would be required for project design and to avoid shading; however, the exact amount of total acreage required is unclear. Because the site alternatives do not contain major washes or sensitive habitat and cultural resources, it is possible that less than 8,230 acres would be required for an 850 MW facility at the Private Land site.

In a June 2009 comment letter, Audubon California and other groups defined a list of criteria for areas to avoid in siting renewable projects. This list is presented below, since it presents other factors related to site selection.

- Locations that support sensitive biological resources, including: federally designated and proposed critical habitat; significant populations of federal or state threatened and endangered species, significant populations of sensitive, rare and special status species, and rare or unique plant communities;
- Areas of Critical Environmental Concern, Wildlife Habitat Management Areas, proposed Habitat Conservation Plan and Natural Community Conservation Plan Conservation Reserves;
- Lands purchased for conservation including those conveyed to the BLM;
- Landscape-level biological linkage areas required for the continued functioning of biological and ecological processes;
- Proposed Wilderness Areas, proposed National Monuments, and Citizens' Wilderness Inventory Areas;
- Wetlands and riparian areas, including the upland habitat and groundwater resources required to protect the integrity of seeps, springs, streams or wetlands;
- National Register of Historic Places eligible sites and other known cultural resources;
- Locations directly adjacent to National or State Park units.

During the FLPMA ROW grant pre-application period, BLM worked closely with the project applicant to identify a feasible site without known environmental concerns. This effort resulting in an identification of the propose site, which does reflect many of the suggested criteria for siting presented by Audubon California as noted above. As a result of the pre-application activity (pre-scoping activity), and the scoping and public comment process, alternative sites considered in this SA/DEIS were selected based on an attempt to meet as many of these criteria as possible.

Other Sites on BLM Land

The BLM has received a large number of utility-scale solar energy project proposals for BLM-administered lands throughout California. The BLM processes solar energy ROW grant applications under its Solar Energy Development Policy (Instructional Memorandum No. 2007-097) and addresses environmental concerns for the utility-scale energy projects on a case-by-case basis in conformance with its existing policies, manuals, and statutory and regulatory authorities. Under its existing regulations, BLM determines if competing applications exist for the same facility or system. Applications that are first in time are given priority in consideration and are not considered competing applications with those filed later in time.

In addition, another site with an active pending application (Site 2) is not a reasonable alternative to a proposed project, such as Calico Solar Project. Site 2 is not a reasonable alternative because selection and approval of Site 2 in lieu of the proposed project (or one of its alternatives) is remote and speculative. If BLM were to consider Site 2 as an alternative to the proposed project, it would inherently be making a determination of reasonableness of the proposed alternative. However, an active pending application for Site 2 commands priority in consideration for that site location just as an active pending application for the Calico Solar Project site commands priority for its site location. Unless and until the active pending application for Site 2 is eliminated from consideration, the BLM would not approve the Site 2 alternative over the proposed project, in this case Calico Solar Project. Therefore, an alternative site on BLM land with an active pending application for another project is not considered a reasonable alternative to the proposed project for purposes of alternatives analysis.

The BLM and DOE are preparing a Programmatic Environmental Impact Statement (PEIS) on solar energy development in six states in the western U.S. (Arizona, California, Colorado, New Mexico, Nevada, and Utah) (USDOE 2008). As part of that PEIS, the BLM and DOE identified 24 tracts of BLM-administered land for in-depth study for solar development, some or all of which may be found appropriate for designation as solar energy zones in the future. The public scoping period on the solar energy zone maps ended in September 2009. The Draft PEIS is anticipated to be published in 2010.

B.2.7.2 PRIVATE LAND ALTERNATIVE

The proposed Calico Solar Project is described above. Multiple scoping comments requested that an alternative site be considered on disturbed land, and specifically on the agriculture lands and brownfields in the Daggett/Yermo area, thereby lessening the potential project impacts to the desert environment. Commenters also noted that because the technology allows for distributed units, a contiguous site may not be necessary.

The applicant considered two alternatives in the AFC that included the use of some private land (Upper Johnson Valley – AS2, and I-40 South – AS4; see **Alternatives Figure 4**). These sites were eliminated from further consideration by the applicant because they lacked railroad access and major highway access and conflicted with other uses. The sites are addressed in Section B.2-8, Alternatives Considered but not Evaluated in Further Detail.

There are limited areas where undeveloped contiguous private land exists within the California desert with the slope and solarity requirements defined by the applicant. The RETI Phase 2A Draft Final Maps (9/01/09) identified private, disturbed land appropriate for solar development east of Barstow, bounded by I-15 on the north and I-40 on the south. This land also achieves most of the site selection criteria defined by Calico Solar, provided earlier in this section, and was suggested in a scoping comment. The Mojave River passes through this region, and its floodplain ranges from about 2,000 feet to one mile wide. The river parallels I-15 on a northeasterly trend.

Alternatives Figure 3 shows this area of private land. **Alternatives Figure 3A and 3B** illustrate the alternative in more detail. This alternative is made up of two separate and unconnected sections. The Private Land Alternative northern section has a total of approximately 64 parcels (27 separate landowners) making up approximately 4,000 acres. The Private Land Alternative southern section has a total of approximately 45 parcels (22 separate landowners), also comprising approximately 4,000 acres. Because each section is approximately 4,000 acres, the alternative would require two phases, each approximately 425 MW. The alternative is considered viable as an alternative site because the Calico Solar project defines construction of separate groups of SunCatchers. However, because the alternative would not be one contiguous parcel, additional major equipment and substations would be required for at this site, increasing the cost of the project.

The Private Land Alternative northern section would be located on private land with a few BLM parcels included, south of and adjacent to Interstate 15 in the community of Harvard, north of Newberry Springs. The Private Land Alternative northern section has appropriate insolation and minimal slope. The elevation of the site is approximately 1,800 feet above mean sea level. The site would be accessed via Harvard Road, off Interstate 15 at the Harvard Road exit. The California Department of Fish and Game (CDFG) owns lands located just south of the site boundary. Additionally, there are several existing structures and residences on some of this private land, and removal of houses or other structures may be required.

The Private Land Alternative southern section is located north of the National Trails Highway and BNSF railroad. This land has appropriate insolation and minimal slope and has been previously graded for agriculture use. Existing solar thermal projects (SEGS I and II) are sited immediately south of the alternative and the original U.S. DOE Solar Two project was located at this site; however, it was decommissioned in November, 2009 and the site may potentially be developed as a solar energy project. The elevation of the site is between sea level and 20 feet below sea level. The site would be accessed via I-40 at the Hidden Springs Road exit.

The Private Land Alternative would require acquisition of approximately 110 parcels, although the number of separate landowners is fewer. Due to the number of parcels that would have to be acquired, this alternative would be substantially more challenging for an applicant to obtain site control (in comparison to BLM land). The applicant would have to negotiate separately with multiple landowners. The Draft Phase 2a Report published by the Renewable Energy Transmission Initiative (RETI) in early June 2009 identified private land areas for solar development only if there were no more than 20 owners in a 2 square mile (1,280 acre) area.

The Mojave River is located in between the Private Land Alternative northern section and the Private Land Alternative southern section. The river is dry most of the year and flows only during the largest rain events. The land use character of the immediate alternative site area is open space, agriculture, and rural residential. Desert Wildlife Management Areas (DWMA) for protection of desert tortoise are located north and south of the alternative.

Approximately five residences are located within the Private Land Alternative northern section. Existing agriculture structures are located on the Private Land Alternative southern section. The Private Land Alternative would also be located adjacent to low density residential areas near Daggett and Newberry Springs. The Private Land Alternative southern section would be located adjacent to an area zoned as regional industrial.

Transmission Interconnection. The SCE Coolwater-Dunn Siding 115 kV transmission line runs through the Private Land Alternative northern and southern sections. The Private Land Alternative sites would require either an upgrade of the SCE Coolwater-Dunn Siding 115 kV transmission line or the construction of a new 10-mile 230 kV transmission line that would follow the existing corridor southwest to the Coolwater Substation. Both the Private Land Alternative sections would require substations; however, one transmission line could be used for both sites.

Environmental and Engineering Assessment of the Private Land Alternative

Air Quality

Environmental Setting. Like the proposed Calico Solar Project, the Private Land Alternative would be located within the Mojave Desert Air Basin, regulated by the Mojave Desert Air Quality Management District (MDAQMD). The Private Land Alternative would be located in the Western Mojave Desert where ozone and particulate matter violate ambient standards, despite the low population density east of Barstow (USEPA 2008).

Environmental Impacts. Exhaust emissions from heavy-duty diesel and gasoline-powered construction equipment and fugitive particulate matter (dust) would be essentially the same at any site. Exhaust emissions would also be caused by workers commuting to and from the work sites, from trucks hauling equipment and supplies to the sites, and crew trucks (e.g., derrick trucks, bucket trucks, pickups). Workers and trucks hauling equipment and supplies would have to commute up to 20 miles (to Barstow) or 60 miles (to Victorville) to reach the Private Land Alternative. The proposed Calico Solar Project site is located approximately 37 miles east of Barstow. Appropriate mitigation at the Private Land Alternative site would likely involve similar, locally oriented recommendations such as the conditions of certification presented in the **AIR QUALITY** section of this SA/DEIS.

Comparison to Proposed Project. The construction and operational emissions at the Private Land Alternative would be similar to those of the Calico Solar Project site. The emissions caused by workers commuting to the work site would be slightly reduced at the Private Land Alternative.

Biological Resources

Environmental Setting. Barstow is located in the Mojave bioregion, encompassing nearly all of San Bernardino County, most of Inyo County, the southeastern tips of Mono and Tulare Counties, the eastern end of Kern County, the northeastern desert area of Los Angeles County, and a piece of north-central Riverside County (California Environmental Resources Evaluation System [CERES] 2010).

The Mojave bioregion is one of the largest bioregions in California, and is part of the vast desert that covers Southern Nevada, the southwestern tip of Utah, and almost one quarter of California in the southeast. Much of the Mojave bioregion lies on a high plateau averaging 2,000 to 3,000 feet above mean sea level (AMSL); however, it also includes the lowest elevation in North America (located in Death Valley) as well as isolated peaks that can exceed 7,000 feet. Common habitats include desert wash, Mojave creosote bush scrub, desert saltbush scrub, Joshua tree scrub, alkali scrub, palm oasis, juniper-pinyon woodland, and some hardwood and conifer forests at higher elevations. Summers are hot and dry, and winters are cool to cold (CERES 2010).

The Mojave bioregion supports a diverse array of plant and animal species. Rare animals include the Mohave ground squirrel (*Spermophilus mohavensis*), prairie falcon (*Falco mexicanus*), Le Conte's thrasher (*Toxostoma lecontei*), Nelson's bighorn sheep (*Ovis canadensis nelsoni*), desert tortoise (*Gopherus agassizi*), pale big-eared bat (*Corynorhinus townsendii*), and Mohave tui chub (*Gila bicolor mohavensis*). Rare plants include white bear poppy (*Arctomecon merriamii*), Barstow woolly sunflower (*Eriophyllum mohavense*), alkali mariposa lily (*Calochortus striatus*), Red Rock poppy (*Eschscholzia minutiflora* ssp. *twisselmannii*), Mojave monkeyflower (*Mimulus mohavensis*), and Stephen's beardtongue (*Penstemon stephensii*; CERES 2010).

The Private Land Alternative is located in the desert region of unincorporated San Bernardino County within the BLM West Mojave Planning Area. The western Mojave Desert comprises a distinct area of the Mojave Desert biome, and flora and fauna have adapted to local conditions and formed distinct natural communities. Freezing temperatures occur on a limited basis in the winter, and summer temperatures regularly exceed 100 degrees. The desert habitat of San Bernardino County includes soils that are predominantly sandy gravel, as well as major dune formations, desert pavement, and dry alkaline lake beds (San Bernardino County 2007). The Mojave Desert region is characterized by arid conditions with low precipitation, and the eastern portion of the West Mojave Planning Area is crossed by expansive alluvial washes.

The West Mojave Planning Area supports a diverse array of plant and wildlife species because of the varied topography and landforms within the planning area (BLM 2005a). The predominant aspect of the West Mojave is a flat, sparsely vegetated region interspersed with mountain ranges and dry lakes. The characteristic creosote bush and saltbush plant communities bloom during years of above-normal winter rainfall, and up to 90% of the flora is comprised of annual plants (BLM 2005a).

The Private Land Alternative would be located immediately north and immediately south of the Mojave River. The Mojave River is in many ways the most prominent landscape feature of the West Mojave desert (BLM 2004). The now-dry river and playas of the historic Mojave River supported species of invertebrates, fish, amphibians, and pond turtles, and attracted migratory birds dependent on water. Remnant populations of these animals are still present today, and comprise many of the rare species in the vicinity of the river. The ancient river and lakes formed sandy beaches and prevailing winds carried the finer particles to the east, forming hummocks and dunes. These blowsand areas now support unique species of insects, plants, and reptiles, including the Mojave fringe-toed lizard, whose entire distribution can be traced to the former path of the ancient Mojave River and Amargosa River (BLM 2004).

The Private Land Alternative would be located on habitat that is considered suitable for the Mohave Ground Squirrel but is outside of the Mohave Ground Squirrel Historic Range (CDFG 2005, CDFG 2009). The Mohave Ground Squirrel is restricted to the Mojave Desert in San Bernardino, Los Angeles, Kern and Inyo Counties and populations have been reduced by urban development, off-road vehicle use, and agriculture. Populations in the southwestern San Bernardino County appear to be extirpated (CDFG 2005).The Mohave Ground Squirrel was not identified in the CNDDB data for this site.

Private Land Alternative northern section. The Private Land Alternative northern section would be located immediately north of the CDFG Camp Cady Wildlife Area (BLM 2004). Camp Cady supports mesquite thickets and riparian forest, and protects western pond turtle, summer tanager, yellow-breasted chat, and a variety of birds of prey, especially in winter. Camp Cady includes habitat for Mojave tui chub, hawks, songbirds and shorebirds. Adjacent public and private lands west of Camp Cady including the Private Land Alternative contain blowsand deposits with Mojave fringe-toed lizard habitat (BLM 2004).

A reconnaissance survey of the biological resources of the Private Land Alternative northern section was conducted on August 16, 2009 from public access roads which allowed visitation throughout the site. The two dominant habitat types of the Private Land Alternative northern section are Mojave creosote bush scrub and atriplex scrub. The Private Land Alternative northern section also included some lands dominated by fallow and ruderal fields and developed areas. During this survey, a number of habitat characteristics were used to rate the quality of the habitat and the capacity to support desert tortoises. These include topography, soil texture, dominant shrubs, herb layer, plant diversity, likelihood of desert tortoise occurrence, likelihood of other special status species occurrence, quality of surrounding habitat, overall habitat quality for wildlife, and overall habitat quality for desert tortoise. Results of the survey show that the Private Land Alternative northern section has varying habitat quality for desert tortoise and wildlife and is generally made up of unsuitable to medium quality habitat for desert tortoise.

The Private Land Alternative northern section had poor quality habitat for rare plants, except on Harvard Hill (where no impacts would be expected due to unbuildable slopes). Much of the Mojave River lacks any notable riparian vegetation. Even where riparian vegetation is good, impacts to wildlife using the river vegetation during breeding season from a solar facility up on the ridge of private lands was expected to be low. There is a buffer of perhaps 300-500 feet from river vegetation/active channel to buildable flats to north where the Private Land Alternative could be expected to be built.

Private Land Alternative southern section. The Private Land Alternative southern section consists mostly of active and fallow agricultural land. A major Los Angeles Department of Water and Power transmission line traverses the central portion of the site from the southwest to the northeast, and an existing solar facility is located at the western site boundary. Surrounding lands, in addition to the airport, are comprised of active and inactive agriculture, a salt pond and a solar facility, private residences, and undeveloped lands. Topography on site is relatively flat, with elevation ranging from approximately 1,804 to 1,969 feet AMSL. Soils mapped for the Private Land Alternative southern section are comprised mostly of Cajon sand and Cajon loamy sand, with smaller patches of Halloran sandy loam, Kimberlina loamy fine sands, and Kimberlina gravelly sandy loam. These soil types are classified as prime farmland.

One small manmade pond surrounded by riparian habitat occurs adjacent to a private residence at the northwestern site perimeter. It is vegetated with wetland species (i.e., giant reed [*Arundo donax*]) and areas with extant wetland vegetation would potentially be considered jurisdictional to the CDFG and ACOE. A focused delineation would be necessary to confirm that this is the case.

Additionally, a small portion of the site (owned by BLM) in the northwestern corner is immediately adjacent to or overlaps with the southern bank of the Mojave River floodplain, but does not contain wetland vegetation. It is likely that the floodplain would be considered waters of the state under the jurisdiction of the CDFG and could potentially be considered waters of the U.S. under the jurisdiction of the ACOE. Similarly, a focused delineation may be necessary to confirm that this is the case.

Although access to the site was restricted primarily to public roads, a variety of animal species were detected or observed on site. Common animal species included harvester ants (*Pogonomyrmex* sp.), coyote (*Canis latrans*), black-tailed jackrabbit (*Lepus californicus*), and various resident and migratory bird species, such as western meadowlark (*Sturnella neglecta*), Say's phoebe (*Sayornis saya*), common raven (*Corvus corax*), yellow-rumped warbler (*Dendroica cornata*), greater roadrunner (*Geococcyx californianus*), European starlings (*Sturnus vulgaris*), and white-crowned sparrow (*Zonotrichia leucophrys*). Also observed in the northwestern portion of the site were a loggerhead shrike (*Lanius ludovicianus*), prairie falcon (*Falco mexicanus*), and red-tailed hawk (*Buteo jamaicenis*). Several small burrows (0.5 to 2") were noted during the reconnaissance on the BLM portions of the site, many of which were inactive. The burrows are likely used by kangaroo rats, lizards, and snakes.

The Barstow-Daggett County Airport bordering the central-south portion of the site, in addition to the I-40 further south and I-15 further north of the site, may potentially restrict wildlife movement for species using the site.

Agriculture, Mohave creosote bush scrub, and desert saltbush scrub are the three primary vegetation communities on the Private Land Agriculture southern section. Additionally, a small area of stabilized sand dunes occurs in the northeastern portion of the site owned by BLM, and the small manmade pond contains riparian vegetation. Areas that are developed (i.e., solar facility and rural residences) or comprised of disturbed habitat occur adjacent to agricultural fields.

Agriculture occurs on approximately 2,602 acres (approximately 53%) of the Private Land Alternative southern section. The active and inactive agriculture is comprised of hay fields, fallow fields, and associated infrastructure. In addition, approximately 296 acres of developed land and 292 acres of disturbed habitat occur adjacent to the agricultural fields. Altogether, agricultural and developed land consists of approximately 65% of the site. Small areas of highly disturbed native habitat, comprised of Mohave creosote bush scrub and desert saltbush scrub, also occur adjacent to the agricultural fields.

Mojave creosote bush scrub occurs on approximately 1,258 acres of the Private Land Alternative southern section and is dominated by varying densities of creosote bush (*Larrea tridentata*), white bur-sage (*Ambrosia dumosa*), and buckwheat (*Eriogonum* spp.). Occassional species observed within the Mojave creosote bush scrub include desert saltbush (*Atriplex polycarpa*), cholla (*Cylindropuntia echionocarpa* and *C.ramosissima*), ephedra (*Ephedra trifurca*), button brittlebush (*Encelia frutescens*), and annual species such as cryptantha (*Cryptantha* sp.), dune primrose (*Oenethera deltoids*), and brown-eyed primrose (*Camissonia claviformis*). Disturbed areas of the Mojave creosote bush scrub are characterized by sparse vegetative cover and greater densities of Russian thistles (*Salsola paulsenii* and *S.tragus*) and Sahara mustard (*Brassica tournefortii*). The northwestern portion of the site, owned by BLM and adjacent to the Mojave River floodplain, contains higher quality Mohave creosote bush scrub. The small area of disturbed Mojave creosote bush immediately adjacent to the BLM-owned areas and north of the manmade pond showed signs of having been burned.

Desert saltbush scrub occurs in small patches on approximately 399 acres of the Private Land Alternative southern section and is comprised primarily of desert saltbush, Russian thistle, and Mediterranean grass (*Schismus barbatus*), with a few creosote bush sometimes present. The largest area of contiguous desert saltbush scrub on site occurs in the southeastern corner between the agricultural fields.

Stabilized sand dunes support species found in Mojave creosote bush scrub and occur on approximately 12 acres of the Private Land Alternative southern section. The riparian habitat near the small pond (< 2 acres) is comprised primarily of non-native vegetation (i.e., giant reed and athel tamarisk [*Tamarix aphylla*]) with native species Fremont cottonwood (*Populus fremontii*), arroweed (*Pluchea sericea*), and pine (*Pinus* sp.).

Two California species of special concern (SSC) were observed during the site reconnaissance: a single loggerhead shrike observed on a shrub adjacent and south of Valley Center Road, and a single prairie falcon observed on a powerline pole at the intersection of Valley Center Road and Hidden Springs Road. CNDDB species records for the site include two locations for prairie falcon at the southeastern corner adjacent to an agricultural field. There is some potential for all species observed on the proposed project site to occur on (or migrate through) the Private Land Alternative southern section, particularly in the native vegetation communities; however, sensitive plants are unlikely to occur on site due to extensive disturbance from agriculture activities.

The following sensitive species occur in the vicinity of the Private Land Alternative southern and northern sites (CNDDB, 2009). Several species are noted because of the proximity to the Mojave River, which flows rarely.

Alternatives Table 2 California Natural Diversity Database Records for Special Status Species within Five Miles of the Private Land Alternative Sections

Common Name *Scientific Name*	Status State/Fed/CNPS/BLM	Occurrence Within 5 Miles of Private Land Alternative Sections
PLANTS		
Crucifixion thorn *Castela emoryi*	--/--/List 2.3/--	Reported approximately 1 mile west of the site.
Barstow woolly sunflower *Eriophyllum mohavense*	--/--/List 1B.2/--	Reported approximately 2 to 3 miles northwest of the site.
Creamy blazing star *Mentzelia tridentate*	--/--/List 1B.3/--	Reported approximately 1 mile south of the site and 1 mile west of the site.
Mojave monkey flower *Mimulus mohavensis*	--/--/List 1B.2/--	Reported approximately 1 mile southwest of the site.
Parish's phacelia *Phacelia parishii*	--/--/List 1B.1/--	Reported approximately 2 miles northwest of the site.
ANIMALS		
Southwestern pond turtle *Actinemys marmorata*	--/SSC/--/S	Reported approximately 1 mile north of the site.
Pallid bat *Antrozous pallidus*	SC/SC/--/S	Reported approximately 3 miles northeast of the site.
Prairie falcon *Falco mexicanus*	--/--/--/--*	Reported on site in the southeastern corner of the site.
Desert tortoise *Gopherus agassizii*	ST/FT/--/S	Reported approximately 2 miles northwest of the site and approximately 0.75 mile southwest of the site.
Yellow-breasted chat *Icteria virens*	--/SSC/--/--	Reported approximately 1 mile north of the site.
Mojave ground squirrel *Spermophilus mohavensis*	SC/ST/--/S	Reported less than 0.5 mile south of the site.
Townsend's big-eared bat Plecotus townsendii	--/SSC/--/S	Reported approximately 2 to 3 miles northwest of the site.
Vermilion flycatcher *Pyrocephalus rubinus*	--/SSC/--/--	Reported approximately 2 to 3 miles northeast of the site.
Le Conte's Thrasher *Toxostoma lecontei*	--/SSC/--/--	Reported approximately 1 mile north of the site and 1.5 miles southeast of the site.
Nelson's bighorn sheep *Ovis canadensis nelson*	FE/ST/--/S	Reported approximately 1 to 2 miles south of the site.

*Formerly a California Species of Special Concern but no longer is of special status.
Source: CDFG 2009.

Status Codes:

Federal FE - Federally listed endangered: species in danger of extinction throughout a significant portion of its range
FT - Federally listed threatened: species likely to become endangered within the foreseeable future

State SE - State listed endangered
ST = State listed threatened
SSC = Species of special concern

California Native Plant Society

List 1B - Rare, threatened, or endangered in California and elsewhere
List 2 - Rare, threatened, or endangered in California but more common elsewhere
List 3 - Plants which need more information
List 4 - Limited distribution – a watch list
0.1 - Seriously threatened in California (high degree/immediacy of threat)
0.2 - Fairly threatened in California (moderate degree/immediacy of threat)
0.3 - Not very threatened in California (low degree/immediacy of threats or no current threats known)

BLM S **=** Sensitive
BLM Manual § 6840 defines sensitive species as "…those species that are (1) under status review by the FWS/NMFS; or (2) whose numbers are declining so rapidly that federal listing may become necessary, or (3) with typically small and widely dispersed populations; or (4) those inhabiting ecological refugia or other specialized or unique habitats." <www.blm.gov/ca/pdfs/pa_pdfs/biology_pdfs/SensitiveAnimals.pdf>

Environmental Impacts. Approximately 650 acres of the Private Land Alternative northern section and 3,400 acres of the Private Land Alternative southern section are disturbed agricultural land. Approximately 3,950 acres of Mojave creosote scrub and other native plant communities would be permanently lost by vegetation clearing, grading, and construction of the solar facilities, potentially affecting special status animal species. It is expected that the entire Private Lands Alternative northern and southern sections and all of the vegetation communities on them (i.e., agriculture, Mojave creosote bush scrub, desert saltbush scrub, stabilized sand dunes) as well as any potential jurisdictional areas (e.g., manmade pond and associated riparian habitat, bank of Mojave River floodplain) would be permanently lost as a result of vegetation clearing, grading, and construction of the solar facilities. It is also assumed that there would be additional impacts by transmission lines; however, data for a transmission line was not available for the alternative site.

Impacts to listed or sensitive plant species would result from direct or indirect loss of known locations of individuals or direct loss of habitat. Indirect loss of individuals may occur in instances such as sediments transported (e.g., from cleared areas during rain events) that cover adjacent plants or changes in a plant's environment that cause its loss (e.g., adjacent shrubs that provided necessary shade are removed). In addition, this alternative is located near the Mojave River, so conditions of certification to protect river corridor species and habitat would be important.

Impacts/Mitigation to Wildlife—Overview

Building a solar facility at the Private Land Alternative sites would potentially have an adverse effect on listed and sensitive wildlife species and their habitats either directly or through habitat modifications. Any wildlife residing within the alternative sites would potentially be displaced, injured, or killed during project activities. Animal species in the project area could fall into construction trenches, be crushed by construction vehicles or equipment, or be harmed by project personnel. In addition, construction activities may attract predators or crush animal burrows or nests. Few impacts to special status animal species would be expected at the Private Lands Alternative southern section because the site is largely active and inactive agricultural land. However, both the loggerhead shrike and prairie falcon were observed using the southern section, and would be affected. Also, the burrowing owl, which is known to use agricultural land for foraging, may be affected if it is present.

Migratory/Special Status Bird Species. Mojave creosote bush scrub at the alternative provides foraging, cover, and/or breeding habitat for migratory birds, including special-status bird species that may be present at the sites. Project construction and operation could impact nesting birds in violation of the Migratory Bird Treaty Act. Preconstruction surveys and avoidance of nesting birds could reduce such impacts.

Desert Tortoise. The Private Lands Alternative is located in habitat of varying quality for desert tortoise. Although the habitat/plant community varies somewhat with elevation, slope, and soils, many areas have been heavily disturbed and some are actively farmed. The majority of the Private Land Alternative southern section and portions of the Private Land Alternative northern section are unsuitable for desert tortoise. Portions of the Private Land Alternative northern section range between low and medium quality habitat for desert tortoise. It is anticipated that the Private Land Alternative also provides unsuitable to medium quality habitat for other special status species that are known to occur in the area. This site is of less value to desert tortoise than the Calico Solar Project site. Critical habitat and ACEC for the desert tortoise is located approximately 1 mile south of the Private Lands Alternative southern section, and desert tortoise has been reported to the CNDDB in between the southern and northern sections and approximately 0.75 mile southwest of the Private Land Alternative southern section.

The Mojave River is located approximately one-half mile from the site. There are patches of well developed riparian habitat and areas of no and poorly developed riparian habitat. The proximity of the river to the project sites would most likely result in increased bird activity in the area but this increase is not expected to result in significant impacts.

This notwithstanding, construction and operation activities may result in direct or indirect impacts to the desert tortoise or its occupied habitat and mitigation measures similar to those required for the proposed Calico Solar Project site would be required should the project be build at the Private Land Alternative.

Human activities in the Private Land Alternative project area potentially provide food or other attractants in the form of trash, litter, or water, which draw unnaturally high numbers of tortoise predators such as the common raven, kit fox, and coyote. Predation could be reduced through the preparation of a Raven Management Plan and other avoidance and minimization measures such as the conditions of certification presented in the **BIOLOGICAL RESOURCES** section of the SA/DEIS.

Mohave Ground Squirrel. Construction and operation activities may result in direct or indirect impacts to the Mohave ground squirrel or its occupied habitat. The project would result in potential take of individuals and permanent loss of up to 4,000 acres of habitat on the solar facility site. The project could also result in disturbance to nearby populations should there be any and increased road kill hazard from construction and operation traffic.

Furthermore, there is some potential for Mojave fringe-toed lizard, golden eagle, California horned lark, Bendire's thrasher, Le Conte's thrasher (Toxostoma lecontei), American badger, and desert kit fox (among other species that could be present) to be impacted on the Private Lands Alternative site because potential habitat for these species is also present and would be impacted.

Finally, wildlife movement across the site is already affected by the disruption in native vegetation communities from agriculture, and the Barstow-Daggett Airport and the I-15 and I-40 to the north and south of the Private Lands Alternative sections, and hence, development of the Private Lands Alternative site would likely only significantly affect the movement of avian species.

Spread of Noxious Weeds. Construction of a solar facility at the Private Land Alternative could result in the introduction and dispersal of invasive or exotic weeds. The permanent and temporary earth disturbance adjacent to native habitats increases the potential for exotic, invasive plant species to establish and disperse into native plant communities, which leads to community and habitat degradation. A weed reduction program could potentially reduce and mitigate impacts.

Noise. Noise from construction activities could temporarily discourage wildlife from foraging and nesting immediately adjacent to the project area. Many bird species rely on vocalization during the breeding season to attract a mate within their territory. Noise levels from certain construction, operations, and demolition activities could reduce the reproductive success of nesting birds.

Lighting and Collisions. The SunCatchers at the Private Land Alternative would potentially include FAA-required lighting and a lightning pole. Lighting may increase the collision risk because lights can attract nocturnal migrant songbirds. Bright night lighting close to the ground at the alternative sites could also disturb wildlife that occurs adjacent to the project site (e.g., nesting birds, foraging mammals, and flying insects).

Operation of a 10-mile transmission line could result in increased avian mortality due to collision with new transmission lines. Mitigation could include installing the transmission line in accordance with the Avian Powerline Interaction Committee (APLIC) Guidelines designed to minimize avian-power line interactions.

Definite conclusions about the potential for significant impacts to biological resources cannot be made in the absence of site-specific survey and project design information.

Comparison to Proposed Project – Biological Resources

Definitive conclusions about the amount of potential adverse impacts to biological resources in the absence of site-specific survey and project design information for the Private Land Alternative site cannot be made. However, development of a solar project at the Private Land Alternative site would impact fewer biological resources compared to the Proposed Project site because development of the Private Land Alternative site would occur partially on agricultural land, whereas development of the Proposed Project site would occur primarily on land supporting native vegetation communities. The Private Land Alternative southern section consists primarily of active and fallow agricultural lands, but also supports smaller areas of native habitat: Mojave creosote bush scrub, desert saltbush scrub, and stabilized sand dunes; most of which is disturbed. The Private Land Alternative northern sections consists of varying habitat quality for desert tortoise and wildlife and is generally made up of unsuitable to medium quality habitat compared with the proposed Calico Solar Project site which supports primarily Mojave creosote bush scrub and one small patch of desert saltbush scrub.

Apart from bird species that may use the agricultural lands for foraging, general wildlife use of the Private Land Alternative also would be expected to be less than for the Proposed Project since much of it is active agricultural lands, while the proposed Project site supports primarily native desert scrub habitat.

Overall, development of a solar project on the Daggett Agriculture alternative site would have fewer impacts to biological resources than the Proposed Project site. Given that most of this alternative (approximately 50%) is agricultural land, disturbed habitat, and developed land it may be possible to site facilities such that most or all of the sensitive biological resources on site would be avoided, making this an even more biologically preferable alternative. The Private Land Alternative is preferred over the Calico Solar Project for impacts to biological resources.

Cultural Resources

Environmental Setting. The Private Land Alternative is located on a combination of agricultural land, undeveloped BLM land, and open space private land in San Bernardino County, California. The alternative site is located in the Mojave Desert adjacent to the Mojave River. The California desert has been inhabited for at least 8,000 to 12,000 years and perhaps longer (BLM 2005a). Prehistoric settlement was often centered on lakes, now the dry playas characteristic of the Mojave Desert and Great Basin. The lakes and marsh environments along the edges had abundant plant and animal species providing food, fibers, medicines, tools, clothing, and ritual objects required for daily life (BLM 2005a). The Mojave River was a significant focus of prehistoric settlement and the principal corridor for prehistoric travel and trade, particularly during the Protohistoric Period (A.D. 1200 to ca. A.D. 1850) (Moratto 1984, pp. 426–430).

From 8,000 to 6,000 years before present, climatic change caused the lakes to dry, and food gathering and land use patterns began that continued into the historic period, including a use of a greater variety of habitats, plants, and animals (BLM 2005a). The bow and arrow may have appeared around 2,000 years ago as evidenced by a shift in projectile point types, and the expansion of bow-and-arrow technology is evidenced by the late prehistoric introduction of the Desert Side-Notched and Cottonwood Triangular points found through the California desert (BLM 2005a). A pattern of exploitation of seasonally available resources resulted in the use of large areas by relatively small populations and left archaeological sites widely scattered (BLM 2005a).

The first documented exploration of the Mojave Desert by nonindigenous people occurred in the mid-1700s by Francisco Garces, a Spanish Franciscan priest looking for a route from Arizona to Northern California (BLM 2005a). Much of the history of this region is because of its use as a corridor, one used by fur trappers and caravans. California was annexed in 1848, the same year that gold was discovered, leading to an influx of prospectors (BLM 2005a). Roads were established to transport goods, people, livestock, food, and ore between the Mojave Desert and Los Angeles, and the western Mojave Desert began to have a large mining industry.

Railroad surveys began in 1853; the San Pedro, Los Angeles, and Salt Lake Line, predecessor to the Union Pacific through the Mojave Desert, was completed in 1905, and the Tonopah and Tidewater finished its line from Ludlow to Beatty, Nevada, in 1907 (BLM 2005a). In 1914, a road was completed to parallel the tracks of the Atlantic & Pacific Railroad, which was the precursor to U.S. 66 (National Trails Highway).

Military bases were established in the desert prior to World War II, and large tracts were set aside for military use, including the MCAGCC (BLM 2005a). Further information regarding this region can be found in the **CULTURAL RESOURCES** section of the SA/DEIS.

One California State Historical Landmark is located immediately south of the Private Land Alternative northern section. Camp Cady (No. 963-1) was located on the Mojave Road which connected Los Angeles to Albuquerque. Non-Indian travel on this and the nearby Salt Lake Road was beset by Paiutes, Mohaves, and Chemehuevis defending their homeland. To protect both roads, Camp Cady was established by U.S. Dragoons in 1860. The main building was a stout mud redoubt. Improved camp structures were built 1/2 mile west in 1868. After peace was achieved, the military withdrew in 1871. This protection provided by Camp Cady enabled travelers, merchandise, and mail using both roads to boost California's economy and growth (OHP 2009). Much of the camp has been destroyed, and unrelated wooden structures exist onsite. The Camp Cady site today is bare of apparent evidences of early use, because a flood in 1938 washed away all traces of the original adobe structures.

A records search for the Private Land Alternative at the San Bernardino Archeological Information Center of the California Historical Resources Information System reveals that the alternative, which is in and adjacent to the Mojave River floodplain, is in a landscape context that has a moderately high frequency of prehistoric archaeological sites. Energy Commission staff conducted the records search on August 5, 2009, focusing on the Private Land Alternative and areas 4 miles to the east and west along the Mojave River. The records search documents the presence of diverse archeological site types on the alluvial terraces that flank the river. The site types include habitation areas, village sites, and campsites, each of which may have food processing, lithic reduction, burial, and cremation components. Other site types typical on and beyond the terraces include lithic quarry sites, rock art sites, ceramic scatters, and trails.

The known prehistoric archaeological site distribution across the area of the Private Land Alternative reflects both the frequency and the diversity of the site types in adjacent areas. Roughly 27% of the Private Land Alternative appears to have been subject to reliable pedestrian surveys. The surveys document three prehistoric archaeological sites in or immediately adjacent to the area of the alternative, a moderately complex habitation area on the alternative that includes three food processing areas, one campsite, and one ceramic scatter (P1801-14), a village site found adjacent to the alternative in 1966 and destroyed by agriculture prior to 1980 (CA-SBR-2689), and a lithic quarry site related to the exploitation of toolstone available on Harvard Hill on the western portion of the alternative (CA-SBR-1933). The extrapolation of the archaeological site frequency for the known, roughly 27% sample of the alternative would appear to indicate the potential presence of three to four times the number of known archaeological sites on the alternative.

Environmental Impacts. The construction and operation of a solar facility on the site of the Private Land Alternative would appear likely to destroy one whole known prehistoric archaeological site and part of a second, and may destroy components of a third, and has the further potential to wholly or partially destroy a number of other prehistoric archaeological sites on portions of the alternative that have not yet been subject to pedestrian survey. One would need to establish the historical significance of the three known resources above and any additional ones that would be found as a result of the complete pedestrian survey of the alternative to comment more definitively on whether any of these resources would qualify for treatment under Federal and State regulatory programs. Given the historic significance of the Mojave River corridor during most of prehistory and the character of the diverse archaeological site types known for the Private Land Alternative and adjacent areas, it is, however, reasonable to conclude that the alternative would most likely have the potential to destroy significant prehistoric archaeological deposits. Federal and State regulatory programs would require treatment for all such deposits.

One historical archaeological site, Camp Cady (California State Historical Landmark No. 963-1), is known in the vicinity of the Private Land Alternative. As the resource is roughly one half of a mile to the south of the alternative, it is relatively unlikely that the presence of a solar facility would result in a significant impact to the particular values for which the resource may be significant. The primary value of the resource probably relates to the information that the careful excavation of the historical archaeological deposits that make up the camp would produce. The construction and operation of a solar facility on the Private Land Alternative would not disturb or destroy any of these deposits. The historical archaeological deposits of Camp Cady could also potentially be found to have historical value for the association of the deposits with significant events or patterns in history. Were the deposits found to have such value, the potential for a nearby solar facility to degrade the visual integrity of the resource would have to be taken into account. The resolution of this issue would require further study.

There are a number of known built environment resources (buildings, structure, and linear infrastructure elements) in and near the Private Land Alternative. The former San Pedro, Los Angeles, and Salt Lake Railroad, now the Union Pacific Railroad, and segments of the Old Spanish Trail, the Mormon Trail, and the Mojave Road are thought to run through the area of the alternative. Camp Cady Ranch is roughly one half of a mile south of the alternative. The presence of the trail and road segments on the alternative is presently unconfirmed, and the integrity of the railroad, trail and road segments, or Camp Cady Ranch is similarly unconfirmed. Further study of the resources could reveal that a solar facility on the Private Land Alternative would have significant physical and visual impacts on historically significant railroad, road, and trail segments that contribute respectively to the historic significance of each overall transportation route, and have a visual impact to Camp Cady Ranch.

Comparison to Proposed Project. The development of a solar facility on the site of the Private Land Alternative would most likely have fewer cultural resource impacts those of the Calico Solar Project. The construction and operation of a solar facility on the Private Land Alternative has the real potential to wholly or partially destroy a number of significant prehistoric archaeological sites. The partial destruction or visual degradation of historical archaeological resources and built environment resources are other potential significant impacts of such a facility. More site-specific information about the cultural resources on the Private Land Alternative would serve to better qualify this comparison.

Hazardous Materials

Environmental Setting. The topography of the Private Land Alternative sites is essentially flat, as are the immediately surrounding areas. Sensitive receptors are present within and adjacent to the Private Land Alternative.

Private Land Alternative northern section. Access to the Private Land Alternative northern section would likely be via Interstate 15 from Barstow to the Harvard Road exit. At Harvard Road, transport would likely turn south onto Harvard Road and would continue southeast for approximately 1 mile through primarily undisturbed land and agriculture land. A religious camp is located adjacent to the southeast corner of the Private Land Alternative northern section.

Private Land Alternative southern section. Access to Private Land Alternative southern section would likely be via Interstate 40 from Barstow to the Hidden Springs Road exit. At Hidden Springs Road, transport would likely turn north for approximately 1.5 miles through agriculture land adjacent to the Barstow/Daggett airport. A residential community is located north of Private Land Alternative southern section.

Environmental Impacts. Hazardous materials use at the Private Land Alternative, including the quantities handled during transportation and disposal, would be the same as those of the proposed project. As stated in the **HAZARDOUS MATERIALS** discipline for the proposed project, hazardous materials used during the construction phase of the project would include gasoline, diesel fuel, motor oil, lubricants, and small amounts of solvents and paint. No acutely toxic hazardous materials would be used on site during construction, and none of these materials pose a significant potential for off-site impacts as a result of the quantities on site, their relative toxicity, their physical states, and/or their environmental mobility.

Transportation of hazardous materials to the Private Land Alternative sites would require passing near residences located in the town of Barstow, Daggett, and Newberry Springs approximately 20 miles from the Private Land Alternative. However, the transportation would be primarily on either Interstate 15 or Interstate 40 and not on smaller road with residences.

Comparison to Proposed Project. The hazardous materials that would be used at the Private Land Alternative sites would be the same as those used at the proposed Calico Solar Project site; however, the Private Land Alternative has sensitive subgroups within 1,000 feet. As such, the potential impacts at the Private Land Alternative would likely be somewhat greater. Compared to the proposed project, selecting the Private Land site would result in similar impacts from transportation of hazardous materials because the transportation route through Barstow, Daggett, and Newberry Springs would be essentially the same. With adoption of the proposed conditions of certification, the Private Land Alternative would comply with all applicable laws, ordinances, regulations, and standards (LORS) and result in no significant impacts to the public.

Land Use

Environmental Setting. The Private Land Alternative would be located on private undisturbed land containing a few rural residences, industrial land, and on agricultural lands. The Private Land Alternative would include approximately 900 acres of unclassified BLM land. The San Bernardino General Plan Land Use designation for the area is Rural Living. The intended use of Rural Living is to provide sites for rural residential uses, incidental agriculture uses, and similar and compatible uses. The primary purpose of the Rural Living Land Use District is to identify areas and encourage appropriate rural development, and prevent inappropriate demands for urban services. Electrical power generation is an allowed use on Rural Living land with a Conditional Use Permit (San Bernardino 2009).

Private Land Alternative northern section. The Private Land Alternative northern section would be located on approximately 320 acres of Prime Farmland and approximately 150 acres of Farmland of Statewide Importance (DOC 2006). Approximately 650 acres of the Private Land Alternative northern section are or were used for agricultural purposes; no lands under Williamson Act contracts would be impacted. The zoning designation for the Private Land Alternative northern section is Rural Living and Resource Conservation.

Approximately 900 acres of the Private Land Alternative northern section are BLM land, and approximately 2,450 acres are private undisturbed lands. The BLM land is within the BLM Western Mojave Planning Area, the purpose of which is to develop management strategies for the desert tortoise, Mohave ground squirrel and over 100 other sensitive plants and animals throughout the western Mojave Desert.

Approximately five rural residences exist on the Private Land Alternative northern section; however, during a site visit it appeared that some of the residences may not be occupied. There is a large private religious camp (Ironwood) located near the alternative site.

Private Land Alternative southern section. The Private Land Alternative southern section would be located on approximately 780 acres of Prime Farmland, approximately 1,760 acres of Farmland of Statewide Importance, approximately 320 acres of Unique farmland, and approximately 320 acres of grazing (DOC 2008). Approximately 3,680 acres of the Private Land Alternative southern section are or were used for agricultural purposes; however, no lands under Williamson Act contracts would be impacted (DOC 2008). The Private Land Alternative southern section would be located immediately east of the Coolwater Generating Station and would include some land zoned as regional industrial.

The Private Land Alternative southern section would be located immediately adjacent to two solar power plants (SEGS I and II), the Blythe-Daggett Airport, and the Coolwater Generation Station.

Environmental Impacts. The Private Land Alternative would be located within San Bernardino County Land Use designation Rural Living. As stated above, electrical power generation is an allowed use in an area designated as Rural Living with a

Conditional Use Permit which would require a General Plan Amendment to apply the Energy Facilities Overlay (San Bernardino 2009).

Based on the site review, there are approximately 3,650 acres of agricultural land at the Private Land Alternative of which approximately 780 acres are considered Prime Farmland. The construction and/or operation of the proposed project would result in a removal of approximately 2,650 acres of actively-used agriculture land (2,000 acres in the Private Land Alternative southern section and 650 acres in the Private Land Alternative northern section). The construction and operation of the solar power plant would eliminate existing agricultural operations and foreseeable future agricultural use. This loss of agricultural lands is a potentially significant impact, and would require a condition of certification potentially requiring purchase of an equivalent number of acres of farmland.

Like the Calico Solar Project proposed site, a key land use plan affecting this project is the U.S. Bureau of Land Management's California Desert Conservation Area (CDCA) Plan of 1980, as amended. The Private Land Alternative, as stated above, is located within areas of the CDCA West Mojave Plan on land that has not been classified by the BLM. Unclassified lands consist of scattered and isolated parcels of public land in the CDCA which have not been placed within the multiple-use classes. Unclassified land is managed by the BLM on a case-by-case basis. As such, at this time it cannot be concluded whether the project is in conformance with the CDCA Plan.

The Private Land Alternative would be build on land that currently has approximately five houses and numerous agricultural facilities. It is not certain if the houses are currently occupied and some of the housing structures appeared abandoned. The Newberry Springs area has a total of 1,522 housing units (US Census, 2009). The five houses within the Private Land Alternative represent less than 1% of the housing units in the Newberry Springs area. If this area were purchased for the purpose of constructing a solar project, the residences would likely be demolished. The landowners cannot be compelled to sell, since BrightSource does not have eminent domain powers, and the current owners would be compensated based on the negotiated sale price of the property. Therefore, while the removal of the five homes by the project would result in a loss of residential dwelling units and associated agricultural facilities, this impact is not considered to be significant.

One group of residences is located immediately north of the Private Land Alternative southern section, at the intersection of Minneola Road and Valley Center Road. One additional sensitive receptor, a Christian camp, is located within 1,000 feet of the Private Land Alternative northern section, east of the intersection of Troy Road and Cherokee Street. Construction activities for the alternative would create temporary disturbance to these residential areas (i.e., heavy construction equipment on temporary and permanent access roads and moving building materials to and from construction staging areas). Conditions of certification to reduce noise and air quality impacts are presented in the Noise and Air Quality sections for the proposed Calico Solar Project site. However, these measures would not eliminate the disturbance to nearby residences. While this disturbance would be temporary at any one location, impacts would be significant if construction was not carefully managed and residents not kept informed.

Comparison to Proposed Project. Selecting the Private Land Alternative site would result in greater impacts to land use than would the Calico Solar Project site because approximately five residences would potentially require demolition. Additionally, approximately 3,650 acres of agricultural land would no longer be available as agriculture land and there would be construction and operational impacts to the nearby religious camp. Additional conditions of certification to offset loss of agricultural lands would be required.

Recreation and Wilderness

Environmental Setting

Private Land Alternative northern section. The Private Land Alternative northern section would be located immediately adjacent to the California Department of Fish and Game Cady Camp Wildlife Area. The Cady Camp Wildlife Area is approximately 1,870 acres of desert riparian habitat with opportunities for hiking and bird watching along with dove, quail, and rabbit hunting (DFG 2009). Camping is allowed at the Cady Camp headquarters and at the Harvard Road “dove” field. Cady Camp Wildlife Area hosts a variety of Game Bird Heritage Program Special Hunts such as a Junior Pheasant Hunt and a Family Pheasant Hunt in the 2007-2008 season (DFG 2009).

A number of man-made water ski lakes are located in the vicinity of the Private Land Alternative sites. The nearest lake is located southeast of the eastern border of the Private Land Alternative northern section adjacent to the Cady Camp Wildlife Area.

The BLM Manix ACEC is located approximately 2 miles east of the Private Land Alternative. The Manix ACEC was established in 1990 by the BLM to protect paleontological and cultural resources. The site also contains terminus of the Mojave Road, which is used by off-highway vehicles.

Private Land Alternative southern section. The Private Land Alternative southern section would be located immediately adjacent to industrial land, an airport, some BLM land and residential areas, and agriculture lands. No recreation or wilderness lands or opportunities are available within 1,000 feet of the site.

Environmental Impacts. The Private Land Alternative southern section would create no impacts to recreation and wilderness areas.

The Private Land Alternative northern section would be located adjacent to the CDFG Cady Camp Wildlife Area, and one to 3 miles north of ski lakes in the Newberry Springs area. Because of the flat topography and the close proximity of the Private Land Alternative northern section to the Cady Camp Wildlife Area, the solar power plant would be visible from the Wildlife Area.

Project construction activities would create a number of temporary conditions that may dissuade recreationists from visiting the Cady Camp Wildlife Area. Noise, dust and heavy equipment traffic generated during construction activities would negatively affect a visitor’s enjoyment of the recreation area. The location of construction equipment may temporarily preclude access to recreation areas, especially in the vicinity of Harvard Road and in the Harvard Road “dove” field. Disturbances to recreational activities would potentially cause a temporary reduction of access and visitation during construction activities.

Construction of the 4,000 acres of Stirling engine systems would change the character of the Cady Camp Wildlife Area. While the wildlife area is located in an area that is zoned Rural Living, few residences are located immediately adjacent to the wildlife area except on the eastern border. Presence of the Stirling engines would significantly contrast with the existing open space and agriculture areas north of the Cady Camp Wildlife Area. The facility would also result in a long-term visual impact to travelers and recreationists in this region. The noise and activity of the solar power plant may potentially scare hunting prey and preclude hunting at the Cady Camp Wildlife Area.

Comparison to Proposed Project. Both the proposed site and the Private Land Alternative northern section are located in areas with existing recreational use. The proposed site is adjacent to the Pisgah Crater lava Flow and south of the Cady Mountains Wilderness Study Area open to camping and some off-highway vehicle use. Additionally, the proposed project would preclude the use of some off-highway vehicle routes that traverse the proposed project area. Recreation and wilderness impacts would be similar at the Private Land Alternative than at the Calico Solar Project site because of the close proximity between the Private Land Alternative and the Cady Camp Wildlife Area and the recreational water ski lakes in the communities of Newberry Springs and Harvard. No natural or man-made feature would block the alternative site from view at the wildlife area. Use of the wildlife area as a hunting ground may no longer be possible should the Private Lands Alternative be chosen. Overall, recreation impacts at the two sites would be similar.

Noise and Vibration

Environmental Setting

Private Land Alternative northern section. Generally low levels of ambient noise exist along the southern portion of the Private Land Alternative northern section, as this portion of the site is primarily undeveloped land. Low noise levels under 50 dBA generally are expected to occur on these lands, which are used for agriculture and recreation with scattered rural residences. Noise levels would be elevated along the northern boundary of the project due to the presence of heavily traveled Interstate 15 and a railroad track. For the majority of the Interstate 15 freeway corridor, a 65 dBA contour extends approximately 100 to 150 feet in either direction from the centerline (FRA 2009).

Intermittent noise is expected to occur at the eastern side of the Private Land Alternative northern section where the alternative site is located near a small religious camp. Nearby sensitive receptors include the camp community adjacent to the Private Land Alternative northern section and the Cady Camp Headquarters which is also used for camping.

Private Land Alternative southern section. The Private Land Alternative southern section is adjacent to BNSF railroad tracks to the south, a conventional power plant and substation to the west, and the Barstow/Daggett airport to the southeast. These existing land uses increase the noise levels of the surrounding areas.

Nearby sensitive receptors include the residential communities north and east of the Private Land Alternative southern section. The nearest residential area would be about 500 feet from the alternative site boundary, immediately north of the site between the alternative and the Mojave River.

Environmental Impacts. As stated in the Noise section of this SA/DEIS, the construction of the Calico Solar Project plant would create noise, or unwanted sound. The character and loudness of this noise, the times of day or night at which it is produced, and the proximity of the facility to sensitive receptors combine to determine whether the facility would meet applicable noise control laws and ordinances and whether it would cause significant adverse environmental impacts.

The noise experienced at any specific receptor during operation of a solar facility on this site would depend on which facility components were closest to the receptor. The Stirling engines would not create operational noise, but the power block would create more noticeable noise.

If built in accordance to conditions of certification similar to those proposed for the Calico Solar Project site, adverse noise impacts to sensitive receptors from construction and operation would be reduced to less than significant levels.

Comparison to Proposed Project. Given the proximity of the Private Land Alternative sites to freeways, an airport, and a railroad the baseline noise levels are elevated at these locations than at the proposed Calico Solar Project site. However, the Private Land Alternative northern section would be in a location adjacent to sensitive receptors, so impacts would be more severe at the proposed Calico Solar Project site.

Public Health and Safety

Environmental Setting

Private Land Alternative northern section. The Private Land Alternative northern section is located in an isolated desert area. The nearest small community, a religious camp, is located approximately 500 feet southeast of the site.

Private Land Alternative southern section. The Private Land Alternative southern site is located in an area primarily dedicated to agricultural, solar power production, and fossil fueled power plants. The nearest residences are immediately north of the site along Valley Center Road.

Environmental Impacts. While the meteorological conditions and topography at the site are not exactly the same as at the applicant's proposed site, they are similar enough that the results of air dispersion modeling and a human health risk assessment for the Private Land Alternative would be similar to that found for the proposed site. The cancer risk and hazard indices are much below the level of significance at the point of maximum impact, so the project would be unlikely to pose a significant risk to public health at this location.

Comparison to Proposed Project. There is no significant difference between this location and the proposed site for public health & safety.

Socioeconomics and Environmental Justice

Environmental Setting. Like the proposed Calico Solar Project site, the Private Land Alternative is located in San Bernardino County. The demographic characteristics of San Bernardino County are described in the **SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE** discipline of the SA/DEIS.

Environmental Impacts. Because of the limited population in Daggett and Newberry Springs, construction workers would most likely be from larger nearby cities such as Victorville and Barstow. The construction workers would most likely have to commute 20 to 50 miles or more daily to reach the construction sites due to the limited housing availability in the Daggett and Newberry Springs region. There are no hotels in Daggett or Newberry Springs, although RV camp sites are available. An additional option would be to erect temporary housing in the immediate area of the Private Land Alternative; however, this would increase the construction impacts and require provision of additional services such as electricity, water, and food. Because it is unlikely that the construction workers would relocate to the Daggett or Newberry Springs region, the Private Land Alternative would not cause a significant adverse socioeconomic impact on the area’s housing, schools, police, emergency services, hospitals, and utilities.

There would be no adverse socioeconomic impacts since most of the construction and operation workforce is within the regional labor market area, and construction activities are short-term. Benefits from the Calico Solar Project, should it be built at the Private Land Alternative, are likely to be similar to the benefits from project at the proposed site. Benefits include increases in sales taxes, employment, and income for San Bernardino County.

Comparison to Proposed Project. The socioeconomic impacts of the Calico Solar Project at the Private Land Alternative sites would be similar to building and operating the project at the proposed site. Workers would have a longer commute to reach the proposed site than to reach the alternative site. Air quality impacts from commute traffic are addressed in the Air Quality Section above.

Soil and Water Resources

Environmental Setting. Soils in the San Bernardino County Desert Region are primarily sandy gravel with low runoff coefficients and fast percolation (San Bernardino County 2006). The desert habitat of San Bernardino County includes soils that are predominantly sandy gravel and include major dune formations, desert pavement, and dry alkaline lake beds (San Bernardino County 2007).

The entire region is crossed by alluvial wash deposits. Desert soils are susceptible to erosion where disturbed due to the limited vegetation and low moisture content, as well as common high winds and infrequent high-intensity rainfall events that may occur (San Bernardino County 2006).

The Private Land Alternative lies within the Lower Mojave River Valley Groundwater Basin (DWR 2004b). The Lower Mojave River Valley Groundwater Basin underlies an elongate east-west valley with the Mojave River flowing occasionally through the valley from the west across the Waterman fault and the existing valley to the east through

Afton Canyon. Precipitation is between 4 to 6 inches with the average for the basin near 4 inches. Water-bearing deposits in this basin are predominantly unconfined (DWR 2004b). Wells yield range from 100 to 4,000 gpm and the average yield is about 480 gpm. The basin is bounded by the Camp Rock-Harper Lake, Calico-Newberry and Pisgah fault zones which form barriers or partial barriers to groundwater flow. Historically springs were located on the west side of many of these faults but most are no longer flowing because of a decline in the water table (DWR 2004b). In the northeastern portion of the basin relatively shallow clay layers result in shallow water levels near Camp Cady.

The published total storage capacity of the Lower Mojave River Valley Groundwater Basin varies. DWR calculated the total storage capacity for the Troy and Daggett storage units as 7,950,000 acre feet (DWR 2004b). The Mojave Water Agency calculated a total storage capacity of approximately 9,010,000 acre feet for the Lower Mojave River Valley Groundwater Basin (DWR 2004b). The site is located in a FEMA Flood Zone D, defined as areas with possible but undetermined flood hazards, no flood hazard analysis has been conducted (FEMA 2009).

An existing lined evaporation pond is located immediately west of the Private Land Alternative southern section and is used by the SEGS I and II (now owned by Cogentrix Energy, LLC) and Coolwater Generation Station.

Environmental Impacts

Soil Erosion Potential by Wind and Water. As stated in the **SOILS AND WATER** discipline of this SA/DEIS, construction activities can lead to adverse impacts to soil resources including increased soil erosion, soil compaction, loss of soil productivity, and disturbance of soils crucial for supporting vegetation and water-dependent habitats. Activities that expose and disturb the soil leave soil particles vulnerable to detachment by wind and water. Soil erosion results in the loss of topsoil and increased sediment loading to nearby receiving waters. Access to the Private Land Alternative would be via the Harvard Road exit off I-15 and via the Hidden Springs Road exit off I-40. Additional access would not be required to reach the site. While the volume of earth movement is unknown at this time, the topography and slopes of the Private Land Alternative and the Calico Solar Project site are similar. Therefore, it is expected that the footprint would be similar at both the Private Land Alternative and Calico Solar Project site, and similar erosion and sedimentation control methods would be used at both sites. However, because approximately 4,000 acres of the Private Land Alternative has been used for agricultural purposes, grading requirements would likely be reduced at the Private Land Alternative. Because of the high erosion potential of the desert soil, impacts to the soils at the Private Land Alternative would likely be significant and require mitigation similar to the mitigation required at the Calico Solar Project site. A Storm Water Pollution Prevention Plan (SWPPP) and a Drainage Erosion and Sediment Control Plan (DESCP) would be required. While grading plans, a SWPPP, and a DESCP would potentially reduce impacts to a less than significant level, near final grading plans, the SWPPP, and the DESCP would need to be prepared and reviewed to be certain this would be feasible.

Storm Water. As stated in the **SOIL AND WATER** discipline, potentially significant water quality impacts could occur during construction, excavation, and grading activities if contaminated or hazardous soil or other materials used during construction were to drain off site. The Private Land Alternative is in primarily undeveloped area and farmland. Brush would be cleared prior to grading. The storm water runoff percolates either into the soil or into flows overland off site. Impacts from storm water runoff would likely be similar to those at the Calico Solar Project site because of the high volume of earth displacement and the long duration for construction. Similar conditions of certification would be required.

Project Water Supply. It is unlikely that groundwater would be encountered during grading activities as the recorded depth to groundwater in the Lower Mojave River Valley Groundwater Basin is between 50 and 800 feet. However, as stated above relatively shallow clay layers result in shallow water levels near the Private Land Alternative northern section. The volume of groundwater required for construction would be similar to that required for constructing the projects at the Calico Solar Project location; however, there is a general trend in this basin for declining groundwater levels. While it is unknown at this time if there is sufficient groundwater available in the Lower Mojave River Valley Groundwater Basin to meet the construction and operation requirements of the Private Land Alternative, staff expects that water use associated with current agriculture practices would be higher than the annual volume of water required of the project. Because the Private Land Alternative site includes 4,000 acres of farmland, the existing water use for agriculture is expected be greater than the average project construction and operational water demand.

Wastewater. Groundwater would be needed during construction of the SunCatchers at the Private Land Alternative. Once used, this water would be reused to the extent possible and then discharged as wastewater. Improper handling or containment of construction wastewater could cause a broader dispersion of contaminants to soil or groundwater. The discharge of any nonhazardous wastewater during construction would be required to be in compliance with regulations for discharge. Water that could not be reused would be transported to an appropriate treatment facility. With implementation of required regulations, impacts would likely be less than significant.

Comparison to Proposed Project – Soil and Water Resources

Due to the large footprint and extensive grading required for the solar facility at both the Calico Solar Project and Private Land Alternative, similar erosion and sedimentation control methods would be required. Impacts to soil and water erosion would be similar at the two sites, although approximately 4,000 acres of the Private Land Alternative have been previously graded for agricultural use and may reduce the amount of grading required for the project. Based on the current water used for agriculture at the Private Land Alternative, sufficient water availability is expected at the Private Land Alternative.

Traffic & Transportation

Environmental Setting

Private Land Alternative northern section. The Private Land Alternative northern section would be located adjacent to Interstate 15. Access to this site would be via Interstate 15 to the Harvard Road exit in Harvard, then approximately 1 mile south on Harvard Road. The Private Land Alternative northern section entrance would most likely be from Harvard Road. A Union Pacific railroad track is located adjacent to Interstate 15.

Workers employed to construct the project at this alternative site would most likely commute from Barstow (20 miles) or Victorville (60 miles). Given the freeway access, there would not likely be added traffic on the Interstate 15 east of the sites (towards Las Vegas).

Private Land Alternative southern section. The Private Land Alternative southern section would be located approximately one mile north of I-40. Access to the site would be via I-40 from the Hidden Springs Road exit. The site is approximately 1 mile south of the Union Pacific terminal at Yermo and 1 mile north of the BNSF track 7200. The Private Land Alternative southern section is located approximately 1,000 feet from the Barstow/Daggett airport. The Barstow/Daggett airport has two runways and receives approximately 36,500 annual operations or approximately 100 flights per day.

Environmental Impacts. Before construction could occur for the Private Land Alternative sites, a construction traffic control and transportation demand implementation program would need to be developed in coordination with Caltrans. This analysis may result in the need to limit construction-period truck and commute traffic to off-peak periods to avoid or reduce traffic and transportation impacts. These impacts would likely be similar to those of the proposed project because construction at the Private Land Alternative would also require travel on I-40. Use of the Private Land Alternative would also require travel on I-15 which operates at a congested level on Friday afternoons. As with the proposed Calico Solar Project site, construction equipment could travel to the Private Land Alternative via railroad.

The project would potentially impact the Union Pacific right-of-way because it would be located immediately south and north of an active railroad right of way. Impacts to rail operations would be less than significant through proper coordination with local agencies.

The Private Land Alternative southern section would be less than 1 mile from the Barstow/Daggett airport. This may require additional marking and lighting along the Stirling engines in order to ensure safety of aircraft.

Comparison to Proposed Project. Impacts to traffic and transportation at the Private Land Alternative would be similar to those at the proposed Calico Solar Project site; including the use of Interstate 40 east of Barstow and potential use of the BNSF to transport materials. The Private Land Alternative site would require the use of Interstate 15 east of Barstow; however, this would be unlikely to cause a significant impact because of its location closer to sources of workers in the Victor Valley and Barstow.

Transmission Line Safety and Nuisance

Environmental Setting. The Private Land Alternative would connect with the SCE transmission system by two possible options. The first would be through an interconnection with the existing SCE 115 kV transmission line that crosses the sites; this would potentially require a transmission line upgrade to 230 kV. The second option would be to construct a 230 kV transmission line for approximately 10 miles southwest to the existing SCE Coolwater Substation in Daggett. The new transmission line would follow the existing 115 kV corridor. The Private Land Alternative is in uninhabited open space, agriculture land, and some rural residences crossed by a BLM utility corridor. BLM utility corridors are typically between 2 and 5 miles wide to provide flexibility in selecting alternative routes for rights-of-way (BLM 1999).

Environmental Impacts. Similar to the proposed project, this alternative would not be likely to cause transmission line safety hazards or nuisances. As stated in the **Transmission Line Safety and Nuisance** section, the potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current standard industry practices, and the potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards, while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route. As with the proposed Calico Solar Project transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed lines' design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information.

Comparison to Proposed Project. The transmission line safety and nuisance impacts at the Private Land Alternative sites would be similar to building and operating the project at the proposed Calico Solar Project site. The Private Land Alternative would potentially require a longer transmission line interconnection with the SCE transmission system should a new transmission line be built. The Private Land Alternative would not require an upgrade to the Lugo-Pisgah No. 2 220 kV transmission line.

Visual Resources

Environmental Setting. The alternative site parallels Interstate 15 and Interstate 40, and a 115kV transmission line crosses the alternative sites from southwest to northeast.

Private Land Alternative northern section. Few buildings are located in the area of the Private Land Alternative northern section; they include scattered rural residences and the Cady Camp Headquarters. The transmission line and the freeway introduce a more developed and industrial feature to the otherwise rural setting.

Nearby views from the Private Land Alternative northern section to the south, west and east are of undisturbed desert landscape crossed by a few unpaved roads, some agriculture lands, and some rural residential areas. A berm crosses the alternative along the northern boundary, along which are located railroad tracks, approximately one mile south of I-15. Further views become more residential once the community of Newberry Springs is in view. Elevation rises to the east of the site, eventually becoming the foothills of the Cady Mountains. More rural communities are located north of Interstate 15 within viewing distance of the site in addition to a number of other major transmission lines paralleling the freeway.

Private Land Alternative southern section. The Private Land Alternative southern section parallels Interstate 40 and the same 115kV transmission line crosses the alternative sites from southwest to northeast. The site is located adjacent to SEGS I and II, now owned and operated by Cogentrix Energy, LLC. The site is also adjacent to the existing Coolwater Generation Station, a natural gas fired station comprised of 4 units. Units 1 and 2 are conventional steam turbine/boiler units with a total capacity of 146 megawatts and are of 1961 and 1964 vintages, respectively. Constructed in 1978, both Units 3 and 4 are combined cycle gas turbine units with a total capacity of 462 megawatts. The Barstow/Daggett airport is located immediately southeast of the site.

Nearby views from the Private Land Alternative southern section are of agriculture landscape crossed by a few unpaved roads and some rural residential areas. Views to the south also include the Barstow/Daggett airport. Views to the west are industrial in nature, including solar facilities, fossil fuel facilities, railroad tracks, and a lined evaporation pond. Further views become more residential once the community of Daggett and Newberry Springs come into view. Elevation rises to the east of the site, eventually becoming the foothills of the Cady Mountains.

Environmental Impacts. As stated in the **VISUAL RESOURCES** section, the Energy Commission staff, in coordination with BLM, applied the BLM Visual Resource Management (VRM) system of visual assessment to the proposed Calico Solar Project site. The existing visual setting baseline under the VRM methodology is characterized in terms of Visual Resource (VR) Classes. Under the VRM system, areas of the project viewshed are delineated and mapped based on broadly uniform characteristics of visual quality, viewers' sensitivity, and distance from project to viewers. These delineated areas are then assigned a VR Class (from I through IV). VR Classes are analogous to Overall Sensitivity ratings under the Energy Commission method and are used to determine an area's visual objective, that is, the level of project-caused contrast that is acceptable, above which contrast could constitute a potentially significant adverse impact. The BLM land areas considered for the Private Land Alternative have not been assigned a VR Class so a formal impact determination under BLM's system cannot be made.

For the non-BLM land (the bulk of the Private Land Alternative), visual impact analysis would be based on a comparison of the area's visual sensitivity with the industrial features added by the solar project at this location. With the addition of the project in the Private Land Alternative northern section, views of the desert and rural communities would change from a relatively undisturbed desert landscape to a substantially more industrial, highly altered one, dominated by roughly 6 square miles of SunCatchers, graded areas, and retention ponds, as well as light rays reflected off ambient atmospheric dust and the bright glow of the receiving portions of the solar collectors.

The site would be prominently visible from Interstate 15, for both westbound and eastbound traffic. Travelers would see the site from a distance although the berm that is located along the northern boundary of the project would potentially block some of the SunCatchers from view. Additionally, because of the shape of the site (see Alternatives – Figure 3A, Interstate 15 would run the entire length of the solar power plant making the visible components more visually intrusive to westbound and eastbound traffic.

For the Private Land Alternative southern section, views of agriculture lands would change to a more industrial, highly altered one as well. However, because the views immediately west of the Private Land Alternative southern section are industrial in nature and views south of the site include the Barstow-Daggett airport, this change would be less prominent and viewers would be less sensitive to the change. The site would be prominently visible from Interstate 40, for both westbound and eastbound traffic. As with the northern section, because of the shape of the site (see Alternatives – Figure 3B), Interstate 40 would run the entire length of the solar power plant making the visible components more intrusive to westbound and eastbound traffic.

The linear facilities associated with the Private Land Alternative include a potential 230-kV transmission line approximately 10 miles long. The transmission line would follow the existing utility corridor and would roughly parallel an existing 115 kV transmission line for 10 miles until reaching the SCE Coolwater Substation and would be prominently visible from Interstate 15. The Private Land Alternative interconnection would introduce additional industrial character to the Interstate 15 corridor.

Comparison to Proposed Project. The Private Land site is preferred over the proposed Calico Solar Project site. While the SunCatchers at the Private Land Alternative site would be visible to more riders along Interstate 15 than along Interstate 40, it would be located in a more urban setting near existing communities and some of the project components would be potentially blocked by an existing berm. The proposed Calico Solar Project site would be visible to recreation areas including wilderness study areas. While the Private Land site would be prominently visible to the Cady Camp Wildlife Area, views from this camp to the south and east are already relatively built up due to the communities of Harvard and Newberry Springs which surround the site. As a result, a large solar project in the Calico Solar Project area would create a more dramatic change to the visual environment than would occur at the Private Land site.

The Private Land Alternative transmission line would create a visual impact similar to that of the Calico Solar Project transmission interconnection. The interconnection transmission line at the Private Land Alternative would be longer than the transmission interconnection, but would be located adjacent to an existing line in an existing corridor.

Waste Management

Environmental Setting. As discussed in the **WASTE MANAGEMENT** section of this SA/DEIS, hazardous and nonhazardous solid and liquid wastes, including wastewater, would be generated at the Calico Solar Project site during construction and operation of the solar power plant. Waste would be recycled where practical and nonrecyclable waste would be deposited in a Class III landfill. The Private Land Alternative would use the same waste recycling/disposal facilities as the Calico Solar Project site.

The hazardous waste generated during project construction could include scrap wood, steel, glass, plastic or paper, solvents, used oils, paints, oily rags, cleaners and adhesives, waste oil, spent batteries, concrete particles, and empty hazardous waste material containers (SES 2008a). The two Class I landfills that accept hazardous wastes in California are the Clean Harbor Landfill (Buttonwillow) in Kern County and the Chemical Waste Management Landfill (Kettleman Hills) in Kings County (SES 2008a).

The Kettleman Hills facility also accepts Class II and Class III wastes. In total, there is in excess of 11 million cubic yards of remaining hazardous waste disposal capacity at these landfills, with approximately 30 years of remaining operating lifetimes (SES 2008a).

Environmental Impacts. Construction at the Private Land Alternative site would require excavation of fill material that underlies the site similar to that of the proposed project. Both nonhazardous and hazardous wastes would be created by the construction of the project at the Private Land Alternative in similar quantities as at the proposed Calico Solar Project site and would be disposed of at appropriate facilities. As with the proposed Calico Solar Project site, the applicant would be required to obtain a unique hazardous waste generator identification number for the site prior to starting construction and would be required to comply with similar conditions of certification. The project would produce minimal maintenance and plant wastes.

All nonhazardous wastes would be recycled to the extent possible, and nonrecyclable wastes would be regularly transported off site to a local solid waste disposal facility. Generation plant wastes include: oily rags, broken and rusted metal and machine parts, defective or broken electrical materials, empty containers, and other miscellaneous solid wastes, including the typical refuse generated by workers. As with the proposed project, all construction and operation activities would need to be conducted in compliance with regulations pertaining to the appropriate management of wastes. The total amount of nonhazardous waste generated from the project is estimated to be 40 cubic yards per week of solid waste from construction, and approximately 10 cubic yards per week from operation. The disposal of the solid wastes generated by the Calico Solar Project facility can occur without significantly impacting the capacity or remaining life of any of these disposal facilities.

Like nonhazardous wastes, hazardous wastes would be recycled to the extent possible. The 1 cubic yard per week of hazardous waste from the Calico Solar Project requiring off-site disposal would be far less than the threshold of significance and would therefore not significantly impact the capacity or remaining life of the Class I waste facilities. Similar to the proposed project, the project would need to implement a comprehensive program to manage hazardous wastes and obtain a hazardous waste generator identification number (required by law for any generator of hazardous wastes).

Comparison to Proposed Project. The environmental impacts of waste disposal at the Private Land Alternative site would be similar to those at the proposed Calico Solar Project site.

Worker Safety and Fire Protection

Environmental Setting. The Private Land Alternative would be located within an area that is open space and agriculture lands. The area is currently served by the San Bernardino County Fire Department. See the **WORKER SAFETY AND FIRE PROTECTION** section for more information regarding the San Bernardino County Fire Department. The fire risks of this alternative would be similar to those of the proposed Calico Solar Project site as both have similar habitat and desert conditions and both sites are adjacent to a heavily used transportation corridor.

Environmental Impacts. Similar to the proposed Calico Solar Project, it would be appropriate for a solar plant at Private Land Alternative to provide a Project Demolition and Construction Injury and Illness Prevention Program and a Project Operations Safety and Health Program in order to ensure adequate levels of industrial safety. The applicant would also be required to provide safety and health programs for project construction, operation, and maintenance, similar to the requirements for the proposed Calico Solar Project site. Also similar to the proposed project, the San Bernardino County fire department would be contacted to assure that the level of staffing, equipment, and response time for fire services and emergency medical services are adequate.

Comparison to Proposed Project. The environmental impact of worker safety and fire protection at the Private Land Alternative site would be similar to that at the proposed Calico Solar Project site.

<u>Engineering Assessment for Private Land Alternative</u>

There would be no difference in the assessment of facility design, power plant efficiency, and power plant reliability, so these areas are not addressed here.

Geology, Paleontology and Minerals

Environmental Setting. The Private Land Alternative is located in an area mapped as Pleistocene nonmarine, dune sand, and alluvium along with limited undivided Miocene nonmarine areas (USGS 2008). Portions of the Private Land Alternative southern section are known to contain fossil resources (San Bernardino County 2007). No known active mineral resources are located at the Private Land Alternative.

The Manix fault, a left-lateral, strike slip located on the southeast side of and sub-parallel to Interstate 15 in the community of Manix between Barstow and Baker, crosses the site (USGS 2008, FTA 2009). The Manix fault is active; in April 1947 a M6.5 earthquake occurred on the Manix fault (FTA 2009). The length of the surface rupture was approximately 3 miles and the maximum slip was approximately 5 centimeters.

The Bedrock Peak Ground Acceleration (10% in 50 years) at the Private Land Alternative is 0.27g (CGS 2009). This includes faults within 100 miles of the solar plant site and estimates of potential seismic ground motion. An active fault runs through the Private Land Alternative site which has experienced a M6.5 earthquake and the fault is considered capable of producing a M7.0 earthquake (FTA 2009).

Environmental Impacts. Seismic ground shaking is probable at the alternative site because the Manix fault crosses the site. The severity and frequency of ground shaking associated with earthquake activity at the Private Land Alternative is slightly higher than at the proposed Calico Solar Project site. As such, more stringent design criteria may be required for the Private Land Alternative in accordance with a design-level geotechnical report and California Building Code (2007) standards. Adequate design parameters for the facility would need to be determined through a site-specific evaluation by a Certified Engineering Geologist or Geotechnical Engineer. Impacts due to seismic hazards and soil conditions would be addressed by compliance with the requirements and design standards of the California Building Code. The potential for liquefaction exists in San

Bernardino County in areas where relatively loose, sandy soils exist with high groundwater level during long duration, high seismic ground shaking. While few areas within the desert region of the county have potential for liquefaction, there is potential for liquefaction along the Mojave River and along the Private Land Alternative (San Bernardino 2009).

The paleontological sensitivity and potential to encounter significant paleontological resources in Quaternary alluvium at the alternative site and the Calico Solar Project site is similar. As stated in the **GEOLOGY, PALEONTOLOGY & MINERALS** discipline, construction of the proposed project will include grading, foundation excavation, utility trenching, and possibly drilled shafts. There exists the probability of encountering paleontological resources. As with the Calico Solar Project site, the proposed conditions of certification are designed to mitigate any paleontological resource impacts to a less-than-significant level.

Comparison to Proposed Project. With the exception of stronger ground shaking and potential for liquefaction, the Private Land Alternative site is subject to geologic hazards of similar magnitude as the Calico Solar Project site. Strong ground shaking could be effectively mitigated through facility design. The potential to encounter geologic resources and significant paleontological resources at the alternative sites is similar to the Calico Solar Project site. The conditions of certification provided in the **GEOLOGY, PALEONTOLOGY AND MINERALS** section would be applicable to the Private Land Alternative.

Transmission System Engineering

Locating a solar facility at the Private Land Alternative would require re-evaluating the capacity of the SCE transmission lines that would be used for interconnection. This alternative may cause adverse effects to the SCE transmission system and require system upgrades at the Coolwater Substation. However, the Private Land Alternative would not require the 65-mile upgrade to the Lugo-Pisgah No. 2 220 kV transmission line that would be required by the Calico Solar Project.

Summary of Impacts. The Private Land Alternative would have impacts similar to the proposed Calico Solar Project site at for air quality, hazardous materials management, recreation, public health, socioeconomics, transmission line safety and nuisance, waste management, worker safety and fire protection, facility design, power plant efficiency, geology and paleontology, and power plant reliability.

The Private Land Alternative would be preferred to the proposed Calico Solar Project site for biological resources, cultural resources, visual resources, and potentially transmission system engineering. The Private Land Alternative would be less preferred than the proposed Calico Solar Project site for land use (including agriculture) and noise.

It is believed that impacts to soils and water at the Private Land Alternative would be similar to those at the proposed Calico Solar Project site; it is assumed that there is groundwater available at the Private Land Alternative site because of the existing irrigated agriculture that would be replaced by the solar project.

B.2.8 ALTERNATIVES CONSIDERED BUT NOT EVALUATED IN FURTHER DETAIL

This section considers potential alternatives to the proposed Calico Solar Project that were evaluated, and determined to not be feasible for meeting key project objectives, they are not yet commercially available, or they would not result in lesser impacts than the proposed action. Because these alternatives would not avoid or substantially reduce the adverse impacts of the proposed Calico Solar Project or because they do not meet project objectives, the purpose and need for the project, or are otherwise not reasonable alternatives, they are not analyzed in further detail in this SA/DEIS.

B.2.8.1 PUBLIC LAND SITE ALTERNATIVES

The following sites located largely on public land managed by the BLM were identified by the Applicant as alternatives for analysis in its Application for Certification. They were evaluated here and, based on the findings of those analyses, were not carried forward for detailed evaluation in this SA/DEIS:

- Camp Rock Road (Site AS1)
- Upper Johnson Valley (Site AS2)
- West of Twentynine Palms (Site AS3)
- I-40 South (Site AS4)
- Broadwell Lake (Site AS5)
- SES Solar Three

Each site is discussed in the following paragraphs.

Camp Rock Road AS1

Camp Rock Road (Site AS1) was identified by the Applicant in the AFC as a potential alternative site for the proposed project. Camp Rock Road is located on nine sections, southwest of T6NR2E north of Camp Rock Road and bisected by an existing transmission line corridor. Two of the sections in the alternative site were acquired by the National Park Service Land & Water Conservation Fund (LWCF) which provides matching grants to States and local governments for the acquisition and development of public outdoor recreation areas and facilities (NPS 2009). The LWCF Act provides legal protection for areas or facilities for which LWCF assistance was obtained and ensures that the Federal investments in LWCF are maintained in public outdoor recreation use unless the National Park Service approves substitution property of reasonably equivalent usefulness and location and of at least fair market value [36 CFR §59.3]. The **LAND USE** discipline of this SA/DEIS discusses the BLM policy regarding LWCF acquired lands in more detail.

The Camp Rock Road site is located adjacent to and partially on the Johnson Valley Off Highway Vehicle (OHV) Area. The OHV area is a 154,700-acre off-highway vehicle area. All forms of motorized vehicle use are allowed within the boundaries of the area. Staging and camping areas include Anderson Dry Lake, Soggy Dry Lake, Cougar

Buttes, and the Rockpile. Competitive events are often held in Johnson Valley. As an example, over 25 OHV events were scheduled in Johnson Valley in 2009 (BLM 2009).

Slopes at the site range from 3 to 6%. Existing access to the site is from a county-maintained road although access would require an additional 3-mile access road to Harrod Road (SES Data Response Set 2 Pt 1). Additionally, there is no railroad within 10 miles. The entire site is classified as Category I Desert Tortoise habitat and is within the Ord-Rodman DWMA (SES Data Response Set 2 Pt 1).

Camp Rock Road was not pursued by the applicant as a possible site for the proposed project because of the lack of railroad access and lack of major highway access and because the site is located on designated critical habitat for Desert Tortoise (SES 2008a). Camp Rock Road is located southwest of the proposed Calico Solar Project site; see **Alternatives Figure 4**.

Environmental Assessment. As with the proposed Calico Solar Project site, Camp Rock Road would require use of a vast amount of land and would result in the permanent loss of approximately 5,750 acres of desert habitat, including Category I desert tortoise habitat, and would likely result in impacts to biological and cultural resources. Additionally, because the site would require a 3-mile access road to reach the site, the alternative would like result in a greater amount of earth movement than the proposed project which is located adjacent to an existing access road.

Impacts to land use and recreation at Camp Rock Road would potentially be significant as it is adjacent and partially located on the Johnson Valley Off Highway Vehicle (OHV) Area and on lands acquired with LWCF funding. Use of the Camp Rock Road Alternative would potentially conflict with the CDCA Recreation Element goals and with the use of lands acquired with LWCF funds and would require appropriate conditions of certification or mitigation such as those required for the proposed project in the **LAND USE** discipline.

Both the proposed Calico Solar Project site and Camp Rock Road would have a large footprint and require extensive grading, potentially resulting in erosion and runoff. Camp Rock Road is within one mile of Lucerne Valley and would likely be visible from this area. Given the size of the power plants and the approximately 40-ft tall SunCatchers, visual impacts would be considerable and similar to those at the proposed Calico Solar Project site.

Rationale for Elimination

Camp Rock Road would likely cause biological and cultural resources impacts due to the extensive grading required for the 850 MW solar power plant. Additionally, because of Camp Rock Road is in Category I desert tortoise habitat, compared with the proposed site which is Category II desert tortoise habitat, impacts to desert tortoise would be expected to more severe than at the proposed Calico Solar Project site. Because Camp Rock Road would be partially located on an OHV area and on lands acquired with LWCF funds, the project would conflict with the use of this land. Under CEQA, the alternative site was eliminated because it would not substantially lessen the significant effects of the proposed Calico Solar Project, and because a portion of the site is not a viable alternative because of conflicts with OHV areas.

The Camp Rock Road alternative site location was not found to be a reasonable alternative for the proposed project because of the land classification of the alternative site. The alternative site is located within a recreational use area which was established pursuant to BLM's multiple use and sustained yield management plan, the CDCA Plan of 1980, as amended over time, in conformance with FLPMA section 601 [43 U.S.C. 1781 (b)]. Without an additional land use plan amendment, which BLM could initiate, solar energy facilities within a designated Off-Highway Vehicle open area are precluded. While the BLM could initiate a land use plan amendment to accommodate the Camp Rock Road alternative site location, the alternative site does not avoid or minimize impacts to recreational interests, desert tortoise habitat, cultural resources, or approved CDCA plan land use.

Upper Johnson Valley AS2

Upper Johnson Valley (Site AS2) was identified by the Applicant in the AFC as a potential alternative site for the proposed Calico project. The site would be located on nine sections, three of which are owned by SCE. The site is located on Category III desert tortoise habitat. The site is located east of Lucerne Valley and north of Bessemer Mine Road. Slopes range from 3 to 5%. Access to the site would be on a county maintained road although it would require an additional 9.5-mile access road to State Hwy 247 (SES Data Response Set 2 Pt 1). Additionally, there is no railroad within 10 miles of the alternative site.

The site would be located on six sections of land that are part of the Upper Johnson Valley OHV Area and would be entirely surrounded by the OHV area. It would be located 8 miles east of Marine Corps Air Ground Combat Center Twentynine Palms (MCAGCC Twentynine Palms).

The site was not pursued by the applicant as a possible site for the proposed project because of the lack of railroad access, lack of major highway access, and because it is located on BLM OHV use area. Upper Johnson Valley site is located southwest of the proposed site; see **Alternatives Figure 4**.

Rationale for Elimination

The Upper Johnson Valley Alternative site location was not found to be a reasonable alternative for the proposed project because of the land classification of the alternative site. The alternative site is located within a designated recreational use area which was established pursuant to BLM's multiple use and sustained yield management plan, the CDCA Plan of 1980, as amended over time, in conformance with FLPMA section 601 (43 U.S.C. 1781 (b)). Without an additional land use plan amendment, which BLM could initiate, solar energy facilities within a designated Off-Highway Vehicle open area are precluded. While the BLM could initiate a land use plan amendment to accommodate the Camp Rock Road alternative site location, the alternative site does not avoid or minimize impacts.

Additionally, the purpose and need statement for the proposed action was developed by BLM consistent with its statutory and regulatory responsibilities. Thus, the portion of the alternative that is not within BLM jurisdiction would not be considered reasonable.

West of Twentynine Palms Military Base (AS3)

West of Twentynine Palms Military Base (Site AS3) was identified by the Applicant in the AFC as a potential alternative site for the proposed project. This site is located on eight sections of land that are part of the Upper Johnson Valley OHV Area and would be entirely surrounded by the OHV area. Additionally, the alternative is immediately west of MCAGCC Twentynine Palms and two of the sections are LWCF acquisition lands. MCAGCC Twentynine Palms is currently considering a Training Land/Airspace Acquisition Study. The DEIS for this study is expected to be released in October 2010. The West of Twentynine Palms Military Base Alternative site would be located within the West Study Area.

Access to the site would require an 11.5-mile access road to I-40 (SES Data Response Set 2 Pt 1). Additionally, there is no railroad within 10 miles of the alternative site. The alternative site was not located in any identified critical habitat land.

The alternative was not pursued as an alternative to the proposed site by the applicant because of land use conflicts, lack of railroad and major highway access, and distance from existing transmission corridors. West of Twentynine Palms Military Base Alternative is located due west of MCAGCC Twentynine Palms and south of the proposed site as shown on **Alternatives Figure 4**.

West of Twentynine Palms Military Base is located in the CDCA Planning area and includes use of lands acquired with LWCF funds.

Rationale for Elimination

The West of Twentynine Palms Military Base Alternative was not found to be a reasonable alternative for the proposed project because the land classification of the alternative. The alternative site is located within a designated recreational use area which was established pursuant to BLM’s multiple use and sustained yield management plan, the CDCA Plan of 1980, as amended over time, in conformance with FLPMA section 601 (43 U.S.C. 1781 (b)). Without an additional land use plan amendment, which BLM could initiate, solar energy facilities within a designated Off-Highway Vehicle open area are precluded. While the BLM could initiate a land use plan amendment to accommodate the Camp Rock Road alternative site location, the alternative site does not avoid or minimize impacts.

I-40 South (AS4)

The I-40 South Alternative site was suggested by the applicant. The site is located on twelve sections of land both federal and private. The site is traversed by the Lugo-Pisgah No. 2 transmission line and is located approximately 2 miles south of I-40. Access to the site would require a .5-mile access road to I-40 (SES Data Response Set 2 Pt 1). Slopes at the site range from 3 to 5%. Three sections of the alternative site (T7N R5E Sections 4, 5, and 6) are located within the Ord-Rodman unit of desert tortoise critical habitat which would limit their use for energy development. CNDDB data indicate the purple-nerve cymopterus (CNPS List 2.2) is present on the site (SES Data Response Set 2 Pt 1).

Three existing mining claims, the National Mine, Silver Bell Mine, and Silver Cliffs Mine, are located within one mile of the alternative site. Access roads to the existing mines cross the alternative site. MCAGCC Twentynine Palms would be located immediately southwest of the alternative site. Rodman Mountains Wilderness would be located one mile west of the alternative site. Additionally the project would be located on approximately 3 miles of the Pisgah Crater Lava Flow. The Pisgah Crater Lava Flow includes what may be the youngest pahoehoe basalts found in California and are open to visitors on BLM managed land.

Environmental Assessment. As with the proposed Calico Solar Project site, the I-40 South Alternative would require use of a vast amount of land and would result in the permanent loss of approximately 7,600 acres of desert habitat. The project would require extensive grading and would likely result in impacts to biological and cultural resources. The project would be located on approximately 1,920 acres of critical desert tortoise habitat and would likely result in significant biological impacts.

Impacts to land use and recreation at I-40 South would potentially be significant as it includes a portion of the Pisgah Crater Lava Flow and has potential conflicts with existing land uses including a number of mines. The project would deny access to three existing mines, and new access routes would be required. The I-40 South would potentially conflict with the MCAGCC Twentynine Palms which is located immediately southeast of the alternative site.

Both the proposed Calico Solar Project site and I-40 South site would have a large footprint and require extensive grading, potentially resulting in erosion and runoff. As with the proposed Calico Solar Project site, the I-40 South site would be within 2 miles of the I-40 and given the size of the power plants and the approximately 40 foot tall SunCatchers, visual impacts to travelers along the I-40 would be considerable. Additionally, the project would likely be visible from the Rodman Mountains Wilderness and potentially visible from the Rodman Mountains ACEC.

Rationale for Elimination

I-40 South Alternative would likely cause biological and cultural resources impacts due to the extensive grading required for the 850 MW solar power plant. Additionally, the alternative site is located on desert tortoise critical habitat and would potentially result in more significant impacts to the species.

As with the existing project, the I-40 South Alternative would impede access to existing uses and alternative access routes would be required. Approximately 3 miles of the Pisgah Crater Lava Flow would be impacted by the project. Impacts to visual resources would likely be severe given the proximity of the project to I-40 and the Rodman Mountains Wilderness. Under CEQA, the alternative site was eliminated because it would not substantially lessen the significant effects of the proposed Calico Solar Project, and because a portion of the site is not a viable alternative because it is located on desert tortoise critical habitat.

Broadwell Lake (AS5)

The Broadwell Lake Alternative site was considered by the applicant because it was near the SCE Lugo-Pisgah No. 2 transmission line. The site is located on 12 sections of BLM land approximately 9 miles north of I-40. The site would be located approximately 5 miles east of the proposed Calico Solar Project site. The site would be east of the Cady Mountain Wilderness Study Area and north of the Sleeping Beauty mountain range and within the proposed national monument. CNDDB data indicate the presence of desert tortoise (Federally and State listed threatened), emory's crucifixion-thorn, small-flowered androstephium (CNPS List 2.2), white-margined beardtongue (CNPS List 1B.2/ BLM Sensitive), and Mojave Fringe-toed Lizard (State species of concern) (SES Data Response Set 2 Pt 1).

Rationale for Elimination

In March 2009, Senator Feinstein announced intention of introducing new legislation to establish a national monument. The proposed national monument would connect the Joshua Tree National Park and Mojave National Preserve and would potentially include the former Catellus Lands donated by the Wildlands Conservancy to the BLM. The proposed Mojave Trails National Monument boundary was released in December 2009 and includes the Broadwell Lake Alternative Site.

Additionally, in January 2007, DPT Broadwell Lake, LLC (BrightSource) submitted an application to the BLM for use of the majority of the land identified in Broadwell Lake (AS5) for the construction and operation of a 500 MW solar power tower facility (BLM 2009). BrightSource has stated that it will not move forward with this application until questions are resolved about whether the land would be included in the national monument (Press Enterprise 2009). However, the application has not been formally withdrawn from the BLM queue. As discussed earlier, under its existing regulations, BLM determines if competing applications exist for the same facility or system. Applications that are first in time are given priority in consideration and are not considered competing applications with those filed later in time. An alternative site on BLM land with a pending application for another project is not considered a reasonable alternative to the proposed project for purposes of alternatives analysis. Therefore, an alternative site on BLM land with a pending application, such as Broadwell Lake, would not be a reasonable alternative for the proposed Calico Solar Project unless that other application is timely rejected or withdrawn.

SES Solar Three Alternative

As suggested by the Defenders of Wildlife, the Stirling Energy System (SES) Solar Three Alternative site was considered in conjunction with the Reduced Acreage Alternative because it would allow for additional development of solar power while avoiding resources of greatest concern. In November 2006, SES Inc. Solar Three, LLC filed an application with the BLM for use of 6,779 acres of land immediately west of Calico Solar Project. Approximately 2,500 acres of the land within the SES Solar Three boundaries show no tortoise sign present, as illustrated in applicant figure 5.6-4 and was considered as a potential alternative to the proposed project.

Rationale for Elimination

SES withdrew the Solar Three application in December of 2009 and the case file for SES Solar Three was closed by the BLM. Prior to the withdrawal of the SES Solar Three application, a second-in-line application had filed for the site. As discussed earlier, under its existing regulations, BLM determines if competing applications exist for the same facility or system. Applications that are first in time are given priority in consideration and are not considered competing applications with those filed later in time. An alternative site on BLM land with a pending application for another project is not considered a reasonable alternative to the proposed project for purposes of alternatives analysis. Therefore, an alternative site on BLM land with a pending application, such as Solar Three, would not be a reasonable alternative for the proposed Calico Solar Project unless that other application is timely rejected or withdrawn.

B.2.8.2 ALTERNATIVE SOLAR GENERATION TECHNOLOGIES

In addition to the range of alternative sites discussed earlier, several alternative solar generation technologies were identified by the Energy Commission and evaluated as potential alternatives to the proposed Calico Solar Project. Although alternative solar generation technologies would achieve most of the project objectives, each would have different environmental or feasibility concerns. BLM did not find these alternatives to be consistent with the project purpose and need, and they are therefore not analyzed in detail under NEPA. The following solar generation technologies were considered in this analysis:

- parabolic trough technology
- solar power tower technology
- linear Fresnel technology
- photovoltaic technology

Alternatives Table 2
Summary Characteristics of Solar Technologies

Technology	Parabolic trough	Solar Power Tower	Stirling Engine	Linear Fresnel	Photovoltaic
Water Use/ 100 MW (Assumes dry cooling)	~65 AFY	~20 AFY	~5 AFY	~12 AFY	~2-10 AFY
Acres per MW	6-7	10	9	4	8-12
Low Impact Construction Possible	No	Yes	Yes	No	Yes
Tallest component (does not include cooling towers or Transmission Line)	25 feet – trough	300 - 650 feel	38 feet - engine	56 feet	10 -15 feet (+ inverter station)
Slope requirements	2% or less	5% or less, can use LID	6% or less, can use LID	1% or less	3% or less, can use LID

Technology	Parabolic trough	Solar Power Tower	Stirling Engine	Linear Fresnel	Photovoltaic
Siting restrictions	Troughs are 1300 feet long, requires contiguous land	Heliostats must be in concentric circles around power tower	Can be sited in irregular shapes	Requires rectangles, requires contiguous land	Can be sited in irregular shapes
Heat Transfer Fluid (do not include water)	Yes	No	No	No (water used)	No

Among the solar thermal technology alternatives, the linear Fresnel alternative has the potential for least impacts due to its more compact configuration (reducing ground disturbance); however, the technology is proprietary and is not available to other applicants or developers. Additionally, in February 2009 Ausra, the proprietary owner of the linear Fresnel technology, changed focus to exit the business of building solar-power plants and instead serves other developers with solar thermal energy systems for industrial use and utility-scale generation. As such, the linear Fresnel technology will only be addressed briefly below.

The distributed solar alternative would have fewer impacts than the proposed Calico Solar Project because it would be located on already existing buildings or on already disturbed land. However, achieving 850 MW of distributed solar PV or solar thermal would depend on additional policy support, manufacturing capacity, and lower cost than currently exists to provide the renewable energy required to meet the California Renewable Portfolio Standard requirements so additional technologies, like utility-scale solar thermal generation, would be necessary.

These analyses assumed that the alternative technologies would be implemented on the site for the proposed Calico Solar Project, east of Newberry Springs.

Parabolic Trough Technology

A parabolic trough system converts solar radiation to electricity by using sunlight to heat a fluid, such as oil, which is then used to generate steam. The plant consists of a large field of trough-shaped solar collectors arranged in parallel rows, normally aligned on a north-south horizontal axis, see **Alternatives Figure 5**. Each parabolic trough collector has a linear parabolic-shaped reflector that focuses the sun’s direct beam radiation on a linear receiver, also referred to as a heat collection element located at the focus of the parabola. Heat transfer fluid within the collector is heated to approximately 740 degrees Fahrenheit (°F) as it circulates through the receiver and returns to a series of heat exchangers where the fluid is used to generate high-pressure steam. The superheated steam is then fed to a conventional reheat steam turbine/generator to produce electricity.

A solar trough power plant generally requires land with a less than 2% grade. On average, 5 to 8 acres of land are required per MW of power generated. A parabolic trough power plant would include the following major elements:

- **Parabolic Trough Collectors**. The parabolic trough collectors would rotate around the horizontal north/south axis to track the sun. Reflectors, or mirrors, would focus the sun's radiation on a linear receiver located along the length of the collector.
- **Solar Boiler.** Solar boilers are designed differently than conventional gas-fired boilers in that they are fueled with hot oil instead of hot gases. This design is similar to any shell and tube heat exchanger in that the hot heat transfer fluid is circulated through tubes and the steam is produced on the shell side.
- **Heat Transfer Fluid Oil Heater**. Due to the high freezing temperature of the solar field's heat transfer fluid (54°F), to eliminate the problem of oil freezing, an oil heater would be installed to protect the system during the night hours and colder months.

Parabolic trough power plants are the currently the most established type of large solar generator. Existing facilities are located in several places, including the following:

- **Nevada SolarOne** (shown in **Alternatives Figure 5**) near Boulder City, Nevada, has been operating since June 2007. It cost over $260 million and generates 64 MW. It is the largest concentrating solar power plant to be built in the last 17 years and is the third largest plant of its kind in the world (Nevada SolarOne 2008).
- **Sunray Energy, Inc. Solar Energy Generating System** is located in Daggett, California adjacent to an abandoned power tower facility. It generates 44 MW and is shown in **Alternatives Figure 5**.
- **Kramer Junction Solar Energy Generating System** is located about 30 miles west of Barstow, California. The project is a series of utility-scale solar thermal electric power plants, which were designed and developed in the mid-1980s by LUZ Industries. The facility can produce 165 MW at full capacity (Solel 2008).

Environmental Assessment. Approximately 4,250 to 6,800 acres of land would be required for a 850 MW solar trough power plant, resulting in a permanent loss of natural desert habitat.

If the solar trough technology were used at the Calico Solar Project site, slightly less acreage would be required. However, parabolic troughs require a more level ground surface, so the entire site would need to be graded for the solar trough power plant, removing all vegetation from the area. This results in a somewhat more severe effect on biological and cultural resources than the Calico Solar Project, which would not require grading the entire site.

The size and height of the solar trough mirrors (each approximately 28 feet high) would cause visual impacts from I-40 Highway and Cady Mountains Wilderness Study Area. While the solar trough technology would be slightly lower to the ground than the Stirling Engine SunCatchers, the number of solar troughs and the large acreage required would introduce prominent and reflective structures, industrializing the area.

Solar trough plants require water to generate the steam that powers the turbines. The technology uses a closed-loop circulation that requires some boiler make-up water to replace water lost in the system. Water is also required to wash the mirrors for both types of technologies. If wet cooling were used, the cooling towers would require approximately 600 acre-feet/year (AFY) per 100 MW of capacity. Dry cooling would use significantly less water, approximately 18 AFY per 100 MW (NRDC 2008a).

Because of the extensive grading required for a solar trough plant, soil erosion and air emissions during construction could be more severe than with the Calico Solar Project.

Summary of Impacts. The land area needed for a solar trough power plant would likely be less than required for the proposed Calico Solar Project, but more intensive in terms of ground disturbance. Because of the more intensive use of the land and the grading required to achieve a 2% grade, there could be more severe impacts to biological and cultural resources than would occur with the Stirling engine facility. Use of a heat transfer fluid as would be conveyed in miles of pipelines from the parabolic trough collectors to the solar boiler would create a potential for spills of hazardous materials into soil or water, which would not be present with the proposed Calico Solar Project engine.

Rationale for Elimination

Solar trough technology is a viable renewable technology and could potentially reduce the footprint of the project between 10 and 45%. However, due to its requirement for a nearly flat, graded site, it would require more construction with greater air emissions and more erosion potential. With a minimum size of nearly 4,000 acres, solar trough technology would not eliminate any of the significant impacts of the Calico Solar Project. Therefore, this alternative technology was eliminated from further consideration in this SA/DEIS.

Solar Power Tower Technology

The solar power tower technology converts thermal energy to electricity by using heliostat (mirror) fields to focus energy on a boiler located on power tower receivers near the center of each heliostat array. Each mirror tracks the sun during the day. The heliostats would be 7.2 feet high by 10.5 feet wide. See **Alternatives Figure 5** for an illustration. The solar power towers can be up to 459 feet tall with additional 10-foot tall lightening rods. The solar power tower would receive heat from the heliostats then convert the heat into steam by heating water in the solar boilers. A secondary phase would convert the steam into electricity using a Rankine-cycle reheat steam turbine electric generator housed in a power block facility at each of the plants.

In general, a solar power tower power plant requires 5 to 10 acres of land per MW of power generated. An 850 MW solar power tower field would require from 4,250 acres to 8,500 acres of land.

Site preparation involves grading the heliostat field and grading the access roads required for maintenance. Each heliostat field has the following primary components.

- **Heliostats.** The heliostat mirrors are arranged around each solar receiver boiler. Each mirror tracks the sun throughout the day and reflects the solar energy to the receiver boiler. The heliostats are approximately 7.2 feet high by 10.5 feet wide. They are arranged in arcs around the solar boiler towers asymmetrically.

- **Power Tower.** The power tower structure height is up to 459 feet. Primary thermal input is via solar receiver boilers, superheater and reheaters at the top of the distributed power towers.
- **Steam Turbine Generator (STGs)**. The steam turbine system consists of a condensing steam turbine generator with reheat, gland steam system, lubricating oil system, hydraulic control system, and steam admission/induction valving. Power will be generated by the STGs at 19 kV (hydrogen cooled) and then stepped up by transformers for more efficient transmission across the grid.

Environmental Assessment. The land area required for an 850 MW solar power tower plant is similar to that required for the proposed Calico Solar Project. Grading of almost the entire Calico Solar Project site would be required along with grading of permanent access roads due to the need for regular washing of the mirrors. This grading would cause removal of vegetation. Additionally, because the proposed Calico Solar Project site is crossed by several desert washes, the installation of the heliostats and power towers could require a larger total acreage of land, resulting in a greater loss of habitat.

Due to the size and height of the solar power towers and mirrors, impacts to visual resources would be greater than those of the Calico Solar Project. The grading of approximately 4,250 to 8,500 acres required for a 850 MW of power along with the approximately 459 foot tall towers would introduce an industrial character to this site and the surrounding areas.

Because of the height of the solar power towers, there may be concerns regarding any nearby aviation or military operations. While the solar power tower technology built at the Solar One site would not be located in the military no fly/no build areas, it would be located in a DOD Airspace Consultation Area and conflicts with the nearby MCAGCC Twentynine Palms may arise.

Rationale for Elimination

The area needed for a solar power tower plant would be comparable to the land requirement for the Calico Solar Project. Grading requirements for the solar power tower would be similar to the proposed Stirling technology because both technologies require access roads in between the rows of heliostats or engines. For these reasons, recreation and land use, biological resources, cultural resource and soil erosion impacts would be similar to those of the Calico Solar Project facility. In addition, due to the extent of the facility and the height of the power towers, visual impacts would like be greater for this alternative. Additionally, the height of the power tower would create potential impacts with the adjacent military facilities.

Because no substantial reduction in impacts would occur under this alternative technology, the solar power tower technology was eliminated from further consideration in this SA/DEIS as an alternative technology.

Linear Fresnel Technology

A solar linear Fresnel power plant converts solar radiation to electricity by using flat moving mirrors to follow the path of the sun and reflect its heat on the fixed pipe receivers located about the mirrors. During daylight hours, the solar concentrators focus heat on the receivers to produce steam, which is collected in a piping system and delivered to steam drums located in a solar field and then transferred to steam drums in a power block (Carrizo 2007). The steam drums transferred to the power block will be used to turn steam turbine generators and produce electricity. The steam is then cooled, condensed into water, and recirculated back into the process.

Each row-segment is supported by large hoops that rotate independently on metal castors. Rotation of the reflectors would be driven by a small electrical pulse motor. Reflectors are stowed with the mirror aimed down at the ground during the night. The major components are:

- **Compact Linear Fresnel Reflector (CLFR) Solar Concentrator.** A solar Fresnel power plant would use Ausra's CLFR technology which consists of slightly curved linear solar reflectors that concentrate solar energy on an elevated receiver structure. Reflectors measure 52.5 by 7.5 feet (Carrizo 2007). There are 24 reflectors in each row. A line is made up of 10 adjacent rows and operates as a unit, focusing on a single receiver (Carrizo 2007).
- **Receiver Structure.** The receiver structure is approximately 56 feet tall (Carrizo 2007). It would carry a row of specially coated steel pipes in an insulated cavity. The receiver would produce saturated steam at approximately 518°F from cool water pumped through the receiver pipes and heated (Carrizo 2007). The steam would drive turbines and produce electricity.

Rationale for Elimination

The Fresnel solar technology is a proprietary technology owned by Ausra, Inc. However, Ausra, Inc. has changed its focus to being a technology and equipment provider rather than an independent power developer and owner and will focus on medium-sized (50 MW) solar steam generating systems for customers including steam users, such as food processors and enhanced oil recovery firms and utilities for power augmentation systems that deliver steam into existing fossil-fuel power plants. A project of 850 MW is theoretically possible, and would require smaller acreage per megawatt. However, at nearly 4,000 acres for 850 MW, this technology would not eliminate the significant impacts of the proposed SES technology at this site.

Solar Photovoltaic Technology – Utility Scale

A solar photovoltaic (PV) power generation facility would consist of PV panels that would absorb solar radiation and convert it directly to electricity. PV facilities have been suggested using two general technologies:

- Thin film installed on fixed metal racks, as proposed by First Solar, Inc. (see **Alternatives Figure 6**)
- Concentrating photovoltaics installed in elevated groups of panels that track the sun. These technologies are available from companies such as SunPower and Amonix. SunPower's PowerTracker technology consists of a single-axis mechanism that rotates the PV panels to follow the sunlight. The Amonix technology allows tracking on two axes. See **Alternatives Figure 6**.

Examples of existing utility scale PV facilities are:

- El Dorado Energy (Boulder City, NV): First Solar built a 10 MW facility using thin film technology for Sempra Energy demonstrating the commercial viability of its technology. The facility consists of over 167,000 solar modules on 80 acres of land and was completed in December 2008. (Sempra 2008). Additionally, Sempra Generation will begin expanding the facility by 48 MW in January 2010. All 58 MWs would be purchased by PG&E (Sempra 2009).
- NRG Solar (Blythe, CA): NRG Solar acquired a 21 MW thin film PV project in Blythe, CA. Commercial operation of the facility began in December 2009 and the electricity generated by the project is being sold to SCE under a 20 year power purchase agreement (NRG 2009).

Because PV technologies vary, the acreage required per MW of electricity produced from a large solar PV power plant is wide ranging and likely to change as technology continues to develop. The land requirement varies from approximately 3 acres per MW of capacity for crystalline silicon to more than 10 acres per MW produced for thin film and tracking technologies (NRDC 2008c). Therefore, a nominal 850 MW solar PV power plant would require between 2,550 and 8,500 acres.

Utility-scale solar PV installations require land with less than 3% slope. Solar photovoltaics do not require water for electricity generation. Because some water will be required to wash the solar panels to maintain efficiency, approximately 2-10 AFY of water is estimated to be required for a 100 MW utility solar PV installation or 15 to 75 AFY for a 850 MW installation (NRDC 2008c). The SunPower-CA Valley Solar Ranch states that the facility would use approximately 11.6 AFY for a 250 MW PV facility, or approximately 40 AFY for an 850 MW PV facility (SLO 2009).

Solar PV arrays and inverters would be approximately 15 to 20 feet high; however, some components of the solar PV facility, such as collector power lines or a transmission interconnection may be substantially taller (SLO 2009).

As with any large solar facility, additional operational components may be required. The SunPower-California Valley Solar Ranch would require such operational components such as electrical equipment, collector power lines, access roads, a substation, an operation and maintenance building, and water tanks (SLO 2009).

Environmental Assessment. A utility scale solar PV facility would create a number of substantial adverse effects similar to those created by the proposed Calico Solar Project facility. If utility scale solar PV technology were built at the Calico Solar Project site, approximately 2,550 to 8,500 acres may be required, depending on the technology. Because the proposed site is crossed by several desert washes, it is likely that additional acreage would be required to site the solar PV arrays away from the major washes. Additionally, because solar PV technology requires ground surface with less than 3% slope, most of the site would be graded, removing all vegetation from the area. This results in a somewhat more severe effect on biological and cultural resources than the Calico Solar Project, which would not require grading the entire site.

The size and height of the solar PV arrays would likely be visible from nearby areas, such as I-40 and the Cady Wilderness Study Area due to the large size of the solar PV facility. The large number of solar PV arrays, access roads, and interconnection power lines required for a 850 MW solar facility would introduce prominent industrial features; however, the solar PV technology would not introduce components as tall as the 40-foot Stirling SunCatchers. Additionally, because most PV panels are black to absorb sun, rather than mirrored to reflect it, glare would be lessened.

Because the solar PV technology does not require any water for cooling or steam generation, the technology uses less water than solar concentrating technologies. Water would be required for washing the solar PV arrays. Approximately 40 AFY would be required (SLO 2009). This is similar to the amount of water required by the Calico Solar Project which estimates use of approximately 36.2 AF annually.

More extensive grading would be required for a PV facility than the proposed Calico Solar Project facility. Because solar PV facilities require land with only 3% slope and the solar panels are grouped more densely together, it is likely that more grading would be required for a solar PV facility. Additionally, many miles of permanent access roads would be required for washing and maintenance of the solar panels. The extensive grading would likely create erosion concerns similar to those of the Calico Solar Project.

Summary of Impacts. The large land area required for PV development would result in similar impacts to recreation, land use, biological and cultural resources, and likely greater impacts to soil and water resources as those of the Calico Solar Project facility. A utility scale PV project would reduce impacts to glare and would require minimal water for washing of the PV panels.

Rationale for Elimination

While utility scale solar PV technology is a viable renewable technology, its use would not reduce major impacts of the proposed Calico Solar Project facility because the extent of land and access roads required, and the more extensive grading and stormwater management system required. Due to its requirement for a nearly flat, graded site, it would require more construction with greater air emissions and more erosion potential. With a minimum size of nearly 2,500 acres, solar PV technology would not eliminate any of the significant impacts of the Calico Solar Project. Therefore, this alternative technology was eliminated from further consideration in this SA/DEIS.

Distributed Solar Technology

There is no single accepted definition of distributed solar technology. The *2009 Integrated Energy Policy Report* (IEPR) defines distributed generation resources as "grid-connected or stand-alone electrical generation or storage systems, connected to the distribution level of the transmission and distribution grid, and located at or very near the location where the energy is used."

Distributed solar facilities vary in size from kilowatts to tens of megawatts but do not require transmission to get to the areas in which the generation is used. Distributed solar generation is generally considered to use photovoltaic (PV) technology although at slightly larger scales it is also being implemented using solar thermal technologies. Both technologies are considered below.

Distributed Solar PV Systems

A distributed solar alternative would consist of PV panels that would absorb solar radiation and convert it directly to electricity. The PV panels could be installed on residential, commercial, or industrial building rooftops or in other disturbed areas such as parking lots or disturbed areas adjacent to existing substations. To be a viable alternative to the proposed Calico Solar Project, there would have to be sufficient newly-installed panels to generate 850 MW of capacity.

California currently has over 500 MW of distributed solar PV systems which cover over 40 million square feet (CPUC 2009). During 2008, 158 MW of distributed solar PV was installed in California, doubling the amount installed in 2007 (78 MW), and with 78 MW installed through May 2009, installation data suggests that at least the same amount of MW could be installed in 2009 as in 2008 (CPUC 2009).

Rooftop PV systems and parking lot systems exist in small areas throughout California. Larger distributed solar PV installations are becoming more common. Examples of distributed PV systems are:

- Nellis Air Force Base (AFB, Nevada): Over 72,000 solar panels, generating 14 MW of energy, were constructed in 2007, by SunPower Corp. on 140 acres of Nellis AFB land (Whitney 2007). Energy generated is used at the Nellis AFB.
- Southern California Edison (Fontana, CA): SCE has installed over 3 MW of distributed solar energy in two phases on over 1 million square-foot commercial roof using thin film PV technology provided by First Solar. This is the beginning of a planned installation of 3.5 million PV panels that would generate 250 MW of capacity (SCE 2009).
- San Diego Gas & Electric (San Diego, CA): SDG&E’s Solar Energy Project is designed to install up to 80 MW of solar PV, which would include PV installation on parking structures and tracking systems on open land (SDG&E 2008).
- Pacific Gas & Electric (San Francisco, CA): PG&E launched a 5-year program to develop 500 MW of solar PV power. The program would consist of 250 MW of utility-owned PV generation and an additional 250 MW to be built and operated by independent developers under a streamlined regulatory process. PG&E’s program targets mid-sized projects, between 1 to 20 MWs, mounted on the ground or rooftops within its service area (PG&E 2009).
- City of San Jose (San Jose, CA): The City of San Jose is considering the development and implementation of 50 MW of renewable solar energy on city facilities and/or land (San Jose 2009). San Jose’s Green Vision lays out a goal of achieving 100% of the city’s electricity from renewable energy by 2020 and plans to implement strategies of a 24-month period to increase solar installations in San Jose by 15%. The City anticipates that City facilities with appropriate solar access including parking lots, garages, lands and landfills would be eligible for solar installation and San Jose received ARRA funding for the project.

Like utility-scale PV systems, the acreage of rooftops or other infrastructure required per MW of electricity produced is wide ranging. As stated above, California has approximately 40 million square feet (approximately 920 acres) of distributed solar PV accounting for 500 MW installed (CPUC 2009). However, based on SCE's use of 600,000-square-feet for 2 MW of energy, 250 million square feet (approximately 5,700 acres) would be required for 850 MW.

Most rooftop PV systems in California are crystalline systems, and result in approximately 15% of sunlight converted to energy (SB 2009). The newer technology is thin film, which converts approximately 5 to 10% of sunlight to energy.

San Bernardino County is estimated to have the technical potential for over 2,000 MW of distributed solar PV (CEC, 2007b). However, the location of the distributed solar PV would impact the capacity factor of the distributed solar PV.[1] The capacity factor depends on a number of factors including the insolation[2] of the site. Because a distributed solar PV alternative would be located throughout the state, the insolation at some of these locations may be less than in the Mojave Desert. The Renewable Energy Transmission Initiative (RETI) assumed a capacity factor of approximately 30% for solar thermal technologies and tracking solar PV and approximately 20% capacity factor for rooftop solar PV which is assumed to be non-tracking, , for viable solar generation project locations (B&V 2008; CEC 2009). Tracking distributed solar PV would have a higher capacity factor as well.

Distributed Solar Thermal Systems

Solar thermal technology, specifically Concentrated Solar Power (CSP) technology, has also been adapted for use at distributed locations. In August 2009, eSolar began operations of a new distributed solar power tower technology. This technology uses small, flat mirrors which track the sun and reflect the heat to tower-mounted receivers that boil water to create superheated steam (eSolar 2009). An example of the eSolar system is the Sierra SunTower, located in Lancaster, CA, which will produce 5 MW of energy for SCE on 20 acres of land (eSolar 2009). Each eSolar module locates one tower, one thermal receiver, and 12,000 mirrors on 10 acres of land and produces 2.5 MW of power. Additionally, eSolar has developed a larger module, a 46 MW CSP plant that would include sixteen towers, a turbine generator set, and a steam condenser which would be located on approximately 160 acres (eSolar 2009).

Another solar thermal technology, the solar trough technology, could also be used as distributed technology. The Andasol 1 power plant in Spain generates 50 MW of power on approximately 127 acres (not including ancillary facilities) and went online in November 2008 (Solar Millenium 2008). The Andasol plant includes thermal storage systems which absorb a portion of the heat produced in the solar field during the day and can run the turbines for approximately 7.5 hours at full load, regardless of the solar conditions at the time (Solar Millenium 2008).

Both the solar thermal technologies have been implemented recently and are described here as an example of the evolving distributed solar technologies.

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[1] The capacity factor of a power plant is a percentage that tells how much of a power plant's capacity is used over time (CEC 2008a)

[2] Insolation is the total amount of solar radiation striking a surface exposed to the sky (CEC 2008a).

Environmental Assessment. Installations of 850 MW distributed solar PV would require up to 255 million square feet (approximately 5,700 acres). Distributed solar PV is assumed to be located on already existing structures or disturbed areas so little to no new ground disturbance would be required and there would be few associated biological and cultural resources impacts.

Minimal grading or new access roads would be required and relatively minimal maintenance and washing of the solar panels would be required. As such, it is unlikely that the rooftop solar PV alternative would create erosion impacts. Relatively large amounts of water would be required to wash the solar panels, especially with larger commercial rooftop solar installations; however, the commercial facilities would likely already be equipped with drainage systems. Therefore, the wash water would not contribute to runoff or to erosion.

Because most PV panels are black to absorb sun, rather than mirrored to reflect it, glare would be lessened. Additionally, the distributed solar PV alternative would not require the additional operational components, such as dry-cooling towers, substations, transmission interconnection, and maintenance and operation facilities with corresponding visual impacts. Solar PV panels would be visible to passing residents and may be viewed by a larger number of people.

Consideration of CEQA Criteria

Reduction of Impacts. Distributed solar technology is assumed to be located on already existing structures or disturbed areas so little to no new ground disturbance would be required; there would be few associated impacts to biological and cultural resources. Additionally, impacts to soils and waters as well as visual resources would be reduced.

Meet Most Project Objectives. A distributed solar technology alternative, if constructed at 850 MW, would meet the CEC project objectives to operate 850 MW of renewable power in California capable of selling competitively priced renewable energy. The solar technology would not necessarily meet the objective to locate the facility in areas of high solarity, because the distributed technology could be located throughout the State.

Feasibility. The rate of PV manufacturing and installation is expected to continue to grow very quickly. However, given that there are currently only about 500 MW of distributed solar PV in California, the addition of an additional 850 MW to eliminate the need for the Calico Solar Project cannot be guaranteed. This would require an even more aggressive deployment of PV at more than double the historic rate of solar PV than the California Solar Initiative program currently employs. Challenges to an accelerated implementation of distributed solar PV are discussed below.

- **RETI Consideration of Subsidies, Tariffs, Cost, and Manufacturing.** The RETI Discussion Draft Paper *California's Renewable Energy Goals – Assessing the Need for Additional Transmission Facilities* published with the RETI Final Phase 2A Report (September 2009), addresses the likelihood of a scenario of sufficient distributed solar PV to remove the need for utility scale renewable development. This discussion paper identified the factors likely to influence the pace of large scale deployment of distributed solar PV: subsidies, feed-in tariffs, manufacturing and installation cost, and manufacturing scale-up.

- **Cost.** The 2009 IEPR states that solar PV technology has shown dramatic cost reductions since 2007, and is expected to show the most improvement of all the technologies evaluated in the 2009 IEPR model, bringing its capital cost within range of that of natural gas–fired combined cycle units. However, the CPUC *33% Renewables Portfolio Standard Implementation Analysis Preliminary Results* considered a number of cases to achieve a 33% RPS standard. The results of this study state that the cost of a high distributed generation case is significantly higher than the other 33% RPS alternative cases. The study explains that this is due to the heavy reliance on solar PV resources which are more expensive than wind and central station solar.
- **Tariffs.** Additionally, the IEPR discusses the need to adjust feed-in tariffs to keep downward pressure on costs. Feed-in tariffs should be developed based on the size and type of renewable resources, given that the cost of generating energy from a 100 MW wind farm is less than the cost of generating to ensure a good mix of new renewable energy projects. According to the report, differentiating feed-in tariffs by type and size can ensure a good mix of new renewable energy projects and avoid paying too much for some technologies and too little for others.
- **Limited Installations**. Examples of large scale distributed solar projects are still limited. In the spring of 2008, SCE proposed 250 to 500 MW of rooftop solar PV to be installed in 5 years. As of January 2010, SCE had installed only 3 MW. As the 2009 IEPR points out, the potential for distributed resources remains largely untapped and integrating large amounts of distributed renewable generation on distribution systems throughout the State presents challenges.
- **Electric Distribution System**. The State's electric distribution systems are not designed to easily accommodate large quantities of randomly installed distributed generation resources at customer sites. Accomplishing this objective efficiently and cost-effectively will require the development of a new transparent distribution planning framework.

The 2009 IEPR makes a number of recommendations to support the integration of distributed generation into the California grid, expand feed-in tariffs, and support the efforts to achieve the RPS goals as a whole. It also recommends supporting new renewable facilities and the necessary transmission corridors and lines to access the facilities.

In testimony filed by the Center for Biological Diversity in the Ivanpah Solar Electric Generating System (ISEGS) proceeding [Docket No. 07-AFC-5], Bill Powers stated his disagreement with the conclusions of the ISEGS Alternatives SA/DEIS section addressing distributed solar PV. Powers believed that the technology and manufacturing capacity would be adequate to develop 400 MW of distributed PV, and that the distribution system would be able to accommodate the additional distributed generation. He presents numerous examples of California utility programs that have committed to development of hundreds of megawatts of additional distributed solar PV.

The conclusion of this section is that, while it will very likely be possible to achieve 850 MW of distributed solar energy over the coming years, the very limited numbers of existing facilities make it difficult to conclude with confidence that it will happen within the timeframe required for the Calico Solar Project. As a result, this technology is eliminated from detailed analysis in this SA/EIS.

B.2.8.3 ALTERNATIVE RENEWABLE TECHNOLOGIES

Non-solar renewable generation technologies were considered as potential alternatives to the proposed Calico Solar Project. The following renewable generation technologies were considered in this analysis:

- wind energy
- geothermal energy
- biomass energy
- tidal energy
- wave energy

The non-solar renewable technologies alternatives (wind, geothermal, biomass, tidal, wave) would either be infeasible for meeting key project objectives at the scale of the proposed Calico Solar Project, or would not eliminate significant impacts caused by the project without creating significant impacts in other locations. Specifically, wind and geothermal energy that would be viable at some locations in San Bernardino County could create significant impacts to biological, visual, cultural, and water and soils resources.

None of these non-solar renewable technologies would meet the BLM's purpose and need, which is to approve, modify, or deny the applicant's request for a right-of-way. These technologies would be too great a departure from the application to be considered a modification of the applicant's proposal.

Wind Energy

Wind carries kinetic energy that can be used to spin the blades of a wind turbine rotor and an electrical generator, which then feed alternating current (AC) into the utility grid. Most state-of-the-art wind turbines operating today convert 35 to 40% of the wind's kinetic energy into electricity. A single 1.5-MW turbine operating at a 40% capacity factor generates 2,100 MWh annually. Modern wind turbines represent viable renewable alternatives to solar energy projects in the region as exemplified by the number of wind projects applications pending at the BLM in both California and Nevada. The BLM has received over 90 applications for wind projects in California as of September 2009, for use of over 790,000 acres of land (BLM 2009b).

Wind turbines currently being manufactured have power ratings ranging from 250 watts to 5 MW, and units larger than 7 MW in capacity are now under development (AWEA 2008). The average capacity of wind turbines installed in the United States in 2007 was 1.65 MW (EERE 2008). The perception of wind as an emerging energy source reached a peak in the early 1980s, when wind turbine generators to convert wind power into electricity were being installed in California at a rate of nearly 2,000 per year. Progress slowed a few years later, however, as start-up tax subsidies disappeared and experience demonstrated some deficiencies in design. At the present time, technological progress has caught up, contributing lower cost, greater reliability, and reason for genuine optimism for this renewable energy source in the future.

This technology is now well developed and can be used to generate substantial amounts of power. There are now approximately 2,490 MW of wind-generated power being produced in California (AWEA 2008).

Modern wind turbines represent viable renewable alternatives to solar energy projects in the region as exemplified by the number of wind projects applications pending at the BLM in both California and Nevada. The BLM has received approximately 64 applications for wind projects in the California Desert District as of August 2009, for use of over 457,769 acres of land (BLM 2009b). Several of these projects are proposed in locations near to the Calico Solar Project site.

Environmental Assessment. Wind turbines can create adverse environmental impacts, as summarized below (AWEA 2008):

- Wind energy requires between 5 and 17 acres per MW of energy created. As such a nominal 850 MW power plant would require between 4,250 and 14,450 acres. However, wind turbine footprints typically use only 5% of the total area.
- Erosion can be a concern in certain habitats such as the desert or mountain ridgelines. Standard engineering practices can be used to reduce erosion potential.
- Birds collide with wind turbines. Avian deaths, particularly raptors, are a substantial concern depending on raptor use of the area.
- Wind energy can negatively impact birds and other wildlife by fragmenting habitat, both through installation and operation of wind turbines themselves and through the roads and power lines that are required to support the turbines.
- Bats collide with wind turbines. The extent of bat mortality depends on turbine placement and bat flight patterns.
- Visual impacts of wind turbines can be significant, and installation in scenic and high traffic areas can result in strong local opposition. Other impressions of wind turbines are that they are attractive and represent clean energy.

Summary of Impacts. Approximately 4,250 and 14,450 acres of land would be required for a 850 MW wind electricity power plant. While wind plants would not necessarily impact the same types of wildlife and vegetation as the proposed Calico Solar Project plant, the significant acreage necessary for an 850 MW wind plant would still cause significant habitat loss in addition to potentially significant impacts from habitat fragmentation and bird and bat mortality.

Wind turbines are often over 400 feet high for 2-MW turbines. As such, any wind energy project would be highly visible, which is of special concern in scenic areas.

Rationale for Elimination

While wind electricity generation is a viable and important renewable technology in California, it would not reduce the large-scale ground disturbance and visual impacts associated with the Calico Solar Project. Therefore wind generation was eliminated from further consideration in this SA/DEIS. Furthermore, wind is part of a renewable energy supply mix along with solar thermal, which staff believes will be needed to meet SCE and statewide RPS requirements.

Geothermal Energy

Geothermal technologies use steam or high-temperature water obtained from naturally occurring geothermal reservoirs to drive steam turbine/generators. There are vapor dominated resources (dry, super-heated steam) and liquid-dominated resources where various techniques are used to extract energy from the high-temperature water.

Geothermal plants account for approximately 5% of California's power and range in size from under 1 MW to 200 MW. California is the largest geothermal power producer in the United States, with about 1,800 MW installed capacity; in 2007, 13,000 gigawatt hours of electricity were produced in California (CEC 2008). Geothermal plants provide highly reliable baseload power, with capacity factors from 90 to 98%.

Geothermal plants must be built near geothermal reservoir sites because steam and hot water cannot be transported long distances without substantial thermal energy loss. Geothermal power plants are currently operating in the following California counties: Lake, Sonoma, Imperial, Inyo, Mono, and Lassen. The RETI Phase 1A Report (2008) estimated an incremental capacity of approximately 2,400 MW for the entire State by 2018.

Geothermal Alternative Scenario. There is no single 850 MW geothermal project that would be viable as an alternative to the Calico Solar Project. Approximately 10-15 smaller projects would be required to achieve 850 MW of geothermal energy. The amount of land required for a geothermal facility varies greatly. Eight hundred and fifty MW of geothermal energy could require the use of many thousands of acres of land. However, the amount of ground disturbance on that area would be less than 10%. Additionally, while components of the power plant, cooling towers and brine ponds would likely be fenced, there would not likely be fencing required for the wells and well pads. In that 10-15 geothermal facilities would be required for provision of 850 MW, depending on the locations of the new facilities, more transmission lines and switchyards with corresponding potential impacts (i.e., biological, cultural, soil & water, land use, visual) may be required for grid interconnection, when compared to the proposed Calico Solar Project.

Environmental Assessment. Concerns regarding geothermal power plants include air quality, hazardous materials, and geology. Benefits from geothermal power plants include an increased reliability and less ground disturbance than some renewable resources, including solar.

Air Quality. Toxic air contaminants and odors would be emitted as a result of fuel combustion in construction-related equipment and vehicles and as a result of geothermal steam released during well testing. Hydrogen sulfide (H_2S) in geothermal steam is a toxic air contaminant and a colorless, flammable, poisonous compound with a characteristic rotten-egg odor. Ammonia also occurs in geothermal steam and is a toxic air contaminant with a pungent, penetrating odor. Ammonia is also a precursor pollutant to particulate matter in the ambient air. Releasing geothermal steam during well testing and development would cause substantial emissions of these toxic air contaminants and odors over the construction phase. Aside from closely managing the well testing schedule, few mitigation options are available, and the impact of toxic air contaminants and odors during construction would be significant and unavoidable.

Extracting power from geothermal steam equipment can cause emissions of ammonia and H_2S, which are odors and toxic air contaminants present in the geothermal brine. Ammonia emissions also react with ambient air to form inhalable PM10, and H_2S in the atmosphere will oxidize to SO_2 and sulfuric acid. Without proper control, emissions of these contaminants would cause increased health risks, create objectionable odors, and cause or substantially contribute to violations of H_2S and/or PM10 ambient air quality standards. These contaminants would be emitted during any short-term commissioning activities or uncontrolled releases of geothermal steam, but these impacts would be less than significant because they would be short-term and managed in accordance with permitting requirements.

Ammonia and H_2S emissions could be avoided with sulfur control systems and use of an air-cooling system to reduce cooling tower drift. Commonly, water cooling causes the geothermal fluid entering the cooling tower to be emitted to the atmosphere as water vapor, which results in high levels of ammonia and H_2S in the vapor from the cooling tower. However, a binary cycle plant emits only fresh water vapor from the cooling tower. Cool geothermal brine is injected into the ground after the energy is extracted.

Hazardous Materials. Geothermal plants can also produce waste and byproducts that can have significant impacts. The most potentially harmful gas generally encountered in geothermal systems is H_2S, which at concentrations higher than 30 parts per million (ppm) is toxic (CEC 2003). It can cause a variety of problems including dizziness, vomiting, and eventually death if one is exposed for long periods of time. In concentrations above 100 ppm, H_2S can be fatal. H_2S is heavier than air and can accumulate in low-lying areas (equipment pits, ravines, and other depressions) and become concentrated over time.

H_2S releases could potentially be of concern during drilling, well testing, and plant start-up and shut-down operations, although recent technology improvements in atmospheric separators can significantly decrease emissions and noise during these operations. H_2S is now often abated at geothermal power plants, resulting in a conversion of close to 100% of the H_2S into elemental sulfur (GEA 2007). Since 1976, H_2S emissions have decreased from 1,900 pounds per hour to 200 pounds per hour despite an increase in geothermal power production from 500 MW to 2,000 MW (GEA 2007).

One additional concern regarding hazardous materials present in geothermal facilities includes the possibility for bacterial growth to occur in the cooling tower, including Legionella. Legionella is a type of bacteria that grows in water and causes Legionellosis, otherwise known as Legionnaires' disease. Untreated or inadequately treated cooling systems in the United States have been correlated with outbreaks of Legionellosis. These outbreaks are usually associated with building heating, ventilating, and air conditioning (HVAC) systems but it is possible for growth to occur in industrial cooling towers. In order to ensure that Legionella growth is kept to a minimum, mitigation would require the project owner to prepare and implement a biocide and antibiofilm agent monitoring program to ensure that proper levels of biocide and other agents are maintained within the cooling tower water at all times, that periodic measurements of Legionella levels are conducted, and that periodic cleaning is conducted to remove bio-film buildup. With the use of an aggressive antibacterial program coupled with routine monitoring and biofilm removal, the chances of Legionella growing and dispersing would be reduced to insignificance.

Geology, Paleontology, and Minerals. Active seismicity and subsidence generally occur in areas with high levels of tectonic activity (e.g., volcanic regions, fault zones), which are the same areas in which geothermal resources occur; therefore, it is difficult to discern between power plant-induced and naturally occurring seismicity and subsidence. Drilling deep into the earth's crust to access high-temperature geothermal resources and subsequent re-injection of fluid into the geothermal reservoir may result in microearthquakes, which are generally below magnitude 2-3 on the Richter scale. These microearthquakes are typically centered on the injection site and are too low to be noticed by humans (Kagel 2007).

Land Use. Geothermal power projects require less ground disturbance than almost any other energy source, typically from about 0.2 to 0.5 acres per MW; however, geothermal plants must be built where the resource is since the steam cannot be piped long distances without significant heat loss. This results in a highly secure and predictable fuel supply and some inflexibility in siting. It may also result in a long interconnection requirement to reach a transmission system.

Because of the minimal ground disturbance required, impacts to biological resources and cultural resources would likely be minimized compared to the Calico Solar.

Reliability. Geothermal facilities may achieve a 95% or higher availability (CEC 2003). Because the geothermal steam is available throughout the day, geothermal facilities provide an adequate level of reliability throughout the entire day.

Rationale for Elimination

Geothermal generation is a commercially available technology and is important for California's renewable energy future because it provides baseload power that is available 24 hours a day. It also can be developed with substantially less ground disturbance than that needed for the Calico Solar Project, so impacts related to biological and cultural resources, water and soils resources, and traffic/transportation would reduced. However, despite the encouragement provided by Renewable Portfolio Standard targets and ARRA funding, few new projects have been proposed and no geothermal projects are included on the Renewable Energy Action Team list of projects requesting ARRA funds. Therefore, while the technology is clearly feasible and additional development is expected, the technology is not retained for detailed analysis in this SA/DEIS

Biomass Energy

Electricity can be generated by burning organic fuels in a boiler to produce steam, which then turns a turbine; this is biomass generation. Biomass can also be converted into a fuel gas such as methane and burned to generate power. Wood is the most commonly used biomass for power generation. Major biomass fuels include forestry and mill wastes, agricultural field crop and food processing wastes, and construction and urban wood wastes. Several techniques are used to convert these fuels to electricity, including direct combustion, gasification, and anaerobic fermentation. Biomass facilities do not require the extensive amount of land required by the other renewable energy sources discussed, but they generate much smaller amounts of electricity.

Currently, nearly 19% of the state's renewable electricity derives from biomass and waste-to-energy sources (CEC 2007). Most biomass plant capacities are in the 3- to 10-MW range and typically operate as baseload capacity. The average size of a sales generation biomass plant is 21 MW (CBEA 2008). Unlike other renewable sources, the locational flexibility of biomass facilities would reduce the need for substantial transmission investments. Solid fuel biomass (555 MW) makes up about 1.75% of the state's electricity, and landfill methane gas generation (260 MW) makes up about 0.75%. Existing landfills not now producing electricity from gas could add a maximum of about 170 MW of new generation capacity (CBEA 2008).

Environmental Assessment. Generally, small amounts of land are required for biomass power facilities; however, a biomass facility should be sited near a relatively large source of biomass to minimize the cost of bringing the biomass waste to the facility.

Operational noise impacts may be a concern, originating from truck engines as a result hauling operations coming from and going to the facility repeatedly on a daily basis. Other operations of the biomass facilities, while internal to the main structure, can result in increased noise due to the material grinding equipment.

The emissions due to biomass fuel-fired power plant operation are generally unavoidable. Direct impacts of criteria pollutants could cause or contribute to a violation of the ambient air quality standards. Significant impacts can potentially occur for PM10 and ozone because emissions of particulate matter and precursors and ozone precursors could contribute to existing violations of the standards for those criteria pollutants. Biomass/biogas facility emissions could also adversely affect visibility and vegetation in federal Class I areas or state wilderness areas as a result of significantly deteriorating air quality related values in the wilderness areas. Toxic air contaminants from routine operation would also cause health risks that could locally adversely affect sensitive receptors.

Rationale for Elimination

Most biomass facilities produce only small amounts of electricity (in the range of 3 to 10 MW) and so could not meet the project objectives. Biomass facilities also generate significant air emissions and require numerous truck deliveries to supply the plants with the biomass waste materials. Also, in waste-to-energy facilities, there is some concern regarding the emission of toxic chemicals, such as dioxin, and the disposal of the toxic ash that results from biomass burning. Therefore, this technology is not analyzed in detail in this SA/DEIS as an alternative to the Calico Solar Project.

Tidal Energy

The oldest technology to harness tidal power for the generation of electricity involves building a dam, known as a *barrage*, across a bay or estuary that has large differences in elevation between high and low tides. Water retained behind a dam at high tide generates a power head sufficient to generate electricity as the tide ebbs and water released from within the dam turns conventional turbines.

Certain coastal regions experience higher tides than others. This is a result of the amplification of tides caused by local geographical features such as bays and inlets. In order to produce practical amounts of power for tidal barrages, a difference between high and low tides of at least 5 meters is required. There are about 40 sites around the world with this magnitude of tidal range. The higher the tides, the more electricity can be generated from a given site and the lower the cost of electricity produced. Worldwide, existing power plants include a 240-MW plant in France, a 20-MW plant in Nova Scotia, and a 0.5-MW plant in Russia (EPRI 2006).

Tidal Fences

Tidal fences are effectively barrages that completely block a channel. If deployed across the mouth of an estuary, they can be very environmentally destructive. However, in the 1990s, their deployment in channels between small islands or in straights between the mainland and islands has increasingly been considered a viable option for generation of large amounts of electricity.

The advantage of a tidal fence is that all the electrical equipment (generators and transformers) can be kept high above the water. Also, by decreasing the cross-section of the channel, current velocity through the turbines is significantly increased.

The United Kingdom is currently considering the feasibility of tidal energy across the Bristol Channel. The feasibility study began with the consideration of the Severn tidal barrage. The barrage would work similarly to a dam which generates hydro electric power by holding water back before it is allowed to flow at speed through a pipe at the base of the dam to drive the turbines (BBC 2007). Since then, alternative tidal projects have been proposed, including a tidal fence that would allow shipping to move freely and keep ports at Cardiff and Bristol open (BBC 2008). The results of the feasibility study are expected to be published in 2010; however, preliminary results from the Sustainable Development Commission confirmed the potential of the huge Severn tidal range to generate approximately 5% of United Kingdom's electricity (BIS 2009).

Tidal Turbines

Tidal turbines are the chief competition to the tidal fence. Looking like an underwater wind turbine, they offer a number of advantages over the tidal fence. They are less disruptive to wildlife, allow small boats to continue to use the area, and have much lower material requirements than the fence.

Tidal turbines function well where coastal currents run at 2 to 2.5 meters per second (slower currents tend to be uneconomic while larger ones stress the equipment). Such currents provide an energy density four times greater than air, meaning that a 15-meter-diameter turbine will generate as much energy as a 60-meter-diameter windmill. In addition, tidal currents are both predictable and reliable, a feature which gives them an advantage over both wind and solar systems. The tidal turbine also offers significant environmental advantages over wind and solar systems; the majority of the assembly is hidden below the waterline, and all cabling is along the sea bed.

There are many sites around the world where tidal turbines could be effectively installed. The ideal site is close to shore (within 1 kilometer) in water depths of about 20 to 30 meters. In April 2007, the first major tidal-power project was installed in the United States off New York City's Roosevelt Island (Fairley 2007). The Roosevelt Island Tidal Energy (RITE) project completed the Phase 2 Demonstration at the end of 2008. This phase included operating six full-scale turbines and resulted in 70 MW hours of energy delivered to two end users (Verdant 2009). Phase 3 of the RITE project is currently underway, and Verdant Power applied to the Federal Energy Regulatory Commission for a pilot license in November 2008. If granted, this license would allow Verdant Power to build out the RITE Project in the east channel of the East River to a 30-turbine 1 MW pilot project and to commercially deliver the energy generated by the field (Verdant 2009).

Turbines such as those used in New York City use in-flow turbines, thereby lessening the environmental impacts. A study conducted in 2006, *System Level Design, Performance, Cost and Economic Assessment – San Francisco Tidal In-Stream Power Plant*, concluded that a tidal plant located under the Golden Gate Bridge could create approximately 35 MW of power with no significant impacts to the environment and recommended further research and development into both ocean energy technology and a pilot project in San Francisco (EPRI 2006a).

Environmental Assessment. Tidal technologies, especially tidal fences, have the potential to cause significant biological impacts, especially to marine species and habitats. Fish could be caught in the unit's fins by the sudden drop in pressure near the unit. The passageways, more than 15 feet high and probably sitting on a bay floor, could squeeze out marine life that lives there or alter the tidal flow, sediment build-up, and the ecosystem in general. Even the in-flow turbines can have adverse impacts on marine systems. The in-flow turbines off New York City must undergo environmental monitoring for 18 months to ensure the turbines will not create adverse impacts to the river's marine wildlife. Also, depending on the location of the tidal technology, commercial shipping could be disrupted during construction.

The reduced tidal range (difference between high and low water levels) resulting from tidal energy generation can destroy inter-tidal habitat used by wading birds. Sediment trapped behind the barrage could also reduce the volume of the estuary over time.

Rationale for Elimination

Tidal fence technology is a commercially available technology in Europe, although limited to areas that are adjacent to a body of water with a large difference between high and low tides, and it creates significant environmental impacts to ocean ecosystems. In-flow tidal turbines are a relatively new technology and are not considered an alternative to the Calico Solar Project because they are an unproven technology at the scale that would be required to replace the proposed project.

Additionally, the environmental impacts of tidal turbines are still under review, as demonstrated by the pilot project under continued environmental monitoring in New York. Therefore, this technology is not analyzed in detail in this SA/DEIS as an alternative to the Calico Solar Project.

Wave Energy

Wave power technologies have used for nearly 30 years. Setbacks and a general lack of confidence have contributed to slow progress towards proven devices that would have a good probability of becoming commercial sources of electrical power.

The highest energy waves are concentrated off the western coasts in the 40^{o} to 60^{o} latitude range north and south. The power in the wave fronts varies in these areas between 30 and 70 kilowatts per meter (kW/m) with peaks to 100 kW/m in the Atlantic southwest of Ireland, the Southern Ocean and off Cape Horn. Many wave energy devices are still in the research and development stage and would require large amounts of capital to get started. Additional costs from permitting and environmental assessments also make wave energy problematic (WEC 2007). Nonetheless, wave energy is likely to increase in use within the next 5 to 10 years.

The total power of waves breaking on the world's coastlines is estimated at 2 to 3 million MW. In favorable locations, wave energy density can average 65 MW per mile of coastline. Three approaches to capturing wave energy are:

- **Floats or Pitching Devices.** These devices generate electricity from the bobbing or pitching action of a floating object. The object can be mounted to a floating raft or to a device fixed on the ocean floor.
- **Oscillating Water Columns.** These devices generate electricity from the wave-driven rise and fall of water in a cylindrical shaft. The rising and falling water column drives air into and out of the top of the shaft, powering an air-driven turbine.
- **Wave Surge or Focusing Devices.** These shoreline devices, also called tapered channel or tapchan systems, rely on a shore-mounted structure to channel and concentrate the waves, driving them into an elevated reservoir. Water flow out of this reservoir is used to generate electricity, using standard hydropower technologies.

In December 2007, PG&E signed a power purchase agreement with Finavera Renewables, which had planned to operate a wave farm approximately 2.5 miles off the coast of Eureka, California. The agreement was for 2 MW of power beginning in 2012. On October 16, 2008, the California Public Utilities Commission rejected PG&E's request for approval of a renewable resource procurement contract with Finavera Renewables because, among other reasons, the CPUC concluded the project had not been shown to be viable. As stated in that decision, there is significant uncertainty surrounding wave technology and the wave energy industry is at a beginning stage (CPUC 2008). The CPUC did authorize up to $4.8 million for PG&E to undertake its WaveConnect project in Decision D.09-01-036. WaveConnect is designed to document the feasibility of a facility that converts wave energy into electricity by using wave energy conversion (WEC) devices in the open ocean adjacent to PG&E's service territory.

In January 2010, the California State Lands Commission and the Federal Energy Regulatory Commission issued a Request for Statements of Interest to prepare an environmental document for the PG&E WaveConnect project discussed above. PG&E has selected a wave energy project siting area that is between 2.5 and 3.0 nautical miles (nm) from the shore in Humboldt County. WaveConnect consists of: (1) wave energy converters (WECs) including multi-point catenary moorings and anchors; (2) marker buoys, navigation lights, and environmental monitoring instruments; (3) subsea electrical cables extending on-shore to (4) land-based power conditioning equipment; (5) an above-ground transmission line and interconnection to the electrical grid; (6) data acquisition and telemetry equipment; and (7) security and safety equipment.

Environmental Assessment. The environmental impacts of wave power have yet to be fully analyzed. A recent study published by the U.S. Department of Commerce and National Oceanic and Atmospheric Administration listed a number of potentially significant environmental impacts created by wave power (Boehlert 2008). These include (Boehlert 2008):

- Significant reduction to waves with possible effects to beaches (e.g. changes to sediment transport processes).
- The use of buoys may have positive effects on forage fish species, which in turn could attract larger predators. Structures need to be designed to reduce the potential entanglement of larger predators, especially marine turtle species.
- Modifications to water circulation and currents may result in changes to larval distribution and sediment transport.
- Wave energy development may affect community structures for fish and fisheries.
- Lighting and above-water structures may result in marine bird attraction and collisions and may alter food webs and beach processes.
- A diversity of concerns would arise regarding marine mammals including entanglement issues.
- Energy-absorbing structures may affect numerous receptors and should avoid sensitive habitats.
- Chemicals used in the process must be addressed both for spills and for a continuous release such as in fouling paints.
- New hard structures and lighting may break loose and increase debris accumulation.
- Impacts on fish and marine mammals caused by noise coming from the buoys should be understood and mitigated.
- Electromagnetic effects may affect feeding or orientation and should be better understood.
- Impact thresholds need to be established. As projects scale up in location or implementation, new risks may become evident.

Rationale for Elimination

Wave energy is new and may not be technologically feasible; as stated above, PG&E is proposing to sponsor a project to test the feasibility of harnessing wave energy. Additionally, wave power must be located where waves are consistently strong; even then, the production of power depends on the size of waves, which result in large differences in the amount of energy produced. Wave technology is not considered an alternative to the Calico Solar Project because is an unproven technology at the scale that would be required to replace the proposed project and because it may also result in substantial adverse environmental impacts. Therefore, this technology is not analyzed in detail in this SA/DEIS as an alternative to the Calico Solar Project.

B.2.8.4 ALTERNATIVE METHODS OF GENERATING OR CONSERVING ELECTRICITY

Nonrenewable generation technologies that require use of natural gas, coal, or nuclear energy would not achieve the key project objective for the proposed Calico Solar Project to provide clean, renewable, solar-powered electricity and to assist Southern California Edison in meeting its obligations under California's Renewable Portfolio Standard Program.

While these generation technologies would not achieve this key objective, they are described briefly in this section to present this information to the public and decision makers. Conservation and demand-side management are also briefly addressed in this section.

The following topics were considered in this analysis:

- natural gas
- coal
- nuclear energy
- conservation and demand-side management

Of the three nonrenewable generation alternatives (natural gas, coal, and nuclear), only natural gas-fired power plants would be viable alternatives within California. However, gas-fired plants would fail to meet a major project objective to construct and operate a renewable power generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities and would therefore not achieve the purpose and need of the project. Because these alternatives would not support renewable power generation within California, and could have significant environmental impacts of their own, they were eliminated from further consideration.

None of these non-renewable energy technologies would meet the BLM's purpose and need, which is to approve, modify, or deny the applicant's request for a right-of-way. These technologies would be too great a departure from the application to be considered a modification of the applicant's proposal

Natural Gas Generation

Natural gas power generation accounts for approximately 22% of all the energy used in the United States and comprises 40% of the power generated in California (CEC 2007). Natural gas power plants typically consist of combustion turbine generators, heat recovery steam generators, a steam turbine generator, wet or dry cooling towers, and associated support equipment. An interconnection with a natural gas pipeline, a water supply, and electric transmission are also required.

A gas-fired power plant generating 850 MW would generally require less than 90 acres of land.

Environmental Assessment. Natural gas power plants may result in numerous adverse environmental impacts such as the following.

- Overall air quality impacts would increase because natural gas-fired power plants can contribute to local violations of the PM10 and ozone air quality standards, and operational emissions could result in toxic air contaminants that could adversely affect sensitive receptors. Net increases in greenhouse gas emissions due to natural gas-firing in the conventional power plants would also be substantial.
- Environmental justice may be a concern. Gas-fired power plants tend to be located in developed urban areas that are zoned for heavy industry. In some instances, low-income and minority populations are also located in such areas.
- To avoid adverse land use impacts, natural gas-fired power plants must be consistent with local jurisdictions' zoning.
- Several hazardous materials, including regulated substances (aqueous ammonia, hydrogen, and sulfuric acid), would be stored at a natural gas power plant during operation. Aqueous ammonia would be stored in amounts above the threshold quantity during the final stages of construction, initial start-up, and operations phases. Transport of hazardous materials during power plant operation includes delivery of aqueous ammonia and removal of wastes. During operation, the aqueous ammonia transporter would be required to obtain a Hazardous Material Transportation License in accordance with California Vehicle Code Section 32105 and would be required to follow appropriate safety procedures and routes.
- Cultural impacts can be severe depending on the power plant siting; however, because natural gas power plants require substantially fewer acres per MW of power generated, impacts to cultural resources would be expected to be fewer than with solar facilities.
- Power plant siting may result in the permanent conversion of designated farmland to non-agricultural uses. However, because natural gas power plants require substantially fewer acres per MW of power generated, impacts to designated farmlands would be expected to be less than with solar facilities.
- Visual impacts may occur with natural gas power plants because they introduce large structures with industrial character. The most prominent structures are frequently the cooling towers, which may reach 100 feet tall, and the power plant stacks, which may reach over 100 feet tall. Visible plumes from the cooling tower would also potentially occur.

Rationale for Elimination

Although natural gas generation is clearly a viable technology, it is not a renewable technology, so it would not attain the objective of generating renewable power meeting California's renewable energy needs. The air quality impacts of gas-fired plants include greenhouse gases and are one major reason that California's Renewable Portfolio Standard was developed. Therefore, this alternative is not considered in detail as an alternative to the Calico Solar Project and is not analyzed further in this SA/EIS.

Coal Generation

Coal-fired electric generating plants are the cornerstone of America's electric power generation system. Traditional coal-fired plants generate large amounts of greenhouse gases. New clean coal technology includes a variety of energy processes that reduce air emissions and other pollutants from coal-burning power plants. The Clean Coal Power Initiative is providing government co-financing for new coal technologies that help utilities meet the Clear Skies Initiative to cut sulfur, nitrogen, and mercury pollutants by nearly 70% by 2018. The Clean Coal Power Initiative is now focusing on developing projects that use carbon sequestration technologies and/or beneficial reuse of carbon dioxide (DOE 2008). In 2009, Hydrogen Energy California received a DOE grant to advance a full-scale demonstration project. However, these technologies are not yet in use.

In 2006, approximately 15.7% of the energy used in California came from coal fired sources; 38% of this was generated in state, and 62% was imported (CEC 2007). The in-state coal-fired generation includes electricity generated from out-of-state, coal-fired power plants owned by and reported by California utilities (CEC 2007). In 2006, California enacted Senate Bill 1368 (Perata, Chapter 598, Statutes of 2006), which prohibits utilities from making long-term commitments for electricity generated from plants that create more carbon dioxide (CO_2) than clean-burning natural gas plants (CEC 2007).

Environmental Assessment. Coal-fired power plants may also result in numerous adverse environmental impacts such as the following.

- Overall, air quality impacts would increase because coal-fired power plants contribute carbon dioxide, sulfur dioxide, nitrogen oxides, mercury, and fly ash (USEPA 2008a). Mining, cleaning, and transporting coal to the power plants generates additional emissions. Average per megawatt hour emissions of a coal-fired power plant are 2,249 pounds of carbon dioxide, 13 pounds of sulfur dioxide and 6 pounds of nitrogen oxides (EPA 2008a). Net increases in greenhouse gas emissions due to coal-firing in conventional power plants would be significant.
- Health risks associated with power plants have also been documented, including problems associated with exposure to fine particle pollution or soot, an increase in asthma, and an increase in non-fatal heart attacks.
- Large quantities of water are generally required to produce steam and for cooling. When coal-fired power plants use water from a lake or river, fish or other aquatic life can be adversely impacted (EPA 2008).

Rationale for Elimination

Although coal generation is a viable technology, it is not a renewable technology, so it would not attain the objective of generating renewable power meeting California's renewable energy needs. Existing technology for coal-fired plants results in high greenhouse gas emissions. Therefore, coal generation was eliminated from detailed analysis.

Nuclear Energy

Due to environmental and safety concerns, California law currently prohibits the construction of new nuclear power plants in the state until the California Energy Commission finds that the federal government has approved and there exists a demonstrated technology for the permanent disposal of spent fuel from these facilities (CEC 2006). In June 1976, California enacted legislation directing the Energy Commission to perform an independent investigation of the nuclear fuel cycle. This investigation was to assess whether the technology to reprocess nuclear fuel rods or to permanently dispose of high-level nuclear waste had been demonstrated and approved and was operational (Public Resources Code 25524.1 (a) (1), 25524.1 (b), and 25524.2 (a)). After extensive public hearings, the Energy Commission determined that it could not make the requisite affirmative findings concerning either reprocessing of nuclear fuel or disposal of high-level waste as documented in the *Status of Nuclear Fuel Reprocessing, Spent Fuel Storage and High-level Waste Disposal*, Energy Commission publication P102-78-001 (January 1978.) As a result, the development of new nuclear energy facilities in California was prohibited by law.

It has been more than 25 years since the last comprehensive Energy Commission assessment of nuclear power issues. The *Nuclear Power in California: 2007 Status Report* (October 2007) provides a detailed description of the current nuclear waste issues and their implications for California. This was prepared as part of the development of the Energy Commission's *2007 Integrated Energy Policy Report* (CEC 2007a).

Rationale for Elimination

The permitting of new nuclear facilities in California is currently illegal, so this technology is infeasible and is not considered further in this PSA/EIS.

Conservation and Demand-Side Management

Conservation and demand-side management consist of a variety of approaches to reduction of electricity use, including energy efficiency and conservation, building and appliance standards, and load management and fuel substitution. In 2005 the Energy Commission and CPUC's Energy Action Plan II declared cost effective energy efficiency as the resource of first choice for meeting California's energy needs. The Energy Commission noted that energy efficiency has helped flatten the state's per capita electricity use and saved consumers more than $56 billion since 1978 (CPUC 2008). The investor-owned utilities' 2006-2008 efficiency portfolio marks the single-largest energy efficiency campaign in U.S. history, with a $2 billion investment by California's energy ratepayers (CPUC 2008). However, with population growth, increasing demand for energy, and the need to reduce greenhouse gases, there is a greater need for energy efficiency.

The CPUC, with support from the Governor's Office, the Energy Commission, and the California Air Resources Board, among others, adopted the *California Long-Term Energy Efficiency Strategy Plan for 2009 to 2020* (CPUC September 2008). The plan is a framework for all sectors in California including industry, agriculture, large and small businesses, and households. Major goals of the plan include:

- All new residential construction will be zero net energy by 2020;
- All new commercial construction will be zero net energy by 2030;
- Heating, ventilation, and air conditioning industries will be re-shaped to deliver maximum performance systems;
- Eligible low-income customers will be able to participate in the Low Income Energy Efficiency program and will be provided with cost-effective energy efficiency measures in their residences by 2020.

In addition to the concept of zero net energy, California is discussing the importance of net zero peak energy use, meaning buildings do not use more energy during peak energy use times and net zero carbon meaning the building generates more zero-carbon energy onsite than it uses in an average year.

Rationale for Elimination

Conservation and demand-side management are important for California's energy future and cost effective energy efficiency is considered as the resource of first choice for meeting California's energy needs. However, with population growth and increasing demand for energy, conservation and demand-management alone are not sufficient to address all of California's energy needs. Additionally, it will not provide the renewable energy required to meet the California Renewable Portfolio Standard requirements, so technologies, like solar thermal generation, would be required. Therefore, they are not analyzed in detail in this SA/EIS as an alternative to the Solar One project.

B.2.9 CONCLUSIONS OF ALTERNATIVES ANALYSIS

In this analysis of the Calico Solar Project, 24 alternatives to the proposed Calico Solar Project were developed and evaluated. These include six alternative sites, solar and renewable technologies, generation technologies using different fuels, conservation/demand-side management, and a Reduced Acreage Alternative and an Avoidance of Donated and Acquired Lands Alternative. Of the 24 alternatives, two alternatives were determined to be feasible by the Bureau of Land Management (BLM) and the Energy Commission and have the potential to result in reduced impacts in comparison with the proposed project: the Reduced Acreage Alternative and the Avoidance of Donated and Acquired Land Alternative. Additionally the BLM and Energy Commission considered the No Project/No Action alternative.

One site alternatives are evaluated in detail by the Energy Commission and evaluated in this SA/DEIS under the California Environmental Quality Act (CEQA) only: the Private Lands Alternative site. While the impacts of this site would be similar to those of the proposed site in many resource elements, the alternative site is likely to have less severe cultural impacts, visual impacts, and would also have reduced impacts to biological resources.

All site alternatives are considered unreasonable by the BLM because they would not meet BLM's Purpose and Need which is to respond to the applicant's request for a right-of-way by granting, granting a modified, or not granting the right of way, or are otherwise unreasonable alternatives under NEPA as discussed above.

Alternative solar thermal technologies (solar trough, solar power tower, utility scale solar photovoltaics, and linear Fresnel) were also evaluated. As compared with the proposed Calico Solar Project, these technologies would not substantially change the severity of visual, biological resources and cultural resources impacts, although the land requirements vary among the technologies. Rooftop solar PV facilities would require extensive acreage although it would minimize the need for undisturbed or vacant land. However, increased deployment of rooftop solar PV faces challenges in manufacturing capacity, cost, and policy implementation. These alternatives also do not meet the BLM's purpose and need because they would be too great a departure from the application to be considered a modification of the application.

Other generation technologies (wind, geothermal, biomass, tidal, wave, natural gas, and nuclear) were also examined as possible alternatives to the proposed Calico Solar Project. These technologies would either be infeasible at the scale of the Calico Solar Project, or would not eliminate substantial adverse impacts caused by the Calico Solar Project without creating their own substantial adverse impacts in other locations. These alternatives also do not meet the BLM's purpose and need because they would be too great a departure from the application to be considered a modification of the application. A natural gas plant would contribute to greenhouse gas emissions and would not meet the project's renewable generation objective. Construction of new nuclear power plants is currently prohibited under California law.

Conservation and demand side management programs would likely not meet the state's growing electricity needs that could be served by the Calico Solar Project. In addition, these programs would not provide the renewable energy required to meet the California Renewable Portfolio Standard requirements.

CEC Staff also concludes that the No Project/No Action alternative is not superior to the proposed project. This alternative would likely delay development of renewable resources or shift renewable development to other similar areas, and would lead to increased operation of existing power plants that use non-renewable technologies.

The Reduced Acreage Alternative and Avoidance of Donated and Acquired Lands Alternative would substantially reduce impacts in comparison to the proposed project. These alternatives would meet the project objectives, but because they would reduce the generation capacity, may not attain the purpose and need for the project.

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Alternatives Appendix A
Sensitive Species Potentially Occurring in the Vicinity of the Calico Solar Project Alternative

Species	Sensitivity Status	Habitat	Potential to Occur/Status on Site	
			Proposed Project Site[1]	Daggett Agriculture Alternative
PLANTS				
Androstephium breviflorum small-flowered androstephium	Federal – None State – None CNPS List – 2	Occurs in Mojave desert scrub (bajadas), blooms March-April	Present. Habitat throughout the survey area. Observed in 2008, but not in 2007.	Low.
Arctomecon merriamii white bearpoppy	Federal – None State – None CNPS List – 2	Chenopod scrub, Mojave desert scrub, blooms April-May.	Moderate. Not observed in 2007 or 2008 survey area.	Low.
Calochortus plummerae Plummer's mariposa lily	Federal – None State – None CNPS List – 1B	Chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, valley and foothill grassland, blooms May-July.	None. Not observed in 2007 or 2008 survey area.	None.
Calochortus striatus Alkali mariposa lily	Federal – None State – None CNPS List – 1B	Chaparral, chenopod scrub, Mojave desert scrub, meadows and seeps at north base of San Bernardino Mts., blooms April-June.	None. Not observed in 2007 or 2008 survey area.	None. Suitable habitat not present.
Cammisoniaw boothii var. *boothii* Booth's evening primrose	Federal – None State – None CNPS List – 2	Joshua tree woodland, pinion and juniper woodland, blooms April-September.	None. Not observed in 2007 or 2008 survey area.	None. Suitable habitat not present.
Castela emoryi Crucifixion thorn	Federal – None State – None CNPS List – 2.3	Occurs in Sonoran desert scrub, playas, and on gravelly soils; 90-670 m. Deciduous shrub that blooms April through July.	Present. Observed in 2008, but not in 2007.	Low. CNDDB record approximately 1 mile west of the site.

Species	Sensitivity Status	Habitat	Potential to Occur/Status on Site	
			Proposed Project Site[1]	Daggett Agriculture Alternative
Chorizanthe xanti var. *leucotheca* white-bracted spineflower	Federal – None State – None CNPS List – 1B	Mojave desert scrub, pinion and juniper woodland, blooms April-June.	Moderate. Not observed in 2007 or 2008 survey area.	Low.
Funastrum [Chynanchum] utahense Utah vine milkweed	Federal – None State – None CNPS List – 4.3	Mojave desert scrub, blooms April-June.	Present. Observed in 2008, but not in 2007.	Moderate.
Deinandra mohavensis Mojave tarplant	Federal – None State – SE CNPS List – 1B	Chaparral, coastal scrub, riparian scrub, blooms June-October.	Low. Not observed in 2007 or 2008 survey area.	None. Suitable habitat not present.
Dodecahema leptoceras Slender-horned sunflower	Federal – CE State – None CNPS List – 1B	Chaparral, cismontane wood-land, coastal scrub (alluvial fan), blooms April-June.	None. Not observed in 2007 or 2008 survey area.	None. Suitable habitat not present.
Eriophyllum mohavense Barstow woolly sunflower	Federal – None State – None CNPS List – 1B	Chenopod scrub, Mojave desert scrub, playas, bloom April-May.	Low. Not observed in 2007 or 2008 survey area	Low. CNDDB record approxi-mately 2 to 3 miles northwest of the site.
Escobaria vivapara var. *rosea*	Federal – None State – None CNPS List – 2	Mojave desert scrub, pinyon and juniper woodland, blooms May-June.	Low. Not observed in 2007 or 2008 survey area	Low.
Loeflingia squarrosa var. *artemisiarum* sagebrush	Federal – None State – None CNPS List – 2	Desert dunes, Great Basin scrub, Sonoran desert scrub, blooms April-May.	Low. Not observed in 2007 or 2008 survey area.	Low.
Mentzelia tridentata Creamy blazing star	Federal – None State – None CNPS List – 1B	Mojave desert scrub, bloom March-May.	Moderate. Not observed in 2007 or 2008 survey area.	Moderate. CNDDB record approximately 1 mile south of the site and 1 mile west of the site.
Mimulus mohavensis Mojave monkey flower	Federal – None State – None CNPS List – 1B	Joshua tree woodland, Mojave desert scrub, blooms April-June.	Low. Not observed in 2007 or 2008 survey area.	Low. CNDDB record approxi-mately 1 mile southwest of the site.

Species	Sensitivity Status	Habitat	Potential to Occur/Status on Site	
			Proposed Project Site[1]	Daggett Agriculture Alternative
Opuntia basilaris var. brachyclada Short-joint beavertail cactus	Federal – None State – None CNPS List – 1B	Chaparral, Joshua tree woodland, Mojave desert scrub, pinion and juniper woodland, blooms April-June.	Low. Not observed in 2007 or 2008 survey area.	Low.
Penstemon albomarginatus White-margined beardtongue	Federal – None State – None CNPS List – 1B	Mojave desert scrub, blooms March-May.	Present. Observed in 2008, but not in 2007.	Low.
Phacelia coerulea Sky-blue phacelia	Federal – None State – None CNPS List – 2	Mojave desert scrub, pinyon and juniper woodland, blooms April-May.	Moderate. Not observed in 2007 or 2008 survey area.	Low.
Phacelia parishii Parish's phacelia	Federal – None State – None CNPS List – 1B	Mojave desert scrub, blooms April-May.	Moderate. Not observed in 2007 or 2008 survey area.	Low. CNDDB record approximately 2 miles northwest of the site.
Plagiobothrys parishii	Federal – None State – None CNPS List – 1B	Desert scrub, Joshua tree woodland, blooms March-June.	Low. Not observed in 2007 or 2008 survey area.	Low.
Polygala acanthoclada desert milkwort	Federal – None State – None CNPS List – 2	Chenopod scrub, Joshua tree woodland, pinyon and juniper woodland, blooms May-August.	Low. Not observed in 2007 or 2008 survey area.	Low.
Sphaeralcea rusbyi var. *eremicola* Rusby's desert mallow	Federal – None State – None CNPS List – 1B	Joshua tree woodland, Mojave desert scrub, blooms May-June.	Moderate. Not observed in 2007 or 2008 survey area.	Low.
Viola aurea golden violet	Federal – None State – None CNPS List – 2	Sandy slopes, blooms April-June.	Low. Not observed in 2007 or 2008 survey area.	Low.

Species	Sensitivity Status	Habitat	Potential to Occur/Status on Site	
			Proposed Project Site[1]	Daggett Agriculture Alternative
REPTILES				
Gopherus agassizii Desert tortoise	Federal – FT State – ST BLM – S	River washes, rocky hillsides, and flat desert having sandy or gravelly soil with creosote bush, burro bush, saltbush, Joshua tree, Mojave yucca, cacti, other shrubs, grasses, and wildflowers.	Present. Observed during 2007 and 2008 surveys.	Very low. No potential burrows observed. CNDDB records approximately 2 miles north-west of the site and approxi-mately 0.75 mile southwest of the site.
Actinemys marmorata western pond turtle[2]	Federal – None State – SSC BLM – S	Ponds, lakes, rivers, streams, and irrigation ditches.	None.	Very low. CNDDB record approximately 1 mile north of the site.
Lichanura trivirgata rosy boa	Federal – None State – None	Arid scrublands, semi-arid shrublands, rocky deserts, desert oases, canyons, and rocky areas.	Moderate. Not observed in 2007 or 2008 survey area.	Moderate.
Sauromalus obesus Chuckwalla	Federal – SC State – None	Desert rock outcrops surrounded by creosote brush scrub	High potential. Numerous rocky outcrops in eastern portion of survey area. Not observed in 2007 or 2008 survey area.	None. No rock outcrops observed on site.
Uma scoparia Mojave fringe-toed lizard	Federal – SC State – SC BLM – S	Areas of aeolian sands including dunes, flats with sandy hummocks, washes and banks of rivers.	Present. Observed in 2008 but not in 2007.	Low.
BIRDS				
Aquila chrysaetos golden eagle[2]	Federal – None State – Fully Protected	Nesting occurs on cliff ledges or in trees on steep slopes, with foraging occurring primarily in grassland and sage scrub.	Present. Flyover observed in 2007 and 2008 surveys.	Moderate (for foraging), but no nesting potential.

Species	Sensitivity Status	Habitat	Potential to Occur/Status on Site	
			Proposed Project Site[1]	Daggett Agriculture Alternative
Athene cunicularia burrowing owl	Federal – None State – SC BLM – S	Found in open grasslands and agricultural areas with suitable fossorial mammal burrows for nesting.	Present. Observed in 2008 but not in 2007.	Moderate. No potential burrows observed.
Buteo swainsoni Swainson's Hawk	Federal – SC State – T	Found in grasslands, prairies, and other wide-open ranges with minimal tree cover.	Present. Observed in 2008 but not in 2007.	Moderate (in migration).
Eremophila alpestris California horned lark	Federal – None State – SSC	Generally occurs in open scrub grasslands and agricultural fields	Present. Observed during 2007 and 2008 surveys.	High.
Falco mexicanus prairie falcon	Federal – None State – SC	Generally occurs in barren mountains, dry plains, and prairies.	Moderate. Not observed in 2007 or 2008 survey area.	Present. Observed in 2009 in northwestern portion of site. CNDDB record on site in the southeastern corner of the site.
Icteria virens Yellow-breasted chat[2]	Federal – None State-SSC	Occurs in mature, riparian woodland.	None.	None, but CNDDB record approximately 1 mile north of the site.
Lanius ludovicianus Loggerhead shrike	Federal – SC State – None	Desert, farmland; nests in cholla and thorny bushes.	Present. Observed in 2008 but not in 2007.	Present.
Polioptila melanura Black-tailed gnatcatcher	Federal – None State – SC	Occurs in dry washes in low desert and arid country.	Moderate. Not observed in 2007 or 2008 survey area.	Moderate.
Vermilion flycatcher (*Pyrocephalus rubinus*)	Federal – None State – SSC	Desert riparian habitat.	None.	None, but CNDDB record approximately 2 to 3 miles northeast of the site.
Toxostoma bendirei Bendire's thrasher	Federal – None State – SC BLM – S	Desert wash vegetation.	Present. Observed in 2008 but not in 2007.	Low.

Species	Sensitivity Status	Habitat	Potential to Occur/Status on Site	
			Proposed Project Site[1]	Daggett Agriculture Alternative
Toxostoma lecontei Le Conte's thrasher	Federal – None State – SSC	Desert flats with sparse bushes; preferred nest sites are in large shrubs along washes.	Moderate. Not observed in 2007 or 2008 survey area.	High. Suitable habitat occurs on site. CNDDB records approximately 1 mile north of the site and 1.5 miles southeast of the site.
MAMMALS				
Antrozous pallidus Pallid bat	Federal – SC State – SC BLM – S	Crevices of canyon walls or deep caves where temperatures are cool and constant.	Moderate. Not observed in 2007 or 2008 survey area.	None. Suitable habitat not present. CNDDB record approximately 3 miles northeast of the site.
Euderma maculatum Spotted bat	Federal – SC State – None BLM – S	Associated with patchy vegetation with prominent rocky features, pinyon juniper and riparian forests.	Low. Not observed in 2007 or 2008 survey area.	None. Suitable habitat not present.
Eumops perotis Western mastiff bat	Federal – None State – None BLM – S	Rocky areas and cliff faces, roosts in cliff crevices, buildings.	High for foraging individuals. Not observed in 2007 or 2008 survey area.	None. Suitable habitat not present.
Ovis canadensis nelsoni desert bighorn sheep	Federal – Endangered State – Threatened BLM – S	Habitats used include alpine dwarf-shrub, low sage, sagebrush, bitterbrush, pinyon juniper, palm oasis, desert riparian, desert succulent shrub, desert scrub, subalpine conifer, perennial grassland, montane chaparral, and montane riparian.	High. Not observed in 2007 or 2008 survey area. Known to occur in area directly north of site.	Very low. Usually prefers higher elevations with rocky substrates. CNDDB record approximately 1 to 2 miles south of the site.
Spermophilus mohavensis Mojave ground squirrel	Federal –SC State – ST BLM – S	Mojave desert scrub west of Barstow.	Low. Not observed in 2007 or 2008 survey area. Known to occur in area directly north of site. East of known distribution.	Moderate. CNDDB record less than 0.5 miles south of the site.

Species	Sensitivity Status	Habitat	Potential to Occur/Status on Site	
			Proposed Project Site[1]	Daggett Agriculture Alternative
Plecotus townsendii Townsend's big-eared bat	Federal – None State – None BLM – S	Desert scrub and coniferous forests, roosts in caves, abandoned mines, and buildings.	High potential for foraging individuals. Observed in Project area in 2008 but not in 2007.	Low. CNDDB record approximately 2 to 3 miles northwest of the site.
Taxidea taxus American badger	Federal – None State – SSC	Grasslands, savannas, and mountain meadows near timberline are preferred, but also occur in desert scrub areas.	Present. Observed in Project area in 2008 but not in 2007.	Low.

1 - Except where noted, data taken from URS Biological Technical Report for the Project Site (2008)
2 - Species not covered in URS report

STATUS CODES:

Federal FE - Federally listed endangered: species in danger of extinction throughout a significant portion of its range
FT - Federally listed threatened: species likely to become endangered within the foreseeable future

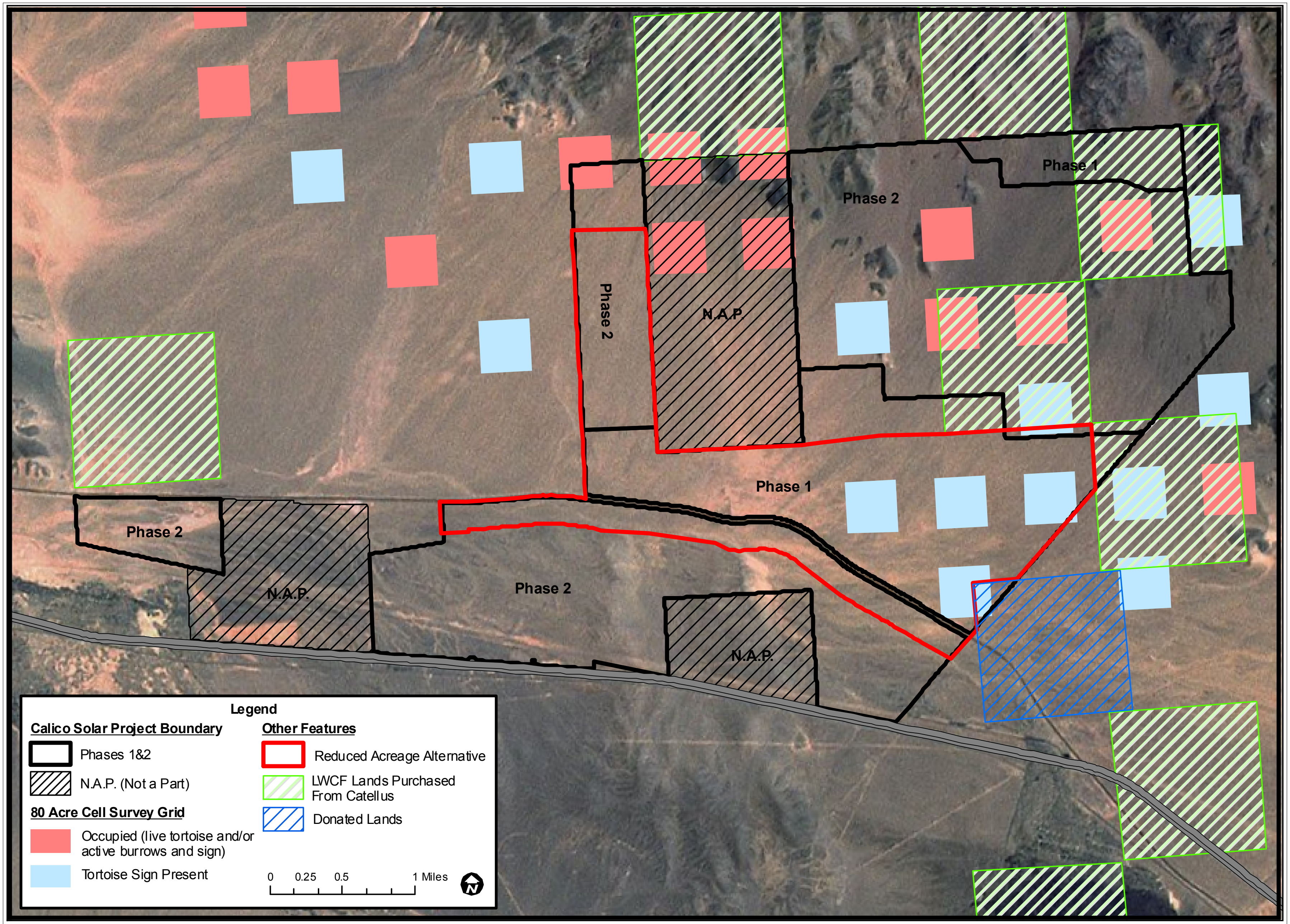
State SE - State listed endangered
ST = State listed threatened
SSC = Species of special concern

California Native Plant Society
List 1B - Rare, threatened, or endangered in California and elsewhere
List 2 - Rare, threatened, or endangered in California but more common elsewhere
List 3 - Plants which need more information
List 4 - Limited distribution – a watch list
0.1 - Seriously threatened in California (high degree/immediacy of threat)
0.2 - Fairly threatened in California (moderate degree/immediacy of threat)
0.3 - Not very threatened in California (low degree/immediacy of threats or no current threats known)

BLM S **=** Sensitive

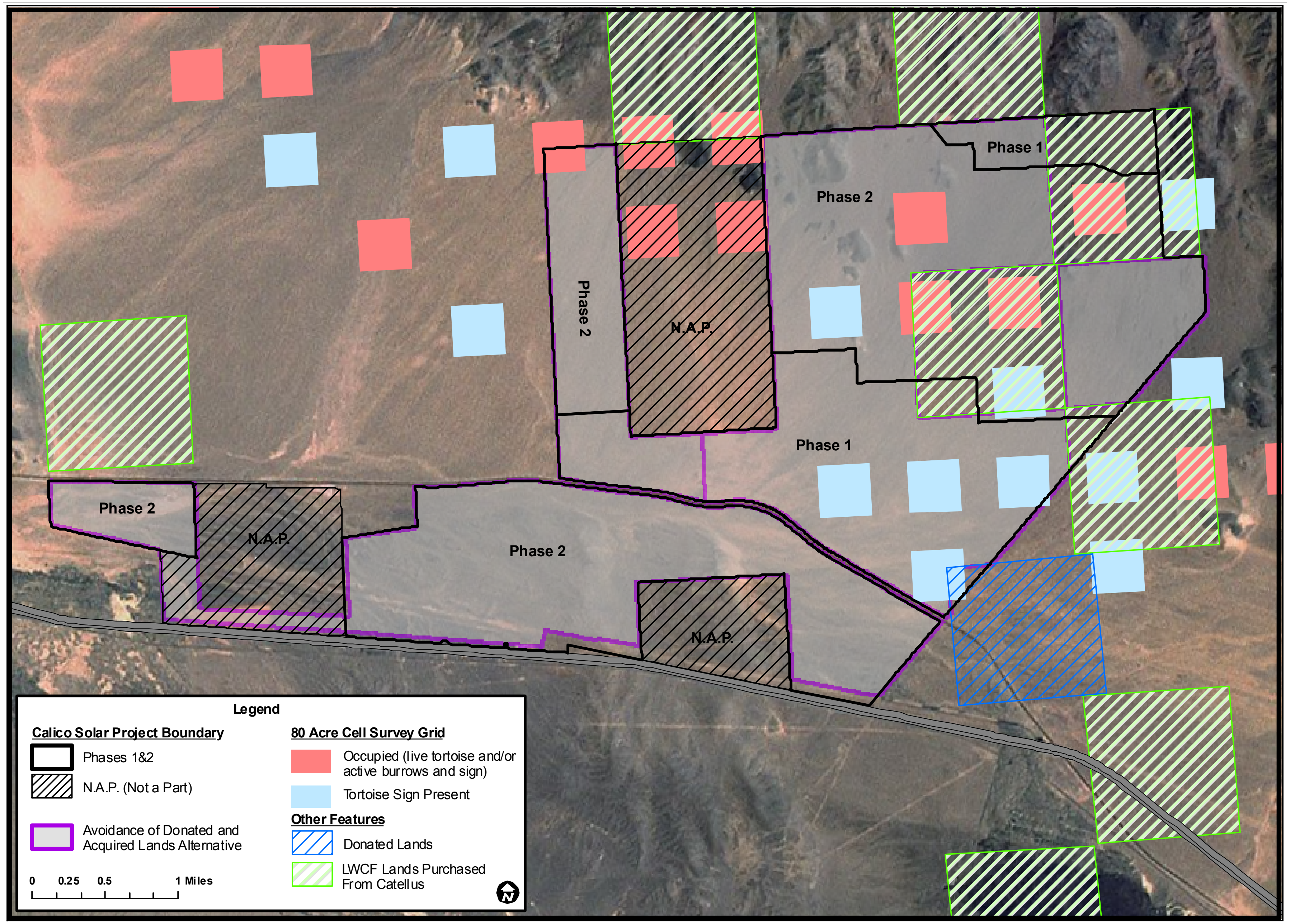
BLM Manual § 6840 defines sensitive species as "…those species that are (1) under status review by the FWS/NMFS; or (2) whose numbers are declining so rapidly that federal listing may become necessary, or (3) with typically small and widely dispersed populations; or (4) those inhabiting ecological refugia or other specialized or unique habitats."
<www.blm.gov/ca/pdfs/pa_pdfs/biology_pdfs/SensitiveAnimals.pdf>

ALTERNATIVES - FIGURE 1
Calico Solar Project- Reduced Acreage Alternative



U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010
SOURCE: California Energy Commission - Tele Atlas Data - San Bernardino County

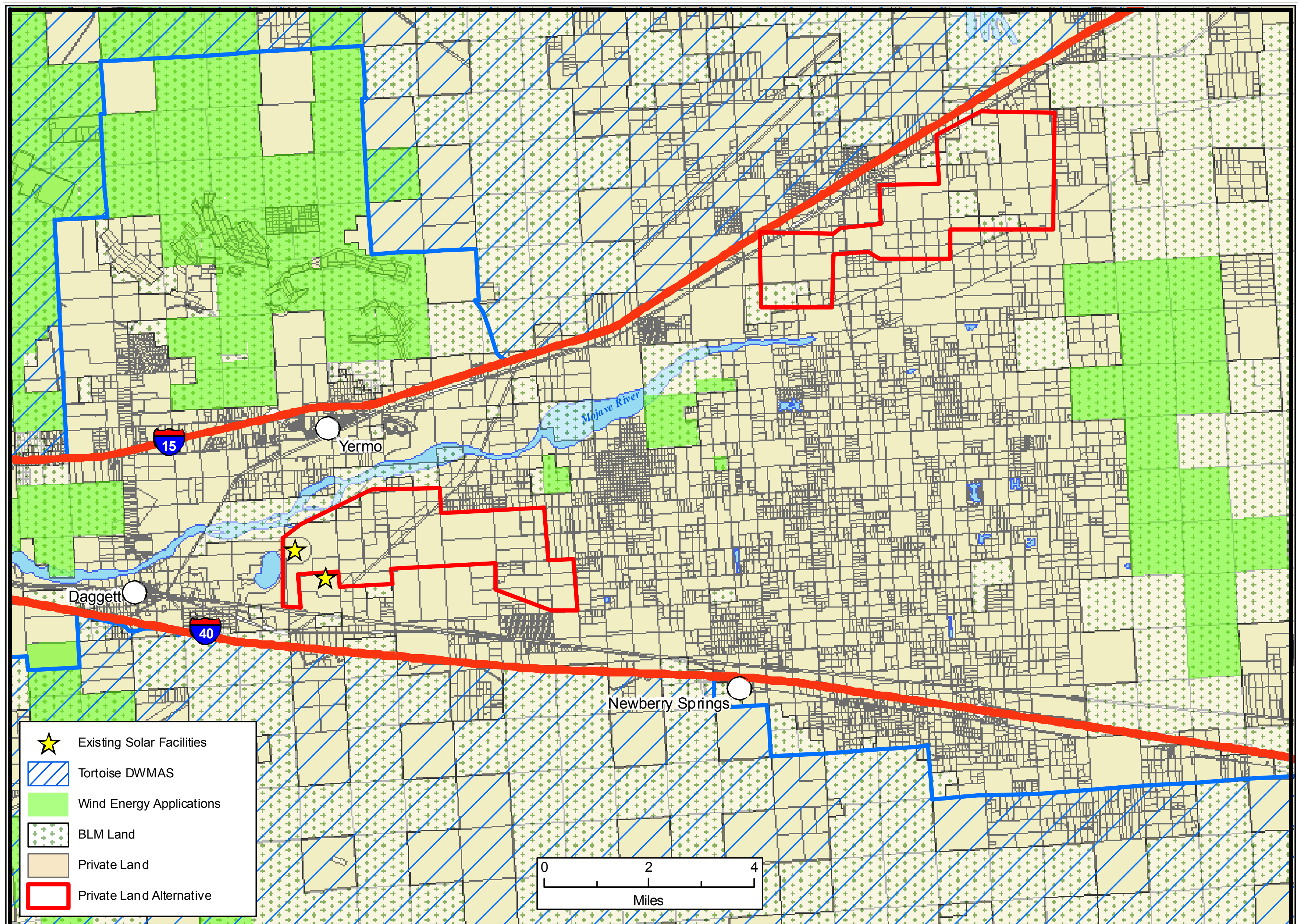
ALTERNATIVES - FIGURE 2
Calico Solar Project - Avoidance of Donated and Acquired Lands Alternative



SOURCE: California Energy Commission - Tele Atlas Data - San Bernardino County

ALTERNATIVES - FIGURE 3

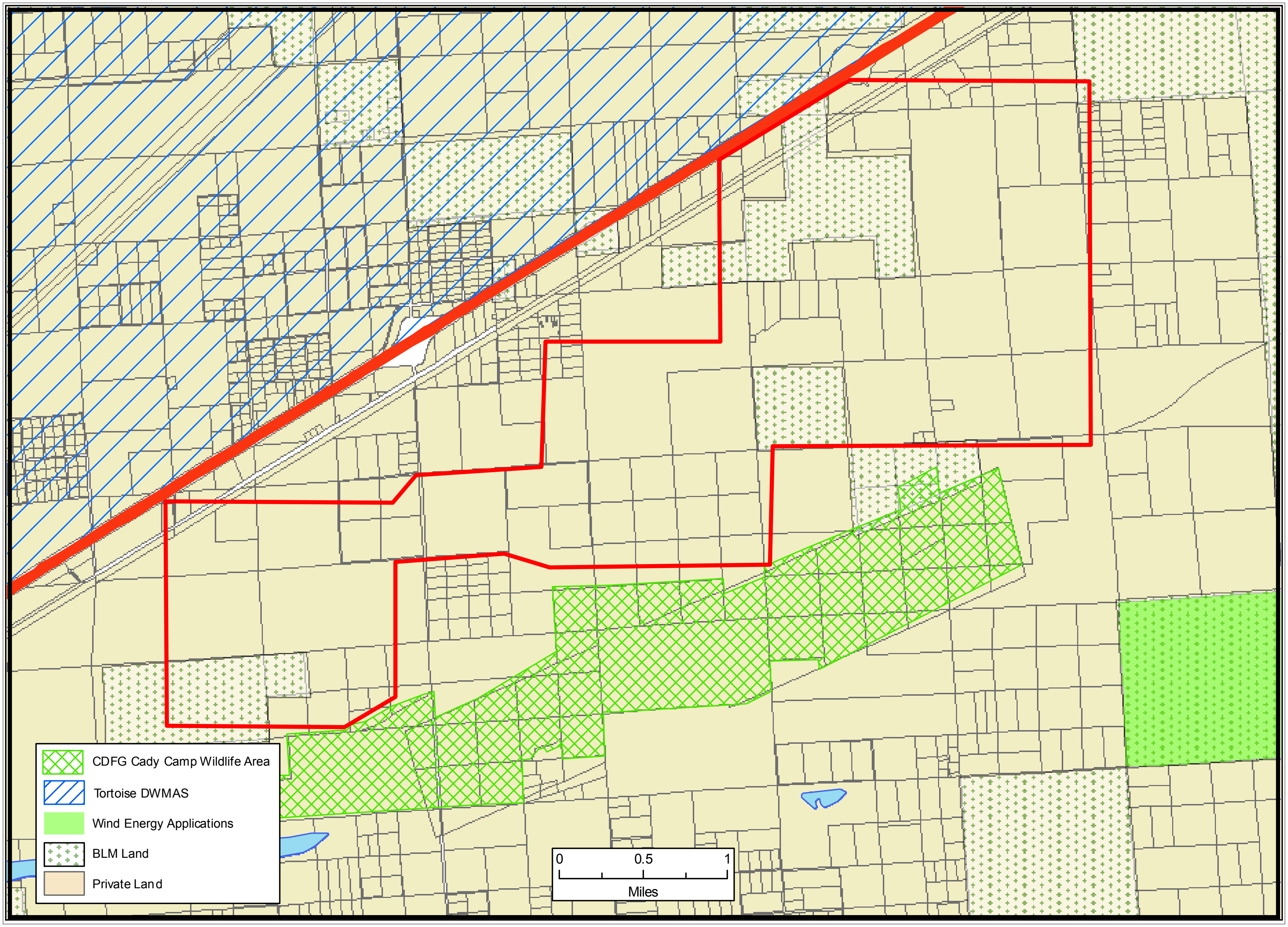
Calico Solar Project - Private Land Alternative



SOURCE: California Energy Commission - Tele Atlas Data - San Bernardino County

ALTERNATIVES - FIGURE 3A

Calico Solar Project - Private Land Alternative Northern Section

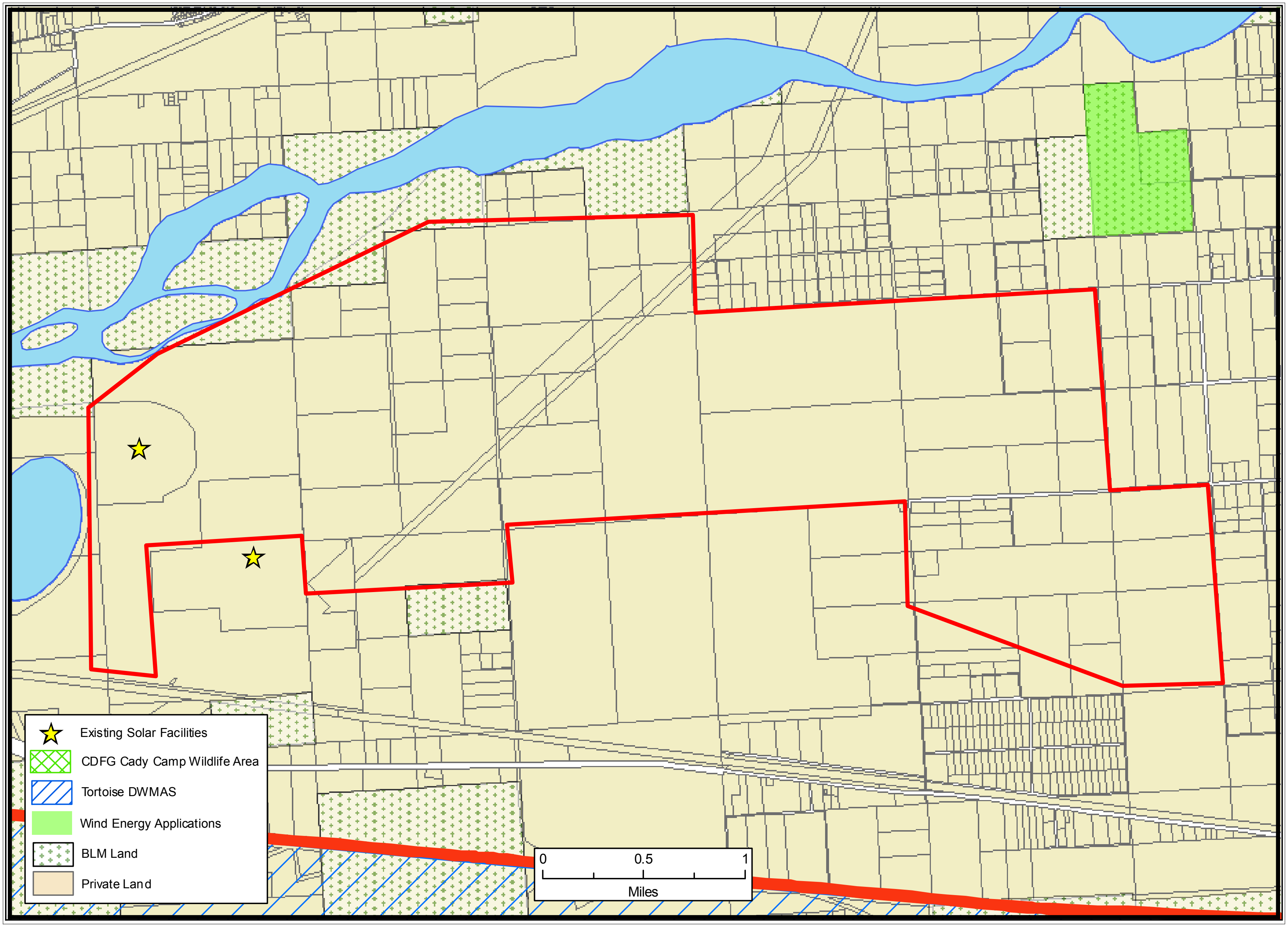


U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission - Tele Atlas Data - San Bernardino County

ALTERNATIVES - FIGURE 3B

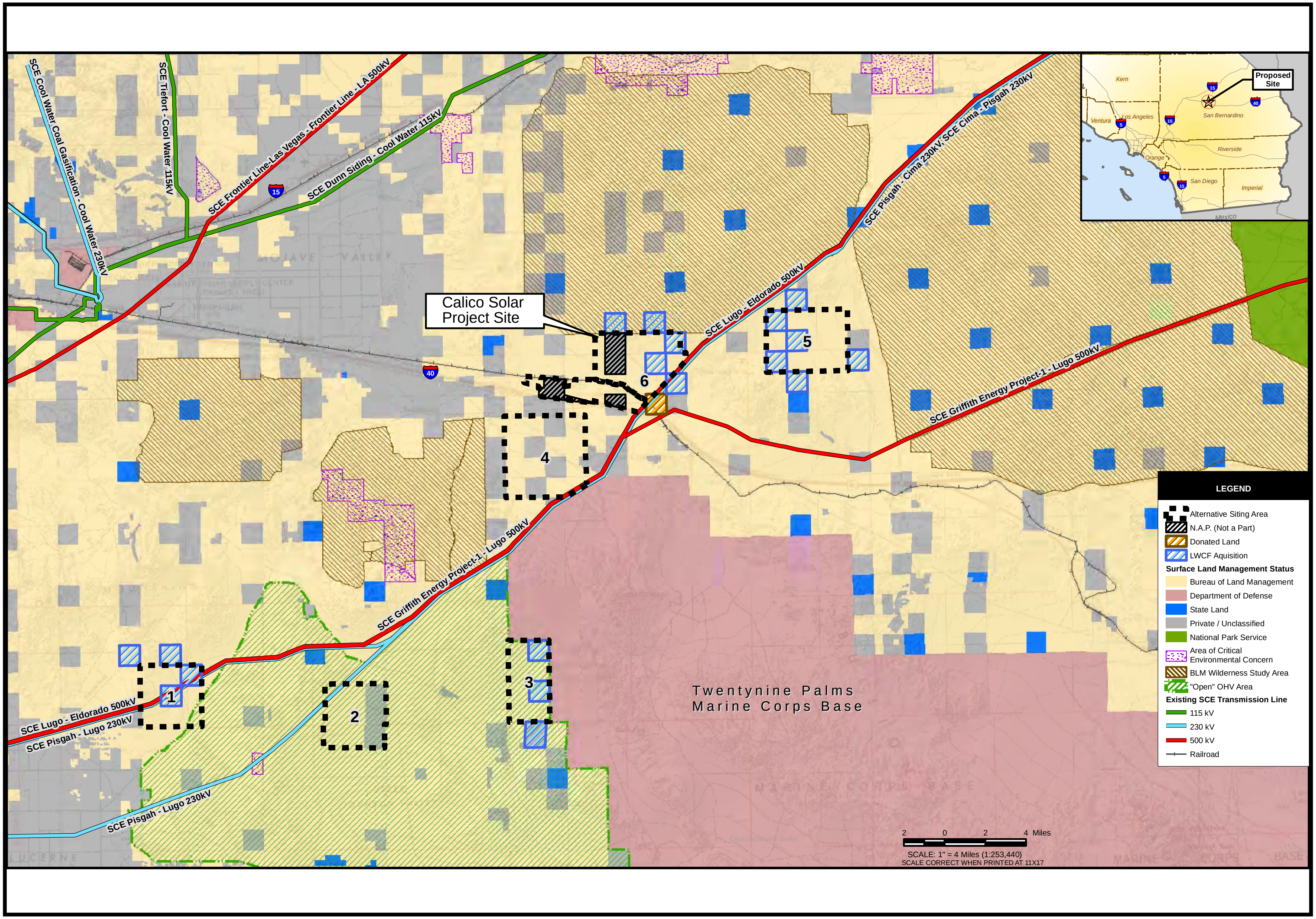
Calico Solar Project - Private Land Alternative Southern Section



U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission - Tele Atlas Data - San Bernardino County

ALTERNATIVES - FIGURE 4
Calico Solar Project - Alternatives Considered but not Evaluated in Further Detail



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010
SOURCE: SES ALT 1

B.3 – CUMULATIVE SCENARIO

Testimony of Susan V. Lee

B.3.1 INTRODUCTION

Preparation of a cumulative impact analysis is required under both CEQA and NEPA. “Cumulative impact” is the impact on the environment which results from the incremental impact of the Proposed Project when considered with other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such other actions (40 CFR §1508.7).

Under CEQA Guidelines, “a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts” (14 Cal Code Regs §15130(a)(1)). Cumulative impacts must be addressed if the incremental effect of a project, combined with the effects of other projects is “cumulatively considerable” (14 Cal Code Regs §15130(a)). Such incremental effects are to be “viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects” (14 Cal Code Regs §15164(b)(1)). Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis.

CEQA also states that both the severity of impacts and the likelihood of their occurrence are to be reflected in the discussion, “but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion of cumulative impacts shall be guided by standards of practicality and reasonableness, and shall focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact” (14 Cal Code Regs §15130(b)).

NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR §1508.7). Under NEPA, both context and intensity are considered. When considering intensity of an effect, we consider “[w]hether the action is related to other actions with individually minor but cumulatively significant impacts. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.” 40 CFR §1508.27(b)(7).

B.3.2 RENEWABLE RESOURCES IN CALIFORNIA

A large number of renewable projects have been proposed on BLM managed land, State land, and private land in California. As of January 2010, there were 244 renewable projects proposed in California and in various stages of the environmental review process or under construction. As of December 2009, *49* of these projects, representing approximately 10,500 MW, were planning on requesting American Recovery and Reinvestment Act funds from the Federal government. Solar, wind, and geothermal development applications have requested use of BLM land, including approximately 1 million acres of the California desert. State and private lands have also been targeted for renewable solar and wind projects.

Cumulative Figures 1 and 2 and **Cumulative Tables 1A and 1B** illustrate the numerous proposed renewable projects on BLM, State and private land in California. In addition, nearly 80 applications for solar and wind projects are being considered on BLM land in Nevada and Arizona.

Likelihood of Development. The large renewable projects now described in applications to the BLM and on private land are competing for utility Power Purchase Agreements, which will allow utilities to meet state-required Renewable Portfolio Standards. Not all of the projects listed in **Tables 1A** and **1B** will complete the environmental review, and not all projects will be funded and constructed. It is unlikely that all of these projects will be constructed for the following reasons:

- Not all developers will develop the detailed information necessary to meet BLM and Energy Commission standards. Most of the solar projects with pending applications are proposing generation technologies that have not been implemented at large scales. As a result, preparing complete and detailed plans of development (PODs) is difficult, and completing the required NEPA and CEQA documents is especially time-consuming and costly.
- As part of approval by the appropriate Lead Agency under CEQA and/or NEPA (generally the Energy Commission and/or BLM), all regulatory permits must be obtained by the applicant or the prescriptions required by the regulatory authorities incorporated into the Lead Agency's license, permit or right-of-way grant. The large size of these projects may result in permitting challenges related to endangered species, mitigation measures or requirements, and other issues.
- Also after project approval, construction financing must be obtained (if it has not been obtained earlier in the process). The availability of financing will be dependent on the status of competing projects, the laws and regulations related to renewable project investment, and the time required for obtaining permits.

Incentives for Renewable Development. A number of existing policies and incentives encourage renewable energy development. These incentives lead to a greater number of renewable energy proposals. Example of incentives for developers to propose renewable energy projects on private and public lands in California, Nevada and Arizona, include the following:

- **U.S. Treasury Department's Payments for Specified Energy Property in Lieu of Tax Credits** under §1603 of the American Recovery and Reinvestment Act of 2009 (Public Law 111-5) – Offers a grant (in lieu of investment tax credit) to receive funding for 30% of their total capital cost at such time as a project achieves commercial operation (currently applies to projects that begin construction by December 31, 2010 and begin commercial operation before January 1, 2017).
- **U.S. Department of Energy (DOE) Loan Guarantee Program** pursuant to §1703 of Title XVII of the Energy Policy Act of 2005 – Offers a loan guarantee that is also a low interest loan to finance up to 80% of the capital cost at an interest rate much lower than conventional financing. The lower interest rate can reduce the cost of financing and the gross project cost on the order of several hundred million dollars over the life of the project, depending on the capital cost of the project.

B.3.3 DEFINITION OF THE CUMULATIVE PROJECT SCENARIO

Cumulative impacts analysis is intended to highlight past actions that are closely related either in time or location to the project being considered, catalogue past projects and discuss how they have harmed the environment, and discuss past actions even if they were undertaken by another agency or another person. Most of the projects listed in the cumulative projects tables (**Cumulative Tables 1, 2, and 3** at the end of this section) have, are, or will be required to undergo their own independent environmental review under either CEQA.

Under CEQA, there are two acceptable and commonly used methodologies for establishing the cumulative impact setting or scenario: the "list approach" and the "projections approach". The first approach would use a "list of past, present, and probable future projects producing related or cumulative impacts." 14 Cal Code Regs §15130(b)(1)(A). The second approach is to use a "summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or area wide conditions contributing to the cumulative impact" (14 Cal Code Regs §15130(b)(1)(B)). This Staff Assessment/Draft Environmental Impact Statement (SA/DEIS) uses the "list approach" for purposes of state law to provide a tangible understanding and context for analyzing the potential cumulative effects of a Project.

Under NEPA, an EIS must provide a sufficiently detailed catalogue of past, present, and reasonably foreseeable future projects, and provide an adequate analysis of how these projects, in conjunction with the proposed action, are thought to have impacted or are expected to impact the environment. While NEPA requires an adequate cataloging of past projects, it also requires a discussion of consequences of those past projects. NEPA is designed to inform decision making and through disclosure of relevant environmental considerations, permit informed public comment.

In order to provide a basis for cumulative analysis for each discipline, this section provides information on other projects in both maps and tables. The Energy Commission and the BLM have identified the California desert as the largest area within which cumulative effects should be assessed for all disciplines, as shown in three maps and accompanying tables. However, within the desert region, the specific area of cumulative effect varies by resource. For this reason, each discipline has identified the geographic scope for the discipline's analysis of cumulative impacts. **Cumulative Figures 1, 2, and 3** are on the following pages, and **Cumulative Tables 1, 2, and 3** are presented at the end of this section.

Cumulative Figure 3 (Newberry Springs/Ludlow Area Existing and Future/Foreseeable Projects) and **Cumulative Tables 2 and 3** define the projects in the immediate vicinity of the Calico Solar Project (formerly the Stirling Energy Systems Solar One Project). The area included on these tables consists of an approximate 15 to 20-mile radius around the project site. Table 2 presents existing projects and Table 3 presents future foreseeable projects. Both tables indicate project name, type, location, and status. This data is presented for consideration within each discipline.

B.3.4 APPROACH TO CUMULATIVE IMPACT ANALYSIS

This Staff Assessment/Draft EIS evaluates cumulative impacts within the analysis of each resource area, following these steps:

1. Define the geographic scope of cumulative impact analysis for each discipline, based on the potential area within which impacts of the Calico Solar Project could combine with those of other projects.
2. Evaluate the effects of the Calico Solar Project in combination with past and present (existing) projects within the area of geographic effect defined for each discipline.
3. Evaluate the effects of the Calico Solar Project with foreseeable future projects that occur within the area of geographic effect defined for each discipline.

Each of these steps is described below.

GEOGRAPHIC SCOPE OF CUMULATIVE ANALYSIS

The area of cumulative effect varies by resource. For example, air quality impacts tend to disperse over a large area, while traffic impacts are typically more localized. For this reason, the geographic scope for the analysis of cumulative impacts must be identified for each resource area.

The analysis of cumulative effects considers a number of variables including geographic (spatial) limits, time (temporal) limits, and the characteristics of the resource being evaluated. The geographic scope of each analysis is based on the topography surrounding the Calico Solar Project and the natural boundaries of the resource affected, rather than jurisdictional boundaries. The geographic scope of cumulative effects will often extend beyond the scope of the direct effects, but not beyond the scope of the direct and indirect effects of the proposed action and alternatives.

In addition, each project in a region will have its own implementation schedule, which may or may not coincide or overlap with the Calico Solar Project's schedule. This is a consideration for short-term impacts from the Calico Solar Project. However, to be conservative, the cumulative analysis assumes that all projects in the cumulative scenario are built and operating during the operating lifetime of the Calico Solar Project.

PROJECT EFFECTS IN COMBINATION WITH FORESEEABLE FUTURE PROJECTS

The intensity, or severity, of the cumulative effects should consider the magnitude, geographic extent, duration and frequency of the effects (CEQ, 1997). The magnitude of the effect reflects the relative size or amount of the effect; the geographic extent considers how widespread the effect may be; and the duration and frequency refer to whether the effect is a one-time event, intermittent, or chronic (CEQ, 1997).

Each discipline evaluates the impacts of the proposed project on top of the current baseline; the past, present (existing) and reasonably foreseeable or probable future projects in the Calico Solar Project vicinity as illustrated in **Cumulative Figure 3 (Newberry Springs/Ludlow Area Existing and Future/Foreseeable Projects)** and **Cumulative Tables 2 (Existing Projects) and 3 (Future/Foreseeable Projects)**.

Reasonably foreseeable projects that could contribute to the cumulative effects scenario depend on the extent of resource effects, but could include projects in the immediate Ludlow area as well as other large renewable projects in the California, Nevada, and Arizona desert regions. These projects are illustrated in **Cumulative Figures 1, 2, and 3**. As shown in the map and table, there are a number of projects in the immediate area around Calico Solar Project whose impacts could combine with those of the proposed project. As shown on **Cumulative Figure 1** and in **Table 1**, solar and wind development applications for use of BLM land have been submitted for approximately 1 million acres of the California Desert Conservation Area. Additional BLM land in Nevada and Arizona also has applications for solar and wind projects.

Cumulative Table 1A
Renewable Energy Projects on BLM Land in the California Desert

BLM Field Office	Number of Projects & Acres	Total MW
SOLAR ENERGY		
Barstow Field Office	18 projects 132,560 acres	12,875 MW
El Centro Field Office	7 projects 50,707 acres	3,950 MW
Needles Field Office	17 projects 230,480 acres	15,700 MW
Palm Springs Field Office	17 projects 123,592 acres	11,873 MW
Ridgecrest Field Office	4 projects 30,543 acres	2,835 MW
TOTAL – CA Desert District	**63 projects** **567,882 acres**	**47,233 MW**
WIND ENERGY		
Barstow Field Office	25 projects 171,560 acres	n/a
El Centro Field Office	9 projects (acreage not given for 3 of the projects) 48,001 acres	n/a
Needles Field Office	8 projects 115,233 acres	n/a
Palm Springs Field Office	4 projects 5,851 acres	n/a
Ridgecrest Field Office	16 projects 123,379 acres	n/a
TOTAL – CA Desert District	**62 projects** **433,721 acres**	n/a

Source: Renewable Energy Projects in the California Desert Conservation Area identifies solar and wind renewable projects as listed on the BLM California Desert District Alternative Energy Website (BLM 2009)

Cumulative Table 1B
Renewable Energy Projects on State and Private Lands

Project Name	Location	Status
SOLAR PROJECTS		
Solargen Panoche Valley Solar Farm (400 MW Solar PV)	San Benito County	EIR in progress
Maricopa Sun Solar Complex (350 MW Solar PV)	Kern County	Information not available
Panoche Ranch Solar Farm (250 MW Solar PV)	Kern County	Information not available
Gray Butte Solar PV (150 MW Solar PV)	Los Angeles County	Information not available
Monte Vista (126 MW Solar PV)	Kern County	Information not available
San Joaquin Solar 1 and 2 (107 MW Solar hybrid)	Fresno	Under environmental review
NRG Alpine Suntower (40 MW solar PV and 46 MW solar thermal)	Los Angeles	Information not available
Palmdale Hybrid Power Project Unit 1 (50 MW solar thermal, part of a hybrid project)	City of Palmdale	Under environmental review
Lucerne Valley Solar (50 MW solar PV)	San Bernardino	Under environmental review
Lost Hills (32.5 solar PV)	Kern County	Information not available
Tehachapi Photovoltaic Project (20 MW solar PV)	Kern County	Information not available
Sun City Project Phase 1 (20 MW solar PV)	Kings County	Information not available
Boulevard Associates (20 MW solar PV)	San Bernardino County	Information not available
Stanislaus Solar Project I (20 MW solar PV)	Stanislaus County	Information not available
Stanislaus Solar Project II (20 MW solar PV)	Stanislaus County	Information not available
Synapse Solar 2 (20 MW solar PV/solar thermal)	Kings	Information not available
T, squared, Inc. (19 MW solar PV)	Kern County	Information not available
Rancho Seco Solar Thermal (15-17 MW solar trough)	Sacramento County	Information not available
Global Real Estate Investment Partners, LLC (solar PV)	Kern County	Information not available
Recurrent Energy (solar PV)	Kern County	Information not available

Project Name	Location	Status
Man-Wei Solar (solar PV)	Kern County	Information not available
Regenesis Power for Kern County Airports Dept.	Kern County	Information not available
Abengoa Mojave Solar Project (250 MW solar thermal)	San Bernardino County, Harper Lake	Under environmental review
Rice Solar Energy Project (150 MW solar thermal)	Riverside County, north of Blythe	Under environmental review
3 MW solar PV energy generating facility	San Bernardino County, Newberry Springs	MND published for public review
Blythe Airport Solar 1 Project (100 MW solar PV)	Blythe, California	MND published for public review
First Solar's Blythe (21 MW solar PV)	Blythe, California	Under construction
California Valley Solar Ranch (SunPower) (250 MW solar PV)	Carrizo Valley, San Luis Obispo County	Under environmental review
LADWP and OptiSolar Power Plant (68 MW solar PV)	Imperial County, SR 111	Under environmental review
Topaz Solar Farm (First Solar) (550 MW solar PV)	Carrizo Valley, San Luis Obispo County	Under environmental review
AV Solar Ranch One (230 MW solar PV)	Antelope Valley, Los Angeles County	Under environmental review
Bethel Solar Hybrid Power Plant (49.4 MW hybrid solar thermal and biomass)	Seeley, Imperial County	Under environmental review
Mt. Signal Solar Power Station (49.4 MW hybrid solar thermal and biomass)	8 miles southwest of El Centro, Imperial County	Under environmental review
WIND PROJECTS		
Alta-Oak Creek Mojave Project (up to 800 MW)	Kern County, west of Mojave	Under environmental review
PdV Wind Energy Project (up to 300 MW)	Kern County, Tehachapi Mountains	Approved
City of Vernon Wind Energy Project (300 MW)	City of Vernon	Information not available
Manzana Wind Project (246 MW)	Kern County	Information not available
Iberdrola Tule Wind (200 MW)	San Diego County, McCain Valley	EIR/EIS in progress
Padoma Wind Energy (175 MW)	Shasta County	Information not available
Pine Canyon (150 MW)	Kern County	Information not available
Shiloh III (200 MW)	Montezuma Hills, Solano County	Information not available

Project Name	Location	Status
AES Daggett Ridge (84 MW)	San Bernardino	EIS in progress
Granite Wind, LLC (81 MW)	San Bernardino	EIR/EIS in progress
Bear River Ridge (70 MW)	Humboldt County	Information not available
Aero Tehachapi (65 MW)	Kern County	Information not available
Montezuma Wind II (52-60)	Montezuma Hills, Solano County	Information not available
Tres Vaqueros (42 MW wind repower)	Contra Costa County	Information not available
Montezuma Hills Wind Project (34-37 MW)	Solano County	Information not available
Solano Wind Project Phase 3 (up to 128 MW)	Montezuma Hills, Solano County	Under environmental review
Hatchet Ridge Wind Project	Shasta County, Burney	Under construction
Lompoc Wind Energy Project	Lompoc, Santa Barbara County	Approved
Pacific Wind (Iberdrola)	McCain Valley, San Diego County	Under environmental review
TelStar Energies, LLC (300 MW)	Ocotillo Wells, Imperial County	Under environmental review
GEOTHERMAL PROJECTS		
Buckeye Development Project	Geyserville, Sonoma	Under environmental review
Orni 18, LLC Geothermal Power Plant (49.9 MW)	Brawley, Imperial County	Information not available
Black Rock Geothermal 1,2,and 3	Imperial County	Information not available

* This list is compiled from the projects on CEQAnet as of November 2009 and the projects located on private or State lands that are listed on the Energy Commission Renewable Action Team website as requesting ARRA funding. Additional renewable projects proposed on private and State lands but not requesting ARRA funds are listed on the website.

Source: CEQAnet [http://www.ceqanet.ca.gov/ProjectList.asp], November 2009 and CEC Renewable Action Team – Generation Tracking for ARRA Projects 12/29/2009 [http://www.energy.ca.gov/33by2020/documents/2009-12-29/2009-12-29_Proposed_ARRA_Renewable_Projects.pdf]

Cumulative Table 2
Existing Projects in the Newberry Springs/Ludlow Area

ID	Project Name	Location	Agency/ Owner	Status	Project Description
1	Twentynine Palms Marine Corps Air Ground Combat Center (MCAGCC)	Morongo Basin (to the south of project site)	U.S. Marine Corps	Existing	The Marine Corps' service-level facility for Marine Air Ground Task Force training. It covers 596,000 acres to the south of the Calico Solar Project site and north of the city of Twentynine Palms
2	SEGS I and II	Near Daggett (17 miles west of project site)	Sunray Energy, Inc.	Existing	Solar parabolic trough facilities generating 13.8 MW and 30 MW, respectively.
3	CACTUS (formerly Solar One and Solar Two)	Near Daggett (to the west of project site)	University of California Davis	Existing	A non-working 10 MW solar power tower plant converted by UC Davis into an Air Cherenkov Telescope to measure gamma rays hitting the atmosphere. The site is comprised of 144 heliostats. This project had its last observational run in 2005. SCE has requested funds from the California Public Utilities Commission to decommission the Solar Two project. (UC Davis 2009)
4	Mine	2 miles west of project site along I-40		Existing	Small-scale aggregate operation (AFC p. 5.3-12)
5	Mine	14 miles west of project site along I-40		Existing	Larger aggregate mining operation that produced less than 500,000 tons per year in 2005 (AFC p. 5.3-12)

Source: These projects were identified through a variety of sources including the project AFC (Section 5.18) and websites of the San Bernardino County Land Use Services Department, BLM, CEC and individual projects.

Cumulative Table 3
Future Foreseeable Projects in the Newberry Springs/Ludlow Area

ID	Project Name	Location	Agency/ Owner	Status	Project Description
A	SES Solar Three (CACA 47702)	T's. 8, 9N., R5E (Immediately west of project site)	SES Solar Three, LLC	BLM received completed amended application June 2007. SES withdrew the application for Solar Three in December 2009. As there was a second-in-line application, this application becomes the project proposed at this location. .	914 MW Stirling solar plant on 6,779-acre site.
B	Broadwell BrightSource (CACA 48875)	Broadwell Valley (T'8N and 9N; R7E) – in northeast direction of project site	BrightSource Energy, Inc.	Application filed with BLM. Potential conflict with proposed National Monument. Plans withdrawn/put on hold in September 2009.	5,130-acre solar thermal facility using power tower technology.
C	SCE Pisgah Substation expansion	immediately southeast of project site	Southern California Edison		Substation upgrade from 220 kV to 500 kV

ID	Project Name	Location	Agency/ Owner	Status	Project Description
D	Pisgah-Lugo transmission upgrade	Pisgah Substation (SE side of project site) to Lugo Substation (near Hesperia)	Southern California Edison		The proposed 850 MW Calico Solar Project would require removal of 65 miles of existing 220-kV transmission line and reinstallation with a 500-kV line. The Reduced Acreage Alternative (275 MW) would require an upgrade of the telecommunication facilities serving the existing 200-kV Pisgah-Lugo transmission line. Specifically, it would require: • Replacement of a portion of existing Eldorado-Lugo 500 kV overhead ground wire with new optical ground wire between the Lugo and Pisgah Substations • Installation of a new fiber-optic line between the Pisgah Substation and Cool Water Substation (new fiber to be installed on approximately 20 miles of existing electric distribution poles).
E	Twentynine Palms Expansion	Morongo Basin (south of project site)	U.S. Marine Corps	NOI to prepare EIS to study alternatives published in Oct. 2009. Draft EIS expected September 2010.	400,000-acre expansion on the east, west, and south of the existing 596,000-acre Twentynine Palms Marine Corps base. In June 2009, approximately 60,000 acres in all study areas were removed from further study, leaving 360,000 acres under study (USMC 2009).
F	Solel, Inc. (CACA 049424)	Southwest of proposed site, immediately north of Twentynine Palms MCAGCC	Solel, Inc.	BLM received application in July 2007, POD is under review.	600 MW solar thermal plant proposed on 7,453 acres.

ID	Project Name	Location	Agency/ Owner	Status	Project Description
G	Wind project (CACA 48629)	Black Lava T2N, R5E, T1N, R5E	Oak Creek Energy	BLM received application December 2006. Issues with partial location in ACEC.	Wind project on 17,920 acres
H	Wind Project (CACA 48667)	South Ludlow T6N/R6E, T7N/R6E, T6N/R7E, T7N/R7E, T6N/R8E, T7N/R8E (In southeast direction of project site)	Oak Creek Energy	Pending	Wind project on 25,600 acres
I	Wind project (CACA 48472)	Troy Lake T9N&10N, R4E (In west direction of project site)	Power Partners SW (enXco)	Pending review of EA.	Wind project on 10,240 acres
J	Twin Mountain Rock Venture	10 miles west of Ludlow and 1 mile south of I-40; APN 0552-011-10-0000	Rinker Materials	Permit granted to extend permit to 2018	Plan to re-permit a cinder quarry on approximately 72 acres of leased land. No development activity has occurred on project site.
K	Solar thermal (CACA 49429)	Stedman (in southeast direction of project site)	Solel, Inc.	Application filed with BLM.	600 MW solar project on 14,080 acres. POD under review.
	Proposed National Monument (former Catellus Lands)	Between Joshua Tree National Park and Mojave National Preserve		In December 2009, Sen. Feinstein introduced bill S.2921 that would designate 2 new national monuments including the Mojave Trails National Monument.	The proposed Mojave Trails National Monument would protect approximately 941,000 acres of federal land, including approximately 266,000 acres of the former railroad lands along historic Route 66. The BLM would be given the authority to conserve the monument lands and also to maintain existing recreational uses, including hunting, vehicular travel on open roads and trails, camping, horseback riding and rockhounding.

ID	Project Name	Location	Agency/ Owner	Status	Project Description
	BLM Renewable Energy Study Areas	Along the I-10 corridor between Desert Center and Blythe	BLM	Proposed, under environmental review	The DOE and BLM identified 24 tracts of land as Solar Energy Study Areas in the BLM and DOE Solar PEIS. These areas have been identified for in-depth study of solar development and may be found appropriate for designation as solar energy zones in the future.

Source: Projects were identified through a variety of sources including the project AFC (Section 5.18) and Applicant's Submittal of CAISO Reports, SES 2010e and websites of the San Bernardino County Land Use Services Department, BLM, CEC and individual projects.

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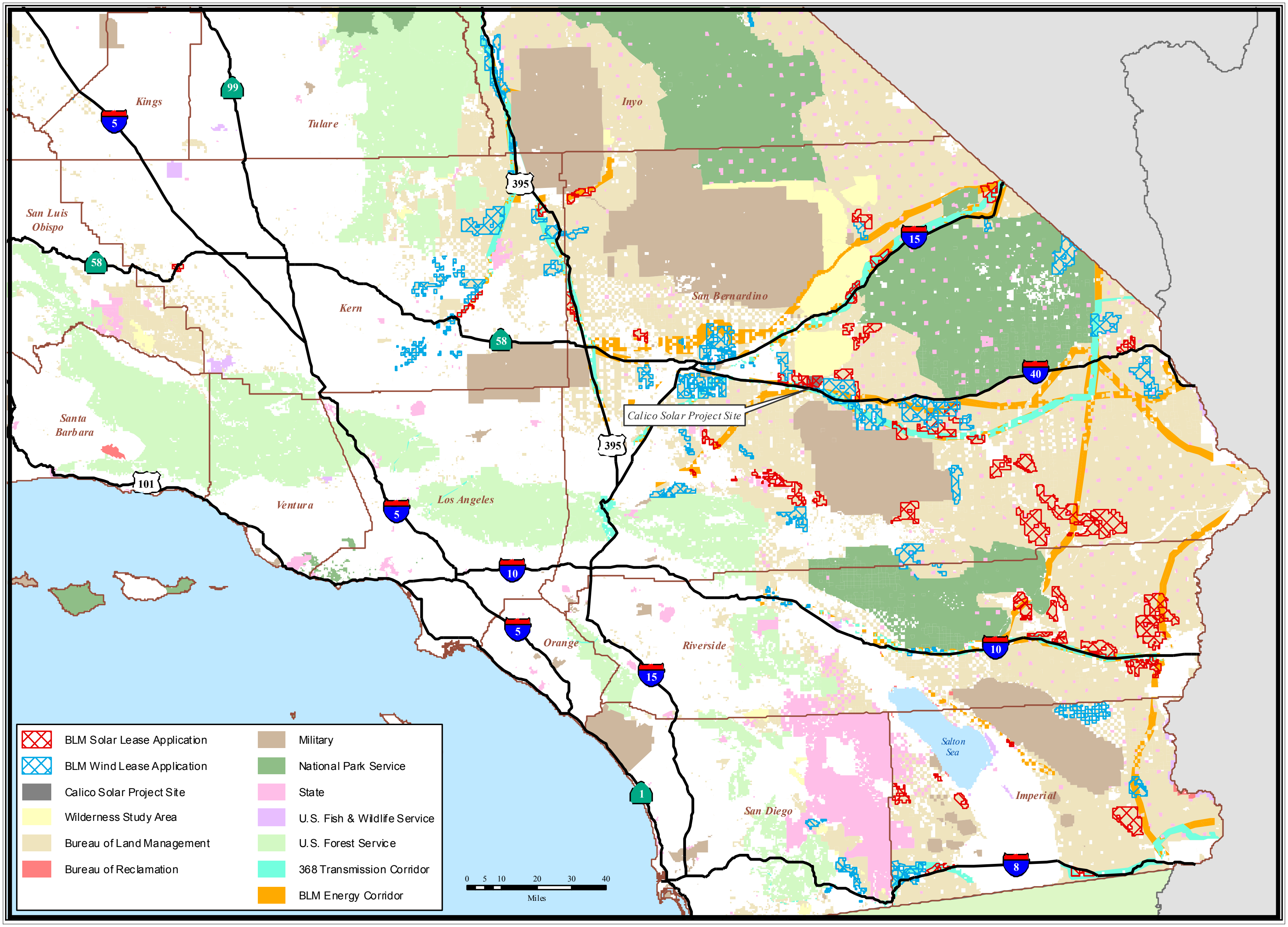
MARCH 2010

CUMULATIVE IMPACTS - FIGURE 1

Calico Solar Project - Renewable Energy Applications in the California Desert



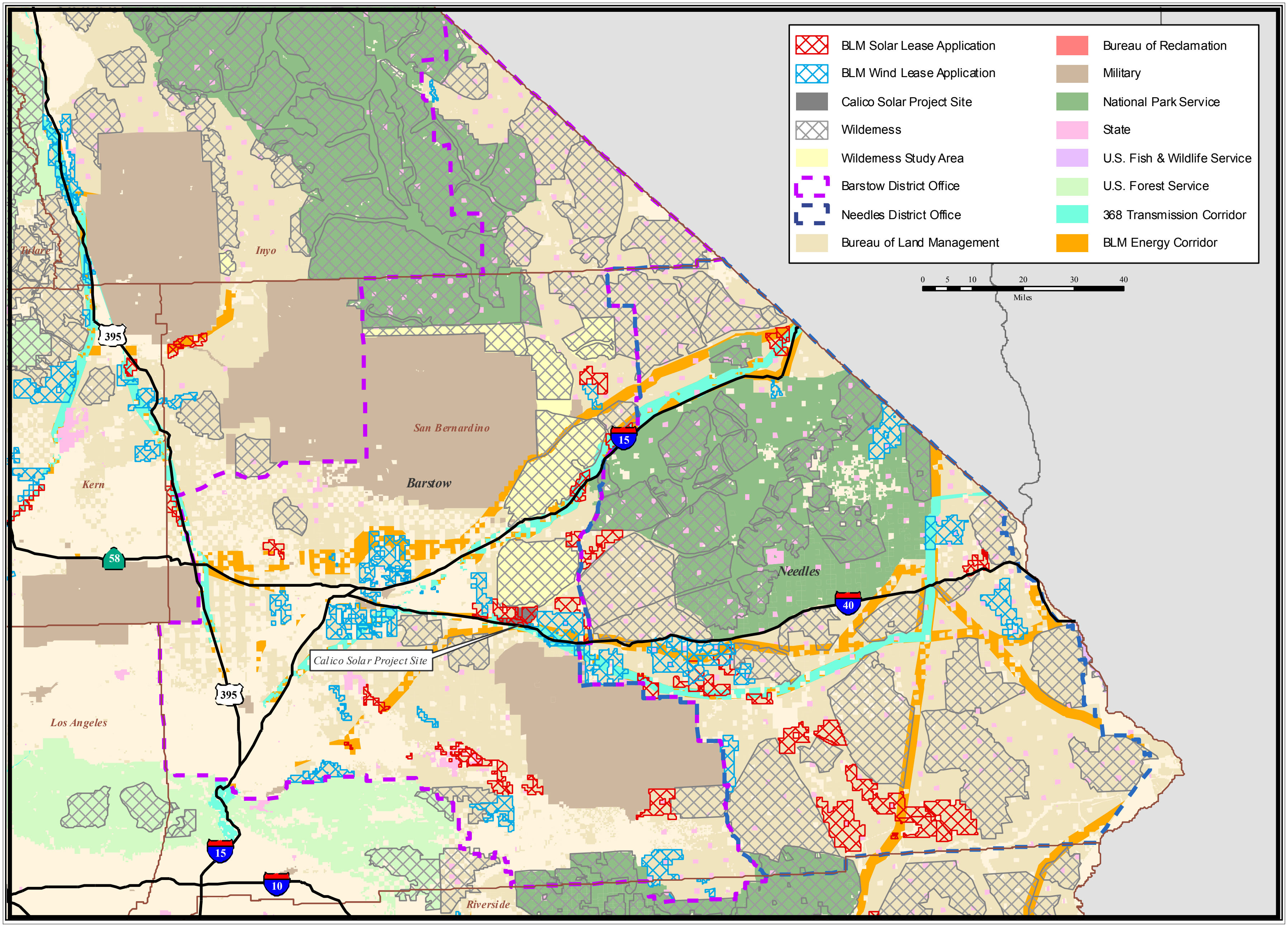
CUMULATIVE IMPACTS

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission, Bureau of Land Management

CUMULATIVE IMPACTS - FIGURE 2

Calico Solar Project - Renewable Energy Applications in the Barstow & Needles District Areas

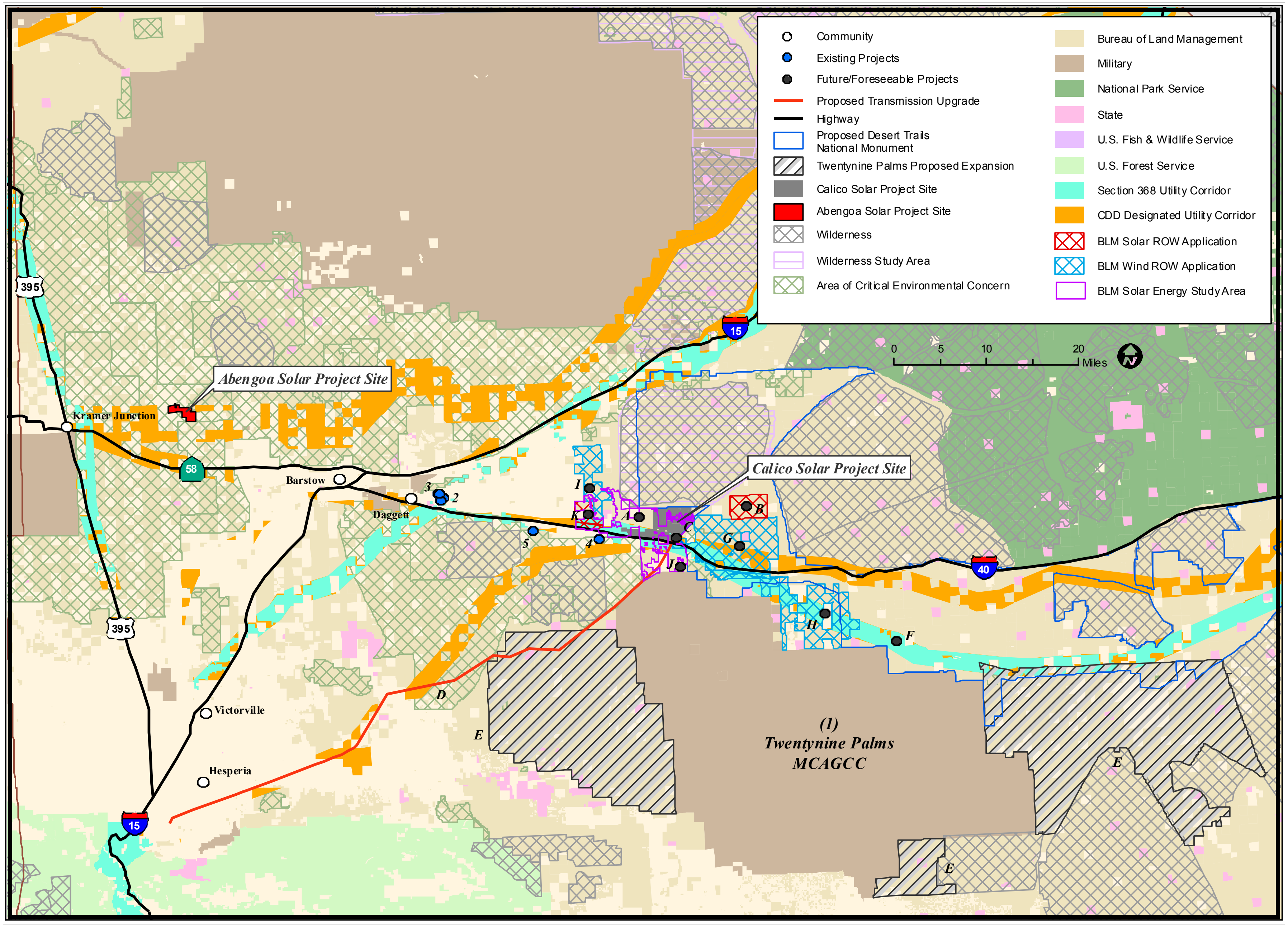


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission, Bureau of Land Management

CUMULATIVE IMPACTS - FIGURE 3

Calico Solar Project - Newberry Springs/Ludlow Area Existing & Future/Foreseeable Projects



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission, Bureau of Land Management

ENVIRONMENTAL ASSESSMENT

C.1 – AIR QUALITY

Testimony of William Walters, P.E.

C.1.1 SUMMARY OF CONCLUSIONS

California Energy Commission staff[1] (hereinafter referred to as “staff”) find that with the adoption of the attached conditions of certification the proposed Calico Solar, LLC’s (applicant) Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) would comply with all applicable laws, ordinances, regulations, and standards and would not result in any significant California Environmental Quality Act air quality impacts. These Conditions of Certification meet the Energy Commission’s responsibility to comply with California Environmental Quality Act and Bureau of Land Management’s responsibility to comply with the National Environmental Policy Act.

Staff have concluded that the proposed project would not have the potential to exceed PSD emission threshold levels during direct source operation and the facility is not considered a major stationary source with potential to cause adverse National Environmental Policy Act air quality impacts. However, without adequate fugitive dust mitigation, the proposed project would have the potential to exceed the General Conformity PM10 applicability threshold during construction and operation, and could cause potential localized exceedances of the PM10 National Ambient Air Quality Standards during construction and operation. This potential exceedance of federal air quality standards would be considered a direct, adverse impact under the National Environmental Policy Act. This impact would be less than adverse with the proposed mitigation measures controlling fugitive dust emissions.

The Calico Solar Project would emit substantially lower greenhouse gas (GHG)[2] emissions per megawatt-hour than fossil fueled generation resources in California. The Calico Solar Project, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]).

C.1.2 INTRODUCTION

Calico Solar, LLC (hereinafter referred to as the applicant) submitted an Application for Transmission and Utility Systems and Facilities on Federal Lands to the BLM on March 16, 2007 (CACA 048810) and an Application for Certification (AFC) to the California Energy Commission on December 2, 2008 to construct and operate a solar power plant in San Bernardino County, California. The Calico Solar Project would be one of the world’s largest solar power projects. The proposed project would have 34,000 solar dish Stirling systems, occupying 8,230 acres of public land managed by

[1] This analysis has been completed solely by Energy Commission staff and has been reviewed by BLM staff.

[2] Greenhouse gas emissions are not criteria pollutants, but they affect global climate change. In that context, staff evaluates the GHG emissions from the proposed project (Appendix Air-1), presents information on GHG emissions related to electricity generation, and describes the applicable GHG standards and requirements.

the Bureau of Land Management (BLM). The project site is located in an undeveloped area of San Bernardino County, approximately 37 miles east of Barstow, and just north of Interstate 40 (I-40).

This analysis evaluates the expected air quality impacts from the emissions of criteria air pollutants from both the construction and operation of the Calico Solar Project (Calico or proposed project). Criteria air pollutants are defined as air contaminants for which the state and/or federal governments, per the California Clean Air Act and the federal Clean Air Act, have established an ambient air quality standard to protect public health.

The criteria pollutants analyzed within this section are nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), and particulate matter (PM). Lead is not analyzed as a criteria pollutant, but lead and other toxic air pollutant emissions impacts are analyzed in the Public Health Section of this Staff Assessment (SA). Two subsets of particulate matter are inhalable particulate matter (less than 10 microns in diameter - PM10) and fine particulate matter (less than 2.5 microns in diameter - PM2.5). Nitrogen oxides (NOx, consisting primarily of nitric oxide [NO] and NO_2) and volatile organic compound (VOC) emissions readily react in the atmosphere as precursors to ozone and, to a lesser extent, particulate matter. Sulfur oxides (SOx) readily react in the atmosphere to form particulate matter and are major contributors to acid rain. Global climate change and greenhouse gas (GHG) emissions from the proposed project are discussed in an Appendix Air-1 and analyzed in the context of cumulative impacts.

In carrying out this analysis, the California Energy Commission (Energy Commission) staff evaluated the following four major issues:

- whether the Calico Solar Project is likely to conform with applicable federal, state, and Mojave Desert Air Quality Management District (MDAQMD or District) air quality laws, ordinances, regulations and standards (Title 20, California Code of Regulations, section 1744 (b));
- whether the Calico Solar Project is likely to cause new violations of ambient air quality standards or contribute substantially to existing violations of those standards (Title 20, California Code of Regulations, section 1743);
- whether mitigation measures proposed for the proposed project are adequate to lessen potential impacts under California Environmental Quality Act (CEQA) to a level of insignificance (Title 20, California Code of Regulations, section 1742 (b)); and
- whether the Calico Solar Project would exceed regulatory benchmarks identified and used by staff to analyze National Environmental Policy Act (NEPA) air quality impacts, before or after implementation of recommended mitigation measures.

C.1.3 METHODOLOGY FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The analysis of proposed project effects must comply with both CEQA and NEPA requirements given the respective power plant licensing and land use jurisdictions of the

California Energy Commission and U.S. Bureau of Land Management (BLM). Because this document is intended to meet the requirements of both NEPA and CEQA, the methodology used for determining environmental impacts of the proposed project includes a consideration of guidance provided by both laws. A significant impact is defined under CEQA as “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project” (Cal.Code Regs., tit.14 [hereinafter CEQA Guidelines] Section 15382). Questions used in evaluating significance of air quality impacts are based on Appendix G of the CEQA Guidelines (CCR 2006). The specific approach used by Energy Commission staff in determining CEQA significance is discussed in more detail below.

Similarly, NEPA states that “‘Significantly’ as used in NEPA requires considerations of both context and intensity…” (40 CFR 1508.27). Under NEPA, the agency considers three regulatory benchmarks in determining whether a project action would result in an adverse environmental impact when evaluated against the baseline. NEPA requires that an Environmental Impact Statement (EIS) be prepared when the proposed federal action (project) as a whole has the potential to “significantly affect the quality of the human environment.” The three regulatory benchmarks that are used to assess impacts under NEPA are discussed in more detail below.

C.1.3.1 LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

The federal, state, and local laws and policies applicable to the control of criteria pollutant emissions and mitigation of air quality impacts for the Calico Solar Project are summarized in **Air Quality Table 1**. Staff’s analysis examines the proposed project’s compliance with these requirements.

Air Quality Table 1
Laws, Ordinances, Regulations, and Standards

Applicable LORS	Description
Federal	
40 Code of Federal Regulations (CFR) Part 52	Nonattainment New Source Review (NSR) requires a permit and requires Best Available Control Technology (BACT) and Offsets. Permitting and enforcement delegated to Mojave Desert Air Quality Management District (MDAQMD). Prevention of Significant Deterioration (PSD) requires major sources or major modifications to major sources to obtain permits for attainment pollutants. The Calico Solar Project is a new source that does not have a rule listed emission source thus the PSD trigger levels are 250 tons per year for NOx, VOC, SOx, PM10, PM2.5 and CO.
40 CFR Part 60	New Source Performance Standards (NSPS), Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Establishes emission standards for compressions ignition internal combustion engines, including emergency fire water pump engines.
40 CFR Part 93 General Conformity	Requires determination of conformity with State Implementation Plan for Projects requiring federal approvals if project annual emissions are above specified levels.

Applicable LORS	Description
State	
Health and Safety Code (HSC) Section 40910-40930	Permitting of source needs to be consistent with Air Resource Board (ARB) approved Clean Air Plans.
HSC Section 41700	Restricts emissions that would cause nuisance or injury.
California Code of Regulations (CCR) Section 93115	Airborne Toxics Control Measure for Stationary Compression Ignition Engines. Limits the types of fuels allowed, established maximum emission rates, establishes recordkeeping requirements on stationary compression ignition engines, including emergency fire water pump engines.
Local (Mojave Desert Air Quality Management District, MDAQMD)	
Rule 201 and 203 Permits Required	Requires a Permit to Construct before construction of an emission source occurs. Prohibits operation of any equipment that emits or controls air pollutant without first obtaining a permit to operate.
Rules 401, 402, 403, and 403.2 Nuisance, Visible Emissions, Fugitive Dust	Limits the visible, nuisance, and fugitive dust emissions and would be applicable to the construction period of the project.
Rule 404 Particulate Matter - Concentration	Limits the particulate matter concentration from stationary source exhausts.
Rule 406 Specific Contaminants	The rule prohibits sulfur compound emissions in excess of 500 ppmv.
Rule 407 Liquid and Gaseous Air Contaminants	The rule prohibits carbon monoxide emissions in excess of 2,000 ppmv.
Rule 409 Combustion Contaminants	Limits the emissions from fossil fuel combustion.
Rule 431 Sulfur Content of Fuels	Limits the sulfur content of liquid fuels to no more than 0.5% by weight.
Rule 461 Gasoline Transfer and Dispensing	This rule specifies the vapor recovery requirement for gasoline tank filling (Phase I) and vehicle refueling (Phase II) for gasoline storage and refueling facilities.
Rule 900 Standard of Performance for New Stationary Source	Incorporates the Federal NSPS (40 CFR 60) rules by reference.
Rule 1303 New Source Review	Specifies BACT/Offsets technology and requirements for a new emissions unit that has potential to emit any affected pollutants.
Rule 1306 Electric Energy Generating Facilities	Describes actions to be taken for permitting of power plants that are within the jurisdiction of the Energy Commission.

C.1.3.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Energy Commission staff assesses four kinds of primary and secondary[3] impacts: construction, operation, closure and decommissioning, and cumulative. Construction impacts result from the onsite and offsite emissions occurring during site preparation and construction of the proposed project. Operation impacts result from the emissions

[3] Primary impacts potentially result from facility emissions of NOx, SOx, CO and PM10/2.5. Secondary impacts result from air contaminants that are not directly emitted by the facility but formed through reactions in the atmosphere that result in ozone, and sulfate and nitrate PM10/PM2.5.

of the proposed project during operation, which includes all of the onsite auxiliary equipment emissions (emergency engine and gasoline tank), the onsite maintenance vehicle emissions, and the offsite employee and material delivery trip emissions. Closure and decommissioning impacts occur from the onsite and offsite emissions that would result from dismantling the facility and restoring the site. Cumulative impacts analysis assesses the impacts that result from the proposed project's incremental effect viewed over time, together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project. (Pub. Resources Code § 21083; Cal. Code Regs., tit. 14, §§ 15064(h), 15065(c), 15130, and 15355.)

C.1.3.3 METHOD FOR DETERMINING CEQA SIGNIFICANCE

Energy Commission staff evaluates potential impacts per Appendix G of the CEQA Guidelines (CCR 2006). A CEQA significant adverse impact is determined to occur if potentially significant CEQA impacts cannot be mitigated through the adoption of Conditions of Certification. Specifically, Energy Commission staff uses health-based ambient air quality standards (AAQS) established by the ARB and the U.S.EPA as a basis for determining whether a project's emissions would cause a significant adverse impact under CEQA. The standards are set at levels that include a margin of safety and are designed to adequately protect the health of all members of the public, including those most sensitive to adverse air quality impacts such as the aged, people with existing illnesses, children, and infants. Staff evaluates the potential for significant adverse air quality impacts by assessing whether the project's emissions of criteria pollutants and their precursors (NOx, VOC, PM10 and SO_2) could create a new AAQS exceedance (emission concentrations above the standard), or substantially contribute to an existing AAQS exceedance.

Staff evaluates both direct and cumulative impacts. Staff would find that a project or activity would create a direct adverse impact when it causes an exceedance of an AAQS. Staff would find that a project's effects are cumulatively considerable when the project emissions in conjunction with ambient background, or in conjunction with reasonably foreseeable future projects, substantially contribute to ongoing exceedances of an AAQS. Factors considered in determining whether contributions to ongoing exceedances are substantial include:

1. the duration of the activity causing adverse air quality impacts;
2. the magnitude of the project emissions, and their contribution to the air basin's emission inventory and future emission budgets established to maintain or attain compliance with AAQS;
3. the location of the project site, i.e., whether it is located in an area with generally good air quality where non-attainment of any ambient air quality standard is primarily or solely due to pollutant transport from other air basins;
4. the meteorological conditions and timing of the project impacts, i.e., do the project's maximum modeled pollutant impacts occur when ambient concentrations are high (such as during high wind periods, or seasonally);
5. the modeling methods, and how refined or conservative the impact analysis modeling methods and assumptions were and how that may affect the determined adverse impacts;

6. the project site location and nearest receptor locations; and whether the identified adverse impacts would also occur at the maximum impacted receptor location; and,
7. the potential for future cumulative impacts; and whether appropriate mitigation is being recommended to address the potential for impacts associated with likely future projects.

C.1.3.4 NEPA AIR QUALITY ANALYSIS METHOD

The NEPA air quality analysis[4] considers the following three regulatory benchmarks:

- The project would exceed General Conformity applicability thresholds for federal nonattainment pollutants. This regulatory threshold applies to both project construction and operation emissions.
- The project would exceed PSD permit applicability thresholds for federal attainment pollutants. This regulatory threshold only applies to project operation.
- The project would cause, for federal attainment pollutants, air quality impacts in exceedance of the NAAQS.

If the proposed project were to exceed either of the first two of these regulatory benchmarks then the impacts would be considered potentially adverse and would require a further refined impact and mitigation analysis in order to demonstrate that the proposed project would not result in an adverse impact based on the potential to cause exceedances of the NAAQS. However, regardless of the NEPA requirements for the proposed project, a refined impact and mitigation analysis has been conducted per CEQA requirements, and that analysis and the resulting NEPA findings are described in detail in this document.

C.1.3.5 IMPACTS FROM CLOSURE AND DECOMMISSIONING

Impacts from closure and decommissioning, as a one-time limited duration event, are evaluated with the same methods as construction emissions as discussed above.

C.1.4 PROPOSED PROJECT

C.1.4.1 SETTING AND EXISTING CONDITIONS

Climate and Meteorology

The Mojave Desert portion of San Bernardino County has a typical desert climate characterized by low precipitation, hot summers, mild winters, low humidity, and strong temperature inversions. Total rainfall in Barstow averages 4.33 inches per year with about 74% of the total rainfall occurring during the winter rainy season and 20% occurring during late summer and early fall thunderstorms (WC 2009). The Mojave Desert is in the rain shadow of the several mountain groups including the San Gabriel, San Bernardino, and Tehachapi Mountains, which greatly reduces the winter season rainfall in comparison with coastal and mountain areas located to the south and west.

[4] This is CEC staff's analysis approach that goes beyond the minimum procedural requirements of NEPA.

The highest monthly average high temperature is 103°F in July and the lowest average monthly low temperature is 33°F in December (WC 2009). The applicant provided a wind rose from the Barstow-Daggett Airport during the years 2003 to 2007. During all seasons, the prevailing winds are predominantly from the west northwest through the west southwest with the highest single wind direction frequency being overwhelmingly from the west.

Sensitive Receptors

The general population includes many sensitive subgroups that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. In addition, the location of the population in the area surrounding a project site may have a large bearing on health risk. Three residences have been identified within a 3-mile radius of the site, the nearest of which is located approximately 1,300 feet south of the property boundary on the other side of I-40. No sensitive receptors, such as schools or hospitals, are known to exist within 3 miles of the site (SES 2008a).

Existing Ambient Air Quality

The Federal Clean Air Act and the California Clean Air Act both require the establishment of standards for ambient concentrations of air pollutants, called ambient air quality standards (AAQS). The state AAQS, established by the California Air Resources Board, are typically lower (more protective) than the federal AAQS, which are established by the United States Environmental Protection Agency (U.S.EPA). The state and federal air quality standards are listed in **Air Quality Table 2**. The averaging times for the various air quality standards, the times over which they are measured, range from one-hour to an annual average. The standards are read as a concentration, in parts per million (ppm), or as a weighted mass of material per a volume of air, in milligrams or micrograms of pollutant in a cubic meter of air (mg/m^3 or $\mu g/m^3$, respectively).

In general, an area is designated as attainment if the concentration of a particular air contaminant does not exceed the standard. Likewise, an area is designated as non-attainment for an air contaminant if that contaminant standard is violated. In circumstances where there are not enough ambient data available to support designation as either attainment or non-attainment, the area can be designated as unclassified. The unclassified area is normally treated the same as an attainment area for regulatory purposes. An area could be attainment for one air contaminant while non-attainment for another, or attainment for the federal standard and non-attainment for the state standard for the same air contaminant.

Air Quality Table 2
Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Standard	California Standard
Ozone (O_3)	8 Hour	0.075 ppm [a] (147 µg/m^3)	0.070 ppm (137 µg/m^3)
	1 Hour	—	0.09 ppm (180 µg/m^3)
Carbon Monoxide (CO)	8 Hour	9 ppm (10 mg/m^3)	9.0 ppm (10 mg/m^3)
	1 Hour	35 ppm (40 mg/m^3)	20 ppm (23 mg/m^3)
Nitrogen Dioxide (NO_2)	Annual	0.053 ppm (100 µg/m^3)	0.03 ppm (57 µg/m^3)
	1 Hour	0.100 ppm[b]	0.18 ppm (339 µg/m^3)
Sulfur Dioxide (SO_2)	Annual	0.030 ppm (80 µg/m^3)	—
	24 Hour	0.14 ppm (365 µg/m^3)	0.04 ppm (105 µg/m^3)
	3 Hour	0.5 ppm (1300 µg/m^3)	—
	1 Hour	—	0.25 ppm (655 µg/m^3)
Particulate Matter (PM10)	Annual	—	20 µg/m^3
	24 Hour	150 µg/m^3	50 µg/m^3
Fine Particulate Matter (PM2.5)	Annual	15 µg/m^3	12 µg/m^3
	24 Hour	35 µg/m^3	—
Sulfates (SO_4)	24 Hour	—	25 µg/m^3
Lead	30 Day Average	—	1.5 µg/m^3
	Calendar Quarter	1.5 µg/m^3	—
Hydrogen Sulfide (H_2S)	1 Hour	—	0.03 ppm (42 µg/m^3)
Vinyl Chloride (chloroethene)	24 Hour	—	0.01 ppm (26 µg/m^3)
Visibility Reducing Particulates	8 Hour	—	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70%.

Source: ARB 2009a.
Notes:
[a] The 2008 standard is shown above, but as of September 16, 2009 this standard is being reconsidered. The 1997 8-hour standard is 0.08 ppm.
[b] The U.S. EPA is in the process of implementing this new standard, which is proposed to become effective April 12, 2010. This standard is based on the 3-year average of the 98th percentile of the yearly distribution of 1-hour daily maximum concentrations. Due to this regulation not yet being effective, with a corresponding lack of guidance on impact analysis and existing background concentrations, staff has not completed an impact assessment for compliance with this standard.

The project site is located in the Mojave Desert Air Basin (MDAB) under the jurisdiction of the Mojave Desert Air Quality Management District (MDAQMD). The San Bernardino County portion of the MDAB surrounding the project site is designated as non-attainment for the federal and state ozone and PM10 standards, and the state PM2.5 standard. This area is designated as attainment or unclassified for the state and federal CO, NOx, SOx, and the federal PM2.5 standards. **Air Quality Table 3** summarizes the area's attainment status for various applicable state and federal standards.

Air Quality Table 3
Federal and State Attainment Status
San Bernardino County

Pollutant	Attainment Status [a]	
	Federal	State
Ozone	Moderate Nonattainment	Moderate Nonattainment
CO	Attainment	Attainment
NO_2	Attainment[b]	Attainment
SO_2	Attainment	Attainment
PM10	Moderate Nonattainment	Nonattainment
PM2.5	Attainment	Nonattainment

Source: ARB 2009b, U.S.EPA 2009a.
Notes:
[a] Attainment = Attainment or Unclassified.
[b] Nitrogen dioxide attainment status for the new federal 1-hour NO_2 standard is scheduled to be determined by January 2012.

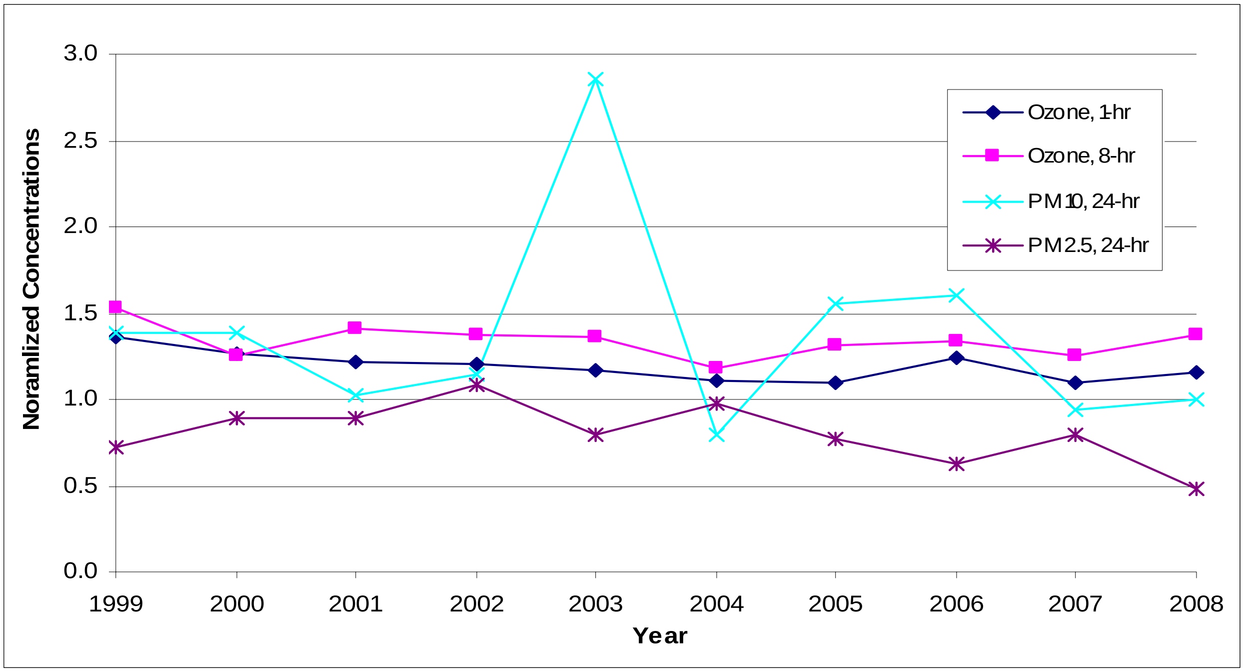
Ambient air quality monitoring data for ozone, PM10, PM2.5, CO, NO_2, and SO_2, compared to most restrictive applicable standards for the years between 2003 through 2008 (the last year that the complete annual data is currently available) at the most representative monitoring stations for each pollutant are shown in **Air Quality Table 4**, and the 1-hour and 8-hour ozone, and 24-hour PM10 and PM2.5 data for the years 1999 through 2008 are shown in **Air Quality Figure 1**. All data except PM2.5 and SOx are from the Barstow monitoring station. PM2.5 for the year 1999 were collected from Victorville-Armagosa Road monitoring station, and PM2.5 for the years 2000 to 2008 and all SOx data are from the Victorville-14306 Park Avenue monitoring station.

Air Quality Table 4
Criteria Pollutant Summary
Maximum Ambient Concentrations (ppm or μg/m³)

Pollutant	Averaging Period	Units	2003	2004	2005	2006	2007	2008	Limiting AAQS[b]
Ozone	1 hour	ppm	0.105	0.1	0.099	0.112	0.099	0.104	0.09
Ozone	8 hours	ppm	0.095	0.083	0.092	0.094	0.088	0.096	0.07
PM10 [a]	24 hours	$\mu g/m^3$	143	40	78	80	47	50	50
PM10	Annual	$\mu g/m^3$	25.7	21.3	25.4	21.9	29.8	26.1	20
PM2.5 [a]	24 hours	$\mu g/m^3$	28	34	27	22	28	17	35
PM2.5	Annual	$\mu g/m^3$	--	10.8	--	10.3	9.7	--	12
CO	1 hour	ppm	2.7	1.6	3.3	3.5	1.4	1.4	20
CO	8 hours	ppm	1.51	1.18	1.34	1.19	0.7	1.23	9.0
NO_2	1 hour	ppm	0.095	0.101	0.087	0.082	0.073	0.081	0.18
NO_2	Annual	ppm	0.024	0.023	0.022	0.022	0.020	0.019	0.03
SO_2	1 hour	ppm	0.011	0.011	0.012	0.018	0.009	0.006	0.25
SO_2	24 hours	ppm	0.006	0.003	0.003	0.005	0.005	0.002	0.04
SO_2	Annual	ppm	0.001	0.001	0.001	0.001	0.001	0.001	0.03

Source: ARB 2008, ARB 2009c, U.S.EPA 2009b
Notes:
[a] Exceptional PM concentration events, such as those caused by wind storms, have been removed to the extent possible, but still may be included in the data presented.
[b] The limiting AAQS is the most stringent of the CAAQS or NAAQS for that pollutant and averaging period.

Air Quality Figure 1
1999-2008 Historical Ozone and PM Air Quality Data
Barstow and Victorville Monitoring Stations, San Bernardino County



Source: ARB 2009c, U.S. EPA 2009b

Note: The highest measured ambient concentrations of various criteria air contaminants were divided by their applicable standard and provided as a graphical point. Any point on the chart that is greater than one means that the measured concentrations of such air contaminant exceed the standard, and any point that is less than one means that the respective standard is not exceeded for that year. For example the 1-hour ozone concentration in 2006 is 0.112 ppm/0.09 ppm standard = 1.24.

Ozone

Ozone is not directly emitted from stationary or mobile sources, but is formed as the result of chemical reactions in the atmosphere between directly emitted nitrogen oxides (NOx) and hydrocarbons (Volatile Organic Compounds [VOCs]) in the presence of sunlight to form ozone.

As **Air Quality Table 4** and **Air Quality Figure 1** indicate, the 1-hour and 8-hour ozone concentrations measured at the Barstow monitoring station have been relatively flat or very slowly decreasing over time and continue to exceed the CAAQS and NAAQS. The collected air quality data (not shown) indicate that the ozone violations occurred primarily during the sunny and hot periods typical during June through August.

Nitrogen Dioxide

The entire air basin is classified as attainment for the state 1-hour and annual NO_2 standards and the federal annual NO_2 standard. The nitrogen dioxide attainment status could change due to the new federal 1-hour standard, although a review of the air basin wide monitoring data suggest this would not occur for the MDAB.

Approximately 90% of the NOx emitted from combustion sources is nitric oxide (NO), while the balance is NO_2. NO is oxidized in the atmosphere to NO_2, but some level of photochemical activity is needed for this conversion. The highest concentrations of NO_2

typically occur during the fall. The winter atmospheric conditions can trap emissions near the ground level, but lacking significant photochemical activity (sun light), NO_2 levels are relatively low. In the summer the conversion rates of NO to NO_2 are high, but the relatively high temperatures and windy conditions disperse pollutants, preventing the accumulation of NO_2. The NO_2 concentrations in the project area are well below the state and federal ambient air quality standards.

Carbon Monoxide

The area is classified as attainment for the state 1-hour and 8-hour CO standards. The highest concentrations of CO occur when low wind speeds and a stable atmosphere trap the pollution emitted at or near ground. These conditions occur frequently in the wintertime late in the afternoon, persist during the night and may extend 1 or 2 hours after sunrise. The project area has a lack of significant mobile source emissions and has CO concentrations that are well below the state and federal ambient air quality standards.

Particulate Matter (PM10) and Fine Particulate Matter (PM2.5)

PM10 can be emitted directly or it can be formed many miles downwind from emission sources when various precursor pollutants interact in the atmosphere.

The area is non-attainment for the federal and state PM10 standards. **Air Quality Table 4** and **Air Quality Figure 1** shows recent PM10/PM2.5 concentrations. The figure shows fluctuating concentrations patterns, and shows clear exceedances of the state 24-hour PM10 standard. It should be noted that exceedance does not necessarily mean violation or nonattainment, as exceptional events do occur and some of those events, which do not count as violations, may be included in the **Air Quality Table 4** data. The MDAB in the site area is designated as nonattainment for both the state and federal PM10 standards.

Fine particulate matter, or PM2.5, is derived mainly from either the combustion of materials, or from precursor gases (SOx, NOx, and VOC) through complex reactions in the atmosphere. PM2.5 consists mostly of sulfates, nitrates, ammonium, elemental carbon, and a small portion of organic and inorganic compounds.

San Bernardino County in the site area is classified as nonattainment for the state PM2.5 standard, and attainment for the federal PM2.5 standard. This divergence between the federal PM10 and PM2.5 attainment status indicates that a substantial fraction of the ambient particulate matter levels are most likely due to localized fugitive dust sources, such as vehicles travel on unpaved roads, agricultural operations, or wind-blown dust[5].

[5] Fugitive dust, unlike combustion source particulate and secondary particulate, is composed of a much higher fraction of larger particles on than smaller particles, so the PM2.5 fraction of fugitive dust is much smaller than the PM10 fraction. Therefore, when PM10 ambient concentrations are significantly higher than PM2.5 ambient concentrations this tends to indicate that a large proportion of the PM10 are from fugitive dust emission sources, rather than from combustion particulate or secondary particulate emission sources.

Sulfur Dioxide

The entire air basin is classified as attainment for the state and federal SO_2 standards.

Sulfur dioxide is typically emitted as a result of the combustion of a fuel containing sulfur. Sources of SO_2 emissions within the Mojave Desert Air Basin (MDAB) come from a wide variety of fuels: gaseous, liquid and solid; however, the total SO_2 emissions within the western MDAB are limited due to the limited number of major stationary sources and California's significant reduction in motor vehicle fuel sulfur content. The project area's SO_2 concentrations are well below the state and federal ambient air quality standards.

Summary

In summary, staff recommends the background ambient air concentrations in **Air Quality Table 5** for use in the modeling and impacts analysis. The maximum criteria pollutant concentrations from the past 3 years of available data collected at the monitoring stations within the San Bernardino County are used to determine the recommended background values.

Air Quality Table 5
Staff Recommended Background Concentrations (µg/m^3)

Pollutant	Averaging Time	Recommended Background	Limiting AAQS[a]	Percent of Standard
NO_2	1 hour	154.4	339	46%
	Annual	41.8	57	73%
PM10	24 hour	80	50	160%
	Annual	29.8	20	149%
PM2.5	24 hour	28.0	35	80%
	Annual	10.3	12	86%
CO	1 hour	4,025	23,000	18%
	8 hour	1,367	10,000	14%
SO_2	1 hour	47.2	655	7%
	3 hour	42.4	1,300	3%
	24 hour	13.1	105	13%
	Annual	2.7	80	3%

Source: ARB 2008, ARB 2009b, U.S. EPA 2009b, and Energy Commission Staff Analysis
Note:
[a] The limiting AAQS is the most stringent of the CAAQS or NAAQS for that pollutant and averaging period.

Where possible, staff prefers that the recommended background concentration measurements come from nearby monitoring stations with similar characteristics. For this proposed project, the closest monitoring station is the Barstow monitoring station (ozone, PM10, CO, NO_2) that is located approximately 30 miles west northwest of the project site's western border. The Victorville monitoring station, the closest monitoring station that monitors PM2.5 and SO_2, is located approximately 51-miles west southwest of the project site's western border.

The background concentrations for PM10 are above the most restrictive existing ambient air quality standards, while the background concentrations for the other pollutants are all well below the most restrictive existing ambient air quality standards.

The pollutant modeling analysis was limited to the pollutants listed above in **Air Quality Table 5**; therefore, recommended background concentrations were not determined for the other criteria pollutants (ozone, lead, visibility, etc.)[6].

C.1.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff provided a number of data requests regarding the construction and operations emission estimates and air dispersion modeling analysis (CEC 2009f and CEC 2009m), which the applicant responded to by providing revised emissions estimates with significantly revised mitigation and maintenance equipment use assumptions (SES 2009t and SES 2009ee) and significantly revised and more robust dispersion modeling analysis (SES 2009v). Staff has reviewed the revised emission estimates and air dispersion modeling analysis[7] and finds them to be reasonable considering the level of emissions mitigation now stipulated by the applicant.

Project Description

The proposed project would be located on approximately 8,230 acres, and would include the installation of 34,000 SunCatchers, operation of Solar Stirling Engine Power Conversion Units (PCUs), administration building, the maintenance building, and the substation building. The majority of the project site is located on public land administered by the Bureau of Land Management (BLM) California Desert District (CDD). Current land use for the project site is mainly undeveloped desert land. The closest main access to the site is from Interstate 40 (I-40).

The proposed project also includes the construction of a project substation, water treatment infrastructure, and onsite road construction. The proposed project would haul water from a well located at Cadiz, approximately 64 miles east southeast of the project site, by train to the project site (TS 2010g).During the construction period, untreated water from the Cadiz well will be used for fugitive dust control and other construction water uses; and during operation this water would be treated and stored on-site for all operational needs. Operational water storage/use would include SunCatcher mirror washing, potable water use, dust control, and fire protection.

The proposed project would be constructed in two phases[8]. Phase 1 of the proposed project would consist of up to 11,000 SunCatchers configured in approximately 183 solar groups of 60 SunCatchers per group on 2,320-acres of land. SunCatchers constructed during Phase 1 would have a net nominal generating capacity of 275 MW. Phase 2 of the proposed project would build an additional 23,000 SunCatchers

[6] The proposed project's lead emissions are negligible, do not require air dispersion modeling, and are not discussed further in this section. Ozone and visibility are complex basin-wide phenomena that are not modeled for project specific impacts, but the proposed project's indirect impacts secondary pollutants including ozone are analyzed in this section.

[7] This includes a review of the emission source inputs, including the type of source (point, volume, area) and the variables used to describe each source (emissions, height, location, temperature, etc. as appropriate).

[8] The two project phases were originally proposed as a 500 MW Phase 1 and 350 MW Phase 2. The project phases have recently been revised by the project applicant as noted above per information provided from the applicant through the BLM.

configured in approximately 383 solar groups on 5,910-acres of land, expanding total net generating capacity to 850 MW. In order to deliver produced electricity, the proposed project would require the proposed SCE expansion and upgrade of the 220 kV SCE Pisgah Substation. The proposed SCE Lugo-Pisgah transmission line expansion is described in detail in Section C.1.8.

Project Emissions

Project Construction

The total duration of project construction for Calico Solar is estimated to be approximately 59 months[9] (TS 2010g). The construction duration would depend on the availability of transmission upgrades by SCE and the build rate of SunCatchers. Different areas within the project site and the construction laydown areas would be disturbed at different times over the period.

Combustion emissions would result from the offroad construction equipment, including diesel construction equipment used for site grading, excavation, and construction of onsite structure, substation, transmission line, bridge, roads, and water/polymeric sealant trucks used to control construction dust emissions. Fuel combustion emissions also would result from exhaust from on road construction vehicles, including pickup trucks and diesel trucks used to transport workers and materials around the construction site, from diesel trucks used to deliver concrete, equipment, general materials and construction supplies to the construction site, and from the exhaust from commuter vehicles. Water is assumed to be delivered by train[10] to the project site from the Cadiz well that is located approximately 64 miles east southeast of the project site. Fugitive dust emissions would also result from site grading/excavation activities, installation of new transmission lines, onsite water distribution lines, and SunCatcher foundations, construction of power plant facilities, roads, and substations, and vehicle travel on paved/unpaved roads. Project construction emissions are based on 7 construction days per week, a 12-hour workday from 7 AM to 7 PM, and 26 construction days per month.

Maximum daily emissions would occur during Month 6. During Month 6 construction would focus on the bridge, main service complex, and portions of the Phase 1 SunCatcher construction area. The applicant's maximum short-term construction emission estimates are provided in **Air Quality Table 6**. The emission estimates include the applicant's stipulated fugitive dust controls, including the use of soil binders to seal roads as soon as practical during construction.

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[9] The air quality assessment is based on a construction schedule of 41 months. It is unclear if the total construction emissions would increase due to the lengthening of the construction schedule, but the worst case daily and annual emissions evaluated for a 41 month construction schedule should be conservative and would not be expected to increase for a 59 month construction schedule.

[10] The train hauling of water option was selected over the truck hauling option by the applicant (TS 2010q).

Air Quality Table 6
Calico Solar Construction - Maximum Daily Emissions (lbs/day)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Construction Emissions						
Onsite Combustion Emissions	337.35	0.43	334.70	58.92	20.30	18.53
Onsite Fugitive Dust Emissions	---	---	---	---	539.93	79.30
Subtotal of Onsite Emissions	337.35	0.43	334.70	58.92	560.23	97.84
Offsite Construction Emissions						
Offsite Combustion Emissions	471.61	1.02	584.76	117.39	31.64	27.64
Offsite Fugitive Dust Emissions	---	---	---	---	105.25	13.83
Subtotal of Offsite Emissions	471.61	1.02	584.76	117.39	136.89	41.47
Total Maximum Daily Emissions	808.96	1.45	919.46	176.31	697.12	139.30

Source: TS 2010q

The estimated maximum annual emissions are the highest emissions during any consecutive 12-month period. The applicant's maximum annual construction emission estimates are provided in **Air Quality Table 7**.

Air Quality Table 7 shows that the maximum annual (12-month) emissions are below the General Conformity Rule applicability thresholds for Ozone Precursors, NOx (100 tons) and VOC (100 tons); and PM10 (100 tons).

Air Quality Table 7
Calico Solar Construction - Maximum Annual (12-Month) Emissions (tons/yr)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Combustion Emissions	37.73	0.05	36.69	6.89	2.38	2.18
Onsite Fugitive Dust Emissions	---	---	---	---	71.72	10.39
Subtotal of Onsite Emissions	37.73	0.05	36.69	6.89	74.10	12.57
Offsite Combustion Emissions	57.83	0.12	64.48	13.97	3.80	3.33
Offsite Fugitive Dust Emissions	---	---	---	---	12.67	1.66
Subtotal of Offsite Emissions	57.83	0.12	64.48	13.97	16.47	4.99
Total Maximum Annual Emissions	95.55	0.16	101.17	20.86	90.57	17.56

Source: TS 2010q

Project Operation

The Calico Solar facility would be a nominal 850 Megawatt (MW) solar electrical generating facility. The direct air pollutant emissions from power generation are negligible; however, there are required auxiliary equipment and maintenance activities necessary to operate and maintain the facility.

Mirror washing would be required approximately once every month, requiring 14 gallons of water per dish with an average washing rate of 20 minutes per washed dish pair, or 10 minutes per dish, since each wash vehicle is able to wash two SunCatchers simultaneously. Assuming travel time to the next pair of dishes would be less than 5 minutes, two dishes would be washed within 25 minutes. In addition to monthly washing, a special mechanical scrubbing is anticipated once every 14 months. Scrubbing would require approximately 20-22 gallons of water per dish and about 30 minutes per dish to complete. Maintenance of the power conversion unit (PCU), and associated maintenance vehicle operations primarily due the replacement of the main piston seals ("CGC seals"), would be required every 6,000 hours of running time, which is about 20 months of solar operation.

To minimize operating emissions, the applicant has proposed mitigation measures to minimize the operating and maintenance vehicles emissions. Following are the proposed mitigation measures.

- Maintenance vehicles measures:
  - All wash vehicles and other maintenance trucks would be gasoline fueled vehicles that meet California vehicle emissions standards for the model year when obtained.
  - Propane-fuel fork lift and man lifts would be used for maintenance activities requiring such equipment.
  - All security vehicles for site inspection would be hybrid-electric vehicles.
- Travel demand for operation and maintenance would be optimized to minimize vehicle miles traveled (VMT).
- Polymer based soil binders would be applied on the unpaved road to create stabilized surfaces and all vehicles would travel only on these stabilized roads to reduce particulate emissions.
- Paved and sealed roads would be cleaned with vacuum-sweeping and/or water-flushing as necessary.
- Van-pooling of employees from Barstow during operations would be provided.
- Stationary and mobile source emissions would be reduced:
  - An electric fire water pump would be used instead of a diesel-fueled pump.
  - A 5,000 gallon regular gasoline storage tank would be used and truck refueling would be kept to minimum.

The following are the stationary and mobile emission source operating assumptions that were used to develop the operation emissions estimates for Calico Solar:

Stationary Emission Source

- The 335 brake-horsepower (bhp) backup diesel generator: testing 20 min/month, 4 hr/yr.
- The 5,000 gallon gasoline tank: 120,000 gallons per year tank throughput. Staff's revised maximum daily throughput basis includes one 4,000 gallon storage tank filling event and maximum daily vehicle refueling of 500 gallons. Emission estimate revised by staff to use ARB emission factors for Phase I and II compliant aboveground tank with vent valves.

Mobile Emissions Source

- Mobile emissions sources required for operation and maintenance, including onsite mirror washing, PCU maintenance, and trucking of replacement hydrogen to the PCUs and offsite water, hydrogen, and other materials delivery and employee commuting trips, are estimated based on vehicle miles traveled (VMT) and operating hours. Each mobile source has different basis for emissions estimates as provided in the applicant's revised emission estimate attachment (TS 2010q).
- Water will be hauled by train[11] to the project site from the Cadiz well that is located approximately 64 miles east southeast of the project site.

The estimated Calico Solar onsite and offsite stationary and mobile source emissions are summarized in **Air Quality Tables 8** and **9**.

Air Quality Table 8
Calico Solar Operations - Maximum Daily Emissions (lbs/day)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Operation Emissions						
Onsite Combustion Emissions	20.93	0.13	157.70	20.32	0.73	0.62
Onsite Gasoline Tank Emissions	---	---	---	2.63	---	---
Onsite Fugitive Dust Emissions	---	---	---	---	225.60	33.30
Subtotal of Onsite Emissions	20.93	0.13	155.70	22.95	226.33	33.95
Offsite Emissions						
Offsite Combustion Emissions	17.29	0.11	37.88	1.91	1.24	0.83
Offsite Fugitive Dust	---	---	---	---	71.07	7.62
Subtotal of Offsite Emissions	17.29	0.11	37.88	1.91	72.30	8.44
Total Maximum Annual Emissions	38.22	0.23	193.58	24.86	298.63	42.39

Source: TS 2010q and staff estimates for the gasoline tank.

Air Quality Table 9
Calico Solar Operations - Maximum Annual Emissions (tons/yr)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Operation Emissions						
Onsite Combustion Emissions	2.89	0.02	27.71	3.55	0.10	0.08
Onsite Gasoline Tank Emissions	---	---	---	0.09	---	---
Onsite Fugitive Dust Emissions	---	---	---	---	35.11	5.14
Subtotal of Onsite Emissions	2.89	0.02	27.71	3.64	35.21	5.23
Offsite Emissions						
Offsite Combustion Emissions	1.14	0.01	6.20	0.21	0.14	0.08
Offsite Fugitive Dust	---	---	---	---	5.37	0.30
Subtotal of Offsite Emissions	1.14	0.01	6.20	0.21	5.51	0.38
Total Maximum Annual Emissions	4.03	0.03	33.91	3.85	40.72	5.61

Source: TS 2010q and staff estimates for the gasoline tank.

[11] The train hauling of water option was selected over the truck hauling option by the applicant (TS 2010q).

Air Quality Table 9 shows that the maximum annual operation emissions are well below the General Conformity Rule applicability thresholds for PM10 (100 tons) and Ozone Precursors, NOx (100 tons) and VOC (100 tons).

Project Construction and Operation Overlap

The applicant plans to start operation of SunCatchers as they are ready; therefore it is anticipated that starting at Month 7 in the construction schedule, the first SunCatchers would be ready to operate and produce electricity. It is anticipated that in this first month 18 MW of generation capacity would be available, then 18 MW would be added every month through Month 15, and 27 MW of capacity would be added every month thereafter until the completion by Month 41. Maximum short-term emissions during overlap periods would occur in the first overlap Month 7, since construction elements would decline as more SunCatchers are available online. Maximum annual (12-month) overlap emissions would occur during Months 7-18 for all criteria pollutants. Maximum overlap construction/operation emissions in any averaging period are estimated by the applicant to be somewhat lower than the maximum construction emissions.

The applicant's estimated maximum daily and annual (12-month) emissions during the maximum construction/operation overlap periods are presented in **Air Quality Tables 10** and **11*.*** The emission estimates in these two tables include the same mitigation measures as described for the construction and operation phase emissions.

Air Quality Table 10
Maximum Daily Construction/Operation Overlap Emissions (lbs/day)

Construction						
	NOx	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Onsite Emissions						
Onsite Combustion Emissions	311.96	0.40	315.73	55.54	19.04	17.37
Onsite Fugitive Dust Emissions	--	--	--	--	503.00	73.94
Subtotal of Onsite Emissions	**311.96**	**0.40**	**315.73**	**55.54**	**522.03**	**91.31**
Offsite Emissions						
Offsite Combustion Emissions	408.63	0.96	562.81	104.37	27.87	24.24
Offsite Fugitive Dust	--	--	--	--	97.67	12.86
Subtotal of Offsite Emissions	**408.63**	**0.96**	**562.81**	**104.37**	**119.78**	**36.36**
Total Maximum Daily Emissions	**720.59**	**1.36**	**878.54**	**159.91**	**641.81**	**127.68**
Operation						
	NOx	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Onsite Emissions						
Onsite Combustion Emissions	1.56	0.03	3.39	0.47	0.03	0.03
Onsite Gasoline Tank Emissions	--	--	--	2.63	--	--
Onsite Fugitive Dust Emissions	--	--	--	--	4.78	0.71
Subtotal of Onsite Emissions	**1.56**	**0.03**	**3.39**	**3.10**	**4.81**	**0.73**
Offsite Emissions						
Offsite Combustion Emissions	0.37	0.00	0.80	0.04	0.03	0.02
Offsite Fugitive Dust	--	--	--	--	1.50	0.16
Subtotal of Offsite Emissions	**0.37**	**0.00**	**0.80**	**0.04**	**1.53**	**0.18**
Total Maximum Hourly Emissions	**1.92**	**0.03**	**4.19**	**3.14**	**6.34**	**0.91**
Construction/Operation Overlap Totals						
	NOx	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Construction/Operation Overlap Total	**722.51**	**1.40**	**882.73**	**163.05**	**648.15**	**128.59**

Source: TS 2010e, Table 2.2-5a, and staff estimates for the gasoline tank.

Air Quality Table 11
Maximum Annual Construction/Operation Overlap Emissions (tons/year)

Construction						
	NOx	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Onsite Emissions						
Onsite Combustion Emissions	31.74	0.04	36.78	6.39	2.11	1.92
Onsite Fugitive Dust Emissions	--	--	--	--	65.55	9.72
Subtotal of Onsite Emissions	**31.74**	**0.04**	**36.78**	**6.39**	**67.65**	**11.64**
Offsite Emissions						
Offsite Combustion Emissions	53.36	0.12	65.33	13.17	3.56	3.11
Offsite Fugitive Dust	--	--	--	--	11.77	1.55
Subtotal of Offsite Emissions	**53.36**	**0.12**	**65.33**	**13.17**	**15.33**	**4.65**
Total Maximum Hourly Emissions	**85.11**	**0.16**	**102.11**	**19.56**	**82.98**	**16.30**
Operation						
	NOx	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Onsite Emissions						
Onsite Combustion Emissions	0.42	0.00	3.96	0.51	0.01	0.01
Onsite Gasoline Tank Emissions	--	--	--	0.09	--	--
Onsite Fugitive Dust Emissions	--	--	--	--	5.02	0.74
Subtotal of Onsite Emissions	**0.42**	**0.00**	**3.96**	**0.60**	**5.03**	**0.75**
Offsite Emissions						
Offsite Combustion Emissions	0.16	0.00	0.89	0.03	0.02	0.01
Offsite Fugitive Dust	--	--	--	--	0.77	0.04
Subtotal of Offsite Emissions	**0.16**	**0.00**	**0.89**	**0.03**	**0.79**	**0.05**
Total Maximum Hourly Emissions	**0.58**	**0.00**	**4.85**	**0.63**	**5.82**	**0.80**
Construction/Operation Overlap Totals						
	NOx	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Construction/Operation Overlap Total	**85.69**	**0.16**	**106.96**	**20.19**	**88.80**	**17.10**

Source: TS 2010e, Table 2.2-6a, and staff estimates for the gasoline tank.

Air Quality Table 11 shows that the maximum annual (12-month) construction/operation overlap emissions are below the General Conformity Rule applicability thresholds for Ozone Precursors, NOx (100 tons) and VOC (100 tons); and PM10 (100 tons).

Initial Commissioning

Initial commissioning refers to a period prior to beginning commercial operation when the equipment undergoes initial tests. For the proposed project initial commission would occur throughout the construction period when each installed Suncatcher becomes operational. Because of the proposed project's use of a non-fuel fired generating technology, staff does not expect significant changes in emissions from the facility commissioning activities compared to that of normal operation.

Dispersion Modeling Assessment

While the emissions are the actual mass of pollutants emitted from the proposed project, the impacts are due to the concentration of pollutants from the proposed project that reach the ground level. When emissions are expelled at a high temperature and velocity through a relatively tall stack, the pollutants would be significantly diluted by the time they reach ground level. For this proposed project there are no tall emission stacks, but the construction and maintenance vehicles and emergency engine do have high temperature exhausts, which would contribute to plume rise. The emissions from the proposed project are analyzed through the use of air dispersion models to determine the probable impacts at ground level.

Air dispersion models provide a means of predicting the location and ground level magnitude of the impacts of a new emissions source. These models consist of several complex series of mathematical equations, which are repeatedly calculated by a computer for many ambient conditions to provide theoretical maximum offsite pollutant concentrations for short-term (1-hour, 3-hour, 8-hour, and 24-hour) and annual periods. The model results are generally described as maximum concentrations, often described as a unit of mass per volume of air, such as micrograms per cubic meter ($\mu g/m^3$).

The applicant used the U.S.EPA guideline ARMS/EPA Regulatory Model (AERMOD) to estimate ambient impacts from project construction and operation. The construction emission sources for the site were grouped into two categories: equipment (off-road equipment); and vehicles (on-road equipment), where the exhaust and fugitive dust emissions for each type were calculated for particulate matter modeling. Emissions from onsite equipment engines were modeled as point sources and fugitive emission sources were modeled as area sources. Similar modeling procedures were used by the applicant to determine impacts from the operating stationary source (emergency engine) and the maintenance vehicle exhaust and fugitive dust emissions.

The inputs for the air dispersion models include stack information (exhaust flow rate, temperature, and stack dimensions), specific engine and vehicle emission data and meteorological data, such as wind speed, atmospheric conditions, and site elevation. For the proposed project, the meteorological data used as inputs to the model included hourly wind speeds and directions measured at the Barstow Daggett Airport meteorological station during 2003 through 2007. Hourly meteorological data for year

2005 was selected as a period with high data capture currently available for this station. Additionally, the applicant obtained hourly ozone and NO_2 ambient data from the Barstow monitoring station for the year 2005 that was used in a more refined NO_2 impact modeling analysis using the Ozone Limiting Method (OLM) option that is available with AERMOD.

For the determination of one-hour average and annual average construction NOx concentrations the Ozone Limiting Method (OLM) was used to determine worst-case near field NO_2 impacts. The NOx emissions from internal combustion sources, such as diesel engines, are primarily in the form of nitric oxide (NO) rather than NO_2. The NO converts into NO_2 in the atmosphere, primarily through the reaction with ambient ozone, and NOx OLM assumes full conversion of stack or tailpipe NO emission with the available ambient ozone. The NOx OLM method used assumed an initial NO_2/NOx ratio of 0.1 for diesel equipment. Actual monitored hourly background ozone concentration data (2005 Barstow monitoring station data that corresponds with the meteorological files) were used by this modeling method to calculate maximum potential NO to NO_2 conversion to determine the maximum hourly NO_2 impacts.

Staff revised the background concentrations provided by the applicant, replacing them with the available highest ambient background concentrations as shown in **Air Quality Table 5**. Staff added the modeled impacts to these background concentrations, and then compared the results with the ambient air quality standards for each respective air contaminant to determine whether the proposed project's emission impacts would cause a new exceedance of the ambient air quality standards or would contribute to an existing exceedance.

The U.S. Environmental Protection Agency (U.S. EPA) is implementing a new, 1-hour NO_2 standard that is scheduled to become effective April 12, 2010. This new standard is expressed as a 3-year average of the 98th percentile of the *daily maximum* 1-hour concentration (i.e., the 8th highest of daily highest 1-hour concentrations). The new standard requires "first tier" ambient NO_2 monitoring near major roadways as defined in the implementing language and "second tier" monitoring for regional NO_2 concentrations. Although U.S. EPA has specified NO_2 monitoring requirements and a schedule for determining attainment status relative to this new standard, it has not yet developed modeling software to generate the statistics in a form that can be used in a compliance demonstration. Therefore, the analyses described below do not include this project's impact on the new federal 1-hour NO_2 standard and the conclusions reached likewise do not include this impact.

The following sections discuss the proposed project's short-term direct construction and operation ambient air quality impacts, as estimated by the applicant, and provide a discussion of appropriate mitigation.

Construction Impacts and Mitigation

Construction Modeling Analysis

Using estimated peak hourly, daily and annual construction equipment exhaust emissions, the applicant modeled the proposed project's construction emissions to determine impacts (SES 2009t and SES 2009v). To determine the construction impacts on ambient standards (i.e. 1-hour through annual) the on-site construction emission levels were modeled conservatively assuming that the emissions would occur for 24 hours a day. The impact would likely be lower than the modeling results, since most of construction activities would occur during daytime when it is better dispersed. In addition, the applicant modeled emission rates that were higher than what they estimated for the worst case emissions. Therefore, the modeling results predicted by the applicant are considered to be conservative. The predicted proposed project pollutant concentration levels were added to staff's conservatively estimated worst-case maximum background emission concentration levels (**Air Quality Table 5**) to determine the cumulative effect. The results of the applicant's modeling analysis are presented in **Air Quality Table 12**. The construction emissions modeling analysis, including both the onsite fugitive dust and vehicle tailpipe emission sources (with applicant-proposed control measures) are summarized in **Air Quality Tables 6** and **7**.

Air Quality Table 12
Calico Solar Maximum Project Construction Impacts

Pollutants	Avg. Period	Impacts ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hr.	68.1	154.4	222.5	339	66%
	Annual	3.9	41.8	45.7	57	80%
PM10	24-hr	26.5	80	106.5	50	213%
	Annual	3.2	29.8	33.0	20	165%
PM2.5	24-hr	4.1	28	32.1	35	92%
	Annual	0.6	10.3	10.9	12	91%
CO	1-hr	61	4,025	4,086	23,000	18%
	8-hr	32	1,367	1,399	10,000	14%
SO_2	1-hr	0.07	47.2	47.3	665	7%
	3-hr	0.05	42.4	42.5	1300	3%
	24-hr	0.02	13.1	13.1	105	12%
	Annual	0.004	2.7	2.7	80	3%

Source: SES 2009t, Table 5.2-19 Revised.

This modeling analysis indicates, with the exception of 24-hour and annual PM10 impacts, that the proposed project would not create new exceedances or contribute to existing exceedances for any of the modeled air pollutants. The conditions that would create worst-case project modeled impacts (low wind speeds) are not the same conditions when worst-case background is expected. Additionally, the worst-case PM10 impacts occur at the fence line and drop off quickly with distance from the fence line. In light of the existing PM10 non-attainment status for the project site area, staff considers the construction PM10 emissions to be potentially CEQA significant and recommends that the off-road equipment and fugitive dust emissions both be mitigated pursuant to CEQA.

In light of the existing ozone non-attainment status for the project site area, staff considers the construction NOx and VOC emissions to be potentially CEQA significant and recommends that the off-road equipment NOx and VOC emissions be mitigated pursuant to CEQA.

Staff concludes that with implementation of staff-proposed mitigation measures the construction impacts would not contribute substantially to exceedances of PM10 or ozone standards.

The modeling analysis shows that, after implementation of the recommended emission mitigation measures, the proposed project's construction is not predicted to cause new exceedances of the NAAQS for attainment pollutants, but we note that PM10 already exceeds the NAAQS. Therefore, staff determined that no adverse NEPA impacts would occur after implementation of the recommended mitigation measures.

Construction Mitigation

To mitigate the impacts due to construction of the facility, the applicant has committed to the following mitigation measures (SES 2009t):

For exhaust emissions control:

- Low-emitting gas and diesel engines meeting state and federal emissions standards (Tiers I, II and III) would be used for construction equipment, including, but not limited to catalytic converter systems and particulate filter systems.
- All vehicles would be required to shut down when idling for more than 5 minutes, or as required by ARB.
- Regular preventive maintenance would be implemented to prevent equipment engine emission increases due to inefficient fuel combustion.
- Diesel fueled motor vehicle would use low sulfur and low aromatic fuel meeting California standards.
- Review availability of alternatively fueled pickups and personnel transport buses and at a minimum use gasoline fueled vehicles.

For fugitive dust emissions control:

- Chemical dust suppressant[12] Soiltac™ or a product with same or better performance would be applied to all on-site unpaved roads and unpaved parking areas which would also be maintained or resealed as needed to minimize dust emissions.
- Construction grading requirements for the maintenance roads will be limited to surface scraping of topsoil.
- Water application, chemical dust suppressant or other suppressant technique would be used to control fugitive dust emissions from wind erosion of areas disturbed from construction activities (including storage piles).
- Paved road surfaces would be vacuum-swept and/or water-flushed to remove buildup of loose material to control dust emissions from travel on the paved access road (including adjacent public streets affected by construction activities) and paved parking areas.
- All trucks hauling soil, sand, and other loose materials would be covered, or all trucks would be required to maintain at least 2 feet of freeboard.

[12] The soil stabilizer product used would require prior approval by BLM and the Energy Commission.

- Traffic speed on all unpaved site areas and sealed roads would be limited to 15 miles per hour.[13]
- Sandbags or other erosion control measures would be installed to prevent silt runoff to roadways.
- Disturbed areas would be revegetated as quickly as possible.
- Tires of all trucks would be washed off exiting construction site.
- Construction workers would be required to park in sealed laydown areas and would be transported to worksites in buses.
- Vehicles, including SunCatcher material delivery trucks, would be required to travel on paved or sealed roads only.
- All vehicles, such as material delivery trucks, would be required to travel on sealed roads only.

Staff recommends the implementation of mitigation measures contained in Conditions of Certification **AQ-SC1** to **AQ-SC5**, which incorporate the applicant's proposed measures with minor revisions and additions recommended by staff to reduce the impacts from the construction of the proposed project. Specific recommendations from staff include requiring the use of Tier 3 offroad equipment where available.

The construction of the proposed project would cause particulate matter emissions that would add to the existing exceedances of the ambient PM10 air quality standards. Therefore, if unmitigated, the proposed project's construction PM10 emission impacts would be significant under CEQA. Additionally, unmitigated PM10 emissions could exceed General Conformity applicability thresholds, and could potentially cause adverse impacts pursuant to NEPA. However, staff concludes that the implementation of proposed specific mitigation measures during construction of the facility as identified in the conditions of certification would reduce the short-term PM10 impacts to a level that is less than significant pursuant to CEQA, and would mitigate the potential for adverse NEPA impacts.

Operation Impacts and Mitigation

The following section discusses the proposed project's direct and cumulative ambient air quality impacts, as estimated by the applicant, and evaluated by staff. Additionally, this section discusses the recommended mitigation measures.

Operation Modeling Analysis

The applicant has provided a modeling analysis using the EPA-approved AERMOD model to estimate the impacts of the proposed project's operation NOx, PM10, CO, and SOx emissions resulting from project operation (SES 2009t). The maintenance emissions and stationary source emissions were modeled using the emissions data presented in **Air Quality Tables 8** and **9.** The emergency diesel generator is the only stationary emission source modeled. Unlike traditional fossil fueled power plants, most

[13] Staff recommends speeds no greater than 10 miles per hour on unpaved areas and up to 25 miles per hour on stabilized, unpaved roads as long as there are no visible dust emissions (see condition AQ-SC3).

operating emissions from Calico Solar would occur from maintenance activities which require the use of mobile emissions sources. Similar to the assessment of construction impacts, staff added the modeled impacts to the available highest ambient background concentrations recorded during the previous 3 years from nearby monitoring stations to assess the proposed project's operation impacts. **Air Quality Table 13** presents the results of the applicant's modeling analysis.

Air Quality Table 13
Calico Solar Operation Emission Impacts

Pollutants	Avg. Period	Impacts ($\mu g/m^3$)	Background [1] ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hr.	47.8	154.4	202.2	339	60%
	Annual	0.3	41.8	42.1	57	74%
PM10	24-hr	2.8	80	82.8	50	166%
	Annual	0.6	29.8	30.4	20	152%
PM2.5	24-hr	0.4	28	28.4	35	81%
	Annual	0.1	10.3	10.4	12	87%
CO	1-hr	166	4,025	4,191	23,000	18%
	8-hr	72	1,367	1,439	10,000	14%
SO_2	1-hr	0.62	47.2	47.8	665	7%
	3-hr	0.22	42.4	42.6	1300	3%
	24-hr	0.07	13.1	13.2	105	13%
	Annual	0.001	2.7	2.7	80	3%

Source: SES 2009t, Table 5.2-20 Revised.

This modeling analysis indicates, with the exception of PM10 impacts, that the proposed project would not create new exceedances or contribute to existing exceedances for any of the modeled air pollutants. The conditions that would create worst-case project modeled impacts (low wind speeds) are not the same conditions when worst-case background is expected for PM10/PM2.5. Additionally, the worst-case PM2.5 and PM10 impacts occur at the fence line and drop off quickly with distance from the fence line. Therefore, staff concludes that the operation impacts, when considering staff's mitigation measures, would not contribute substantially to exceedances of the PM10 CAAQS.

However, in light of the existing PM10 and ozone non-attainment status for the project site area, staff considers the operation NOx, VOC, and PM emissions to be potentially CEQA significant and recommends that the off-road equipment and fugitive dust emissions be mitigated pursuant to CEQA.

The modeling analysis shows that, after implementation of the recommended emission mitigation measures, the proposed project's operation is not predicted to cause new exceedances of the NAAQS for attainment pollutants, but note that PM10 already exceeds the NAAQS. Therefore, staff determined that no adverse NEPA impacts would occur after implementation of the recommended mitigation measures.

Construction/Operation Overlap Impacts

The applicant has provided an emission analysis, summarized in **Air Quality Tables 9** and **10**, that indicates that the mitigated construction/operation overlap emissions would be no higher than those determined for the worst-case project construction period. Therefore, as was determined for project construction, no significant CEQA or adverse NEPA impacts would occur after implementation of the recommended construction and operation mitigation measures.

Operation Mitigation

Applicant's Proposed Mitigation

Emission Controls

As discussed in the air quality section of the AFC and Data Reponses (SES 2009t), the applicant has committed to the following emission controls on the stationary equipment associated with the Calico Solar operation:

Emergency Generator

The applicant has proposed an ARB/EPA Tier 3 engine, compliant with the New Source Performance Standards, Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, to meet Best Available Control Technology (BACT) requirements for the emergency generator engine. The proposed ARB/EPA Tier 3 engine would have the following emission guarantees:

- NOx: 4.61 gram/bhp-hour, 3.41 lbs/hour
- CO: 0.39 gram/bhp-hour, 0.29 lbs/hour
- VOC: 0.15 gram/bhp-hour, 0.11 lbs/hour
- PM10: 0.06 gram/bhp-hour, 0.04 lbs/hour
- PM2.5: 0.06 gram/bhp-hour, 0.04 lbs/hour
- SO_2: 0.12 gram/bhp- hour, 0.09 lbs/hour

Gasoline Tank

The applicant proposes to use a 5,000 gallon regular gasoline storage tank that incorporates ARB-certified Phase I (tank filling) & Phase II (vehicle refueling) vapor recovery systems. The tank would be filled only when necessary to reduce turnover and truck refueling would be kept to a minimum. The maximum annual tank throughput is expected to be 120,000 gallons.

Operation and Maintenance Vehicles

- Chemical dust suppressant Soiltac^{TM} or a product with same or better performance would be applied to all maintenance roads.
- All maintenance vehicles would be required to travel only on chemically-sealed or paved roads.
- Mirror washing maintenance would be done efficiently. Each wash vehicle would wash two SunCatchers at the same time to reduce the amount of time wash vehicles operate, and therefore reduce their emissions.
- New gasoline fueled vehicles will be used in place of diesel vehicles to reduce ozone precursor and diesel particulate matter emissions.

- Hybrid-electric vehicles would be used for all security vehicles.
- To reduce emissions from commuting, van pools would be provided from Barstow.
- Paved road surfaces would be vacuum-swept and/or water-flushed to remove buildup of loose material to control dust emissions from travel on the paved access road (including adjacent public streets affected by construction activities) and paved parking areas.
- To reduce exhaust emission, propane-fueled fork lift and man lifts would be used for maintenance.
- Calico Solar, LLC is committed to a better travel demand management to reduce VMTs whenever and wherever possible and to using alternatively fueled vehicles.

Emission Offsets

The applicant has not proposed any emission offsets and the stationary source and operating fugitive dust emissions for Calico Solar as currently proposed by the applicant would be below District offset thresholds.

Adequacy of Proposed Mitigation

Staff concurs with the District's determination that the proposed project's stationary source proposed emission controls for criteria pollutants currently meet regulatory requirements and that the proposed stationary source emission levels are reduced adequately, but recommends that a condition needs to be added to ensure that the emergency engine emission controls/emission levels meet potential future requirements as this source may not be purchased and installed for several years. Additionally, staff generally agrees that the applicant's proposed fugitive dust mitigation measures would provide adequate fugitive dust emission control, but has recommended minor changes and additions to the applicant's proposed measures.

Staff Proposed Mitigation

As mentioned earlier in the discussions of the ozone and PM10 impacts, staff concludes that the proposed project's direct stationary source ozone precursor and PM10 emissions are minimal, but when combined with the maintenance vehicles' emissions could be significant per CEQA. Additionally, staff believes a solar renewable project, which would have a 30 to 40-year life in a setting likely to continue to be impacted by both local and upwind emission sources, should address its contribution to the potentially ongoing nonattainment of the PM10 and ozone standards. Staff concludes that the applicant's proposed mitigation measures would generally mitigate these emissions adequately, so staff recommends formalizing the applicant's stipulated onsite vehicle emission mitigation measures and fugitive dust mitigation measures, with minor revisions and additions, in Conditions of Certification **AQ-SC6** and **AQ-SC-7**, respectively.

Staff is also proposing Condition of Certification **AQ-SC8** to ensure that the Energy Commission license is amended as necessary to incorporate changes to the air quality permits.

Staff concludes that the implementation of its recommended operations mitigation measures would reduce the potential CEQA emission impacts from the facility on ozone and PM10 to a level of less than significant. Additionally, staff concludes that the implementation of its recommended operations fugitive dust mitigation measures would mitigate the potential for NEPA adverse impacts.

Staff has considered the minority population surrounding the site (see Socioeconomics Figure 1). Since the proposed project's direct CEQA air quality impacts have been reduced to a less than significant level, there is no environmental justice issue for air quality.

Indirect Pollutant and Secondary Pollutant Impacts

The proposed project would have direct emissions of chemically reactive pollutants (NOx, SOx, and VOC), but would also have indirect emission reductions associated with the reduction of fossil-fuel fired power plant emissions due to the proposed project displacing the need for their operation, since solar renewable energy facilities would operate on a must-take basis[14]. However, the exact nature and location of such reductions is not known, so the discussion below focuses on the direct emissions from the proposed project within the San Bernardino County portion of the Mojave Desert Air Basin.

Ozone Impacts

There are air dispersion models that can be used to quantify ozone impacts, but they are used for regional planning efforts where hundreds or even thousands of sources are input into the model to determine ozone impacts. There are no regulatory agency models approved for assessing single source ozone impacts. However, because of the known relationship of NOx and VOC emissions to ozone formation, it can be said that the emissions of NOx and VOC from the Calico Solar Project do have the potential (if left unmitigated) to contribute to higher ozone levels in the region. These impacts would be cumulatively significant under CEQA because they would contribute to ongoing violations of the state and federal ozone ambient air quality standards.

PM2.5 Impacts

Secondary particulate formation, which staff assumes to be 100% PM2.5, is the process of conversion from gaseous reactants to particulate products. The process of gas-to-particulate conversion, which occurs downwind from the point of emission, is complex and depends on many factors, including local humidity and the presence of air pollutants. The basic process assumes that the SOx and NOx emissions are converted into sulfuric acid and nitric acid first and then react with ambient ammonia to form sulfate and nitrate. The sulfuric acid reacts with ammonia much faster than nitric acid and converts completely and irreversibly to particulate form. Nitric acid reacts with ammonia to form both a particulate and a gas phase of ammonium nitrate. The particulate phase will tend to fall out; however, the gas phase can revert back to ammonia and nitric acid. Thus, under the right conditions, ammonium nitrate and nitric

[14] This refers to the fact that the contract between the owner of this solar power facility and the utility will require that the utility take all generation from this facility with little or no provisions for the utility to direct turn down of generation from the facility.

acid establish a balance of concentrations in the ambient air. There are two conditions that are of interest, described as *ammonia rich* and *ammonia poor*. The term ammonia rich indicates that there is more than enough ammonia to react with all the sulfuric acid and to establish a balance of nitric acid-ammonium nitrate. Further ammonia emissions in this case would not necessarily lead to increases in ambient PM2.5 concentrations. In the case of an ammonia poor environment, there is insufficient ammonia to establish a balance and thus additional ammonia would tend to increase PM2.5 concentrations.

The San Bernardino County portion of the Mojave Desert Air Basin has not undergone the rigorous secondary particulate studies that have been performed in other areas of California, such as the San Joaquin Valley, that have more serious fine particulate pollution problems. However, the available chemical characterization data shows that the ammonium nitrate and ammonium sulfate fine particulate concentrations in China Lake, Edwards Air Force Base, and Mojave in 2000 were 40% of the to the PM2.5 on an annual average (ARB 2005). Because of the known relationship of NOx and SOx emissions to PM2.5 formation it can be said that the emissions of NOx and SOx from Calico Solar do have the potential (if left unmitigated) to contribute to higher PM2.5 levels in the region.

Impact Summary

The applicant is proposing to mitigate the proposed project's stationary source NOx, VOC, SO_2, and PM10/PM2.5 emissions through the use of BACT. Additionally, staff recommends additional mitigation to reduce maintenance vehicle emissions, both tailpipe emission and fugitive dust emissions that could contribute to further ozone and PM10 violations. With the applicant proposed and staff recommended emission mitigation, staff concludes that the proposed project would not cause significant secondary pollutant impacts.

C.1.4.3 CEQA LEVEL OF SIGNIFICANCE

Project Construction

Staff considers the unmitigated construction NOx, VOC, and PM emissions to be potentially CEQA significant and, therefore, staff is recommending that the NOx, VOC, and PM emission be mitigated pursuant to CEQA. Staff is recommending several mitigation measures (**AQ-SC1** through **AQ-SC5**), that also include the applicant's stipulated construction mitigation measures, to limit exhaust emissions and fugitive dust emissions during project construction to the extent feasible.

Therefore, while there would be adverse CEQA air quality impacts during construction they are expected to be less than significant after implementation of the applicant's stipulated and staff's recommended mitigation measures.

Project Operation

Staff considers the unmitigated operation and maintenance NOx, VOC, and PM emissions to be potentially CEQA significant and, therefore, staff is recommending that the NOx, VOC, and PM emissions be mitigated pursuant to CEQA. Staff is recommending two mitigation measures (**AQ-SC6** and **AQ-SC7**), that also include the applicant's stipulated operations emission mitigation, to limit exhaust emissions and fugitive dust emissions during project operation to the extent feasible.

Therefore, while there would be adverse CEQA air quality impacts during operation, they are expected to be less than significant after implementation of the applicant's stipulated and staff's recommended mitigation measures.

Closure and Decommissioning

Eventually the facility would close, either at the end of its useful life or due to some unexpected situation such as a natural disaster or catastrophic facility breakdown. When the facility closes, all sources of air emissions would cease to operate and thus impacts associated with those emissions would no longer occur. The only other expected emissions would be equipment exhaust and fugitive particulate emissions from the dismantling activities. These activities would be of much a shorter duration than construction of the proposed project, equipment are assumed to have much lower comparative emissions due to technology advancement, and fugitive dust emissions would be required to be controlled in a manner at least equivalent to that required during construction. Therefore, while there would be adverse CEQA air quality impacts during decommissioning, they are expected to be less than significant.

C.1.5 REDUCE ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the central portion of the proposed 850 MW project. It was developed because it can be constructed without upgrading the SCE Lugo-Pisgah transmission line. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

C.1.5.1 SETTING AND EXISTING CONDITIONS

The setting and existing conditions for this alternative are the same as the proposed project. The existing ambient air quality does not change and the facility would still be within the same air basin and subject to the same air quality LORS.

C.1.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Reduced Acreage Alternative would consist of 11,000 SunCatchers with a net generating capacity of approximately 275 MW occupying approximately 2,600 acres of land. The Reduced Acreage Alternative would transmit power to the grid through the SCE Pisgah Substation and would require infrastructure similar to the entire proposed 850 MW project, including water storage tank, transmission line, road access, main services complex, and substation. However, the Reduced Acreage Alternative would not require the 65-mile upgrade to the SCE Lugo-Pisgah transmission line.

The Reduced Acreage Alternative would use approximately 32% of the SunCatchers, provide 32% of the power generating potential, and would affect approximately 32% of the land of the land of the proposed 850 MW project. The applicant did not provide criteria pollutant emission estimates for the construction and operation of this alternative but did provide estimates for the applicant proposed Phase 1 (500 MW) and Phase 2 (350 MW) alternatives (SES 2009ee), which use the same emission control assumptions as those used for the proposed project. The information provided by the applicant for these two alternatives only provide consolidated emission summaries and tables for the total construction period emissions and the maximum annual operating emissions.

The construction and operation criteria pollutant emission estimates for the Reduced Acreage Alternative, presented in terms of total construction period emissions and maximum annual operation emissions, are estimated based on linear extrapolation of the applicant's Phase 2 Alternative emission estimates and are provided in **Air Quality Tables 14** and **15**, respectively.

Air Quality Table 14
Calico Solar Construction – Reduced Acreage Alternative
Total Construction Period Emissions (tons)[a]

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Combustion Emissions	19.38	0.02	22.90	3.50	1.19	1.08
Onsite Fugitive Dust Emissions	---	---	---	---	64.34	9.18
Subtotal of Onsite Emissions	**19.38**	**0.02**	**22.90**	**3.50**	**65.54**	**10.26**
Offsite Combustion Emissions	46.97	0.09	46.48	11.26	3.09	2.72
Offsite Fugitive Dust Emissions	---	---	---	---	10.51	1.37
Subtotal of Offsite Emissions	**46.97**	**0.09**	**46.48**	**11.26**	**13.60**	**4.09**
Total Emissions	**66.35**	**0.11**	**69.38**	**14.76**	**79.14**	**14.35**

Source: SES 2009ee, Table DR-136c, extrapolated by staff.
Note:
[a] The small amount of train haul water delivery emissions are not included in this table.

Air Quality Table 15
Calico Solar Operations - Reduced Acreage Alternative
Maximum Annual Emissions (tons/yr)[a]

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Operation Emissions						
Onsite Combustion Emissions	0.68	0.00	2.51	0.05	0.02	0.02
Onsite Gasoline Tank Emissions	--	--	--	0.07	--	--
Onsite Fugitive Dust Emissions	--	--	--	--	11.97	1.76
Subtotal of Onsite Emissions	**0.68**	**0.00**	**2.51**	**0.12**	**11.99**	**1.78**
Offsite Emissions						
Offsite Combustion Emissions	0.28	1.93	1.93	0.06	0.04	0.02
Offsite Fugitive Dust	--	--	--	--	1.56	0.07
Subtotal of Offsite Emissions	**0.28**	**1.93**	**1.93**	**0.06**	**1.60**	**0.09**
Total Maximum Annual Emissions	**0.96**	**1.93**	**4.43**	**0.18**	**13.59**	**1.88**

Source: SES 2009ee, Table DR-136g, extrapolated by staff.
Note:
[a] The small amount of train haul water delivery emissions are not included in this table.

The maximum daily construction emissions for the Reduced Acreage Alternative might be as high as that estimated for the proposed project, assuming the same maximum daily construction activities, but the maximum annual emissions are not expected to be as high as the proposed project due to the overall reduction in construction activity requirements for this much smaller project alternative. Therefore, the worst-case short-term and annual construction emissions and construction pollutant concentration impacts for this alternative would be no worse than those shown in **Air Quality Table 12**.

The maximum short-term and annual operation emissions for the Reduced Acreage Alternative are expected to decrease from that of the proposed project due to its smaller size. Therefore, the worst-case short-term and annual operation pollutant concentration impacts for this alternative would be less than those shown previously in **Air Quality Table 13**.

Air Quality Tables 14 and **15** also show that the maximum annual construction and operation emissions from the Reduced Acreage Alternative would remain below the General Conformity Rule applicability thresholds for PM10 (100 tons) and Ozone Precursors, (NOx [100 tons] and VOC [100 tons]).

The results of the Reduced Acreage Alternative would be the following:

- The worst-case short-term construction emissions and ground level pollutant concentration impacts would be similar to the proposed project and would require the same level of mitigation. The total construction period and total construction emissions and long-term ground level pollutant concentration impacts would be reduced from those required to construct the proposed project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated, but mainly out of air basin, criteria pollutant emissions would be reduced.
- The impacts of the proposed project would not occur on the lands not used due to the smaller project size. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.

If the Reduced Acreage Alternative were approved, other renewable projects would likely be developed on other sites in the in San Bernardino County, the Mojave Desert, or in adjacent states to fill the 575 MW gap not supplied by the proposed project as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates[15].

C.1.5.3 CEQA LEVEL OF SIGNIFICANCE

The CEQA level of significance for the Reduced Acreage Alternative would be the same as for the proposed project, with the same significance rationale, where if left unmitigated there is the potential for significant NOx and PM emission impacts during the Alternative project's construction and operation. The mitigation that would be proposed for the Reduced Acreage Alternative would be the same as that proposed for the proposed project (staff recommended conditions **AQ-SC1** to **AQ-SC8**).

[15] Such as the State of California 33 percent Renewable Portfolio Standard (RPS) mandated under Executive Order S-14-08.

C.1.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed 850 MW project. This alternative, the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 2**.

C.1.6.1 SETTING AND EXISTING CONDITIONS

The setting and existing conditions for this alternative are the same as the proposed project. The existing ambient air quality does not change and the facility would still be within the same air basin and subject to the same air quality LORS.

C.1.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Avoidance of Donated and Acquired Lands Alternative would consist of 28,800 SunCatchers with a net generating capacity of approximately 720 MW occupying the entire proposed project footprint but avoiding use of any lands that were donated to BLM or acquired by BLM through the Land and Water Conservation Fund program.

Like the proposed project, this alternative would transmit power to the grid through the SCE Pisgah Substation and would require infrastructure similar to the entire proposed 850 MW project, including water storage tanks, transmission line, road access, main services complex, and substation. Additionally, like the proposed project, the Avoidance of Donated and Acquired Lands Alternative would require the 65-mile upgrade to the SCE Lugo-Pisgah transmission line.

The Avoidance of Donated and Acquired Lands Alternative would use approximately 85% of the SunCatchers, provide 85% of the power generating potential, and would affect approximately 86% of the land (7,050 acres) of the proposed 850MW project. The applicant did not provide criteria pollutant emission estimates for the construction and operation of this alternative but did provide estimates for the applicant proposed Phase 1 (500 MW) and Phase 2 (350 MW) alternatives (SES 2009ee), which use the same emission control assumptions as those used for the proposed project.

The information provided by the applicant for the Phase 1 and Phase 2 alternatives only provide consolidated emission summaries and tables for the total construction period emissions and the maximum annual operating emissions.

The construction and operation criteria pollutant emission estimates for the Avoidance of Donated and Acquired Lands Alternative, presented in terms of total construction period emissions and maximum annual operation emissions, are estimated based on linear interpolation of the applicant’s Phase 1 Alternative emission estimates for total construction emissions, and are estimated based on a MW capacity linear interpolation of the Phase 1 Alternative estimated operation emissions and the proposed project estimated operation emissions[16]; and these estimates are provided in **Air Quality Tables 16** and **17**, respectively.

Air Quality Table 16
Calico Solar Construction
Avoidance of Donated and Acquired Lands Alternative
Total Construction Period Emissions (tons)[a]

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Combustion Emissions	68.28	0.09	81.33	12.43	4.18	3.80
Onsite Fugitive Dust Emissions	---	---	---	---	169.55	24.88
Subtotal of Onsite Emissions	**68.28**	**0.09**	**81.33**	**12.43**	**173.72**	**28.68**
Offsite Combustion Emissions	187.21	0.33	181.18	44.65	12.25	10.80
Offsite Fugitive Dust Emissions	---	---	---	---	41.82	5.44
Subtotal of Offsite Emissions	**187.21**	**0.33**	**181.18**	**44.65**	**54.07**	**16.24**
Total Emissions	**255.50**	**0.42**	**262.51**	**57.08**	**227.79**	**44.93**

Source: SES 2009ee, Table DR-136a, interpolated by staff.
Note:
[a] The small amount of train haul water delivery emissions are not included in this table.

Air Quality Table 17
Calico Solar Construction
Avoidance of Donated and Acquired Lands Alternative
Maximum Annual Emissions (tons/yr)[a]

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Operation Emissions						
Onsite Combustion Emissions	2.16	0.01	26.37	3.49	0.07	0.06
Onsite Gasoline Tank Emissions	---	---	---	0.09	---	---
Onsite Fugitive Dust Emissions	---	---	---	---	27.99	4.10
Subtotal of Onsite Emissions	**2.16**	**0.01**	**26.37**	**3.58**	**28.06**	**4.16**
Offsite Emissions						
Offsite Combustion Emissions	1.06	0.01	5.29	0.16	0.12	0.07
Offsite Fugitive Dust	---	---	---	---	5.32	0.36
Subtotal of Offsite Emissions	**1.06**	**0.01**	**5.29**	**0.16**	**5.44**	**0.43**
Total Maximum Annual Emissions	**3.21**	**0.02**	**31.65**	**3.75**	**33.50**	**4.59**

Source: SES 2009ee, Table DR-136e; SES 2009t, Table 5.2-13b revised, interpolated by staff
Note:
[a] The small amount of train haul water delivery emissions are not included in this table.

The maximum daily and maximum annual construction emissions for the Reduced Acreage Alternative are likely to be as high as that estimated for the proposed project, assuming the same maximum daily and annual construction activities. Therefore, the worst-case short-term and annual construction emissions and construction pollutant concentration impacts for this alternative are likely to be similar to those shown in **Air Quality Table 12**.

The maximum short-term and annual operation emissions for the Avoidance of Donated and Acquired Lands Alternative are expected to decrease marginally from that of the proposed project due to its marginally smaller size. Therefore, the worst-case short-term

[16] Additionally, the revised emission estimates for water hauling by train (TS 2010q) have been incorporated through linear interpolation.

and annual operation pollutant concentration impacts for this alternative would be marginally less than those shown previously in **Air Quality Table 13**.

The maximum annual construction emissions for the Avoidance of Donated and Acquired Lands Alternative are assumed to be no higher than those shown for the proposed project in **Air Quality Table 9** and so would remain well below the General Conformity Rule applicability thresholds for PM10 (100 tons) and Ozone Precursors, (NOx [100 tons] and VOC [100 tons]).

Air Quality Table 17 also shows that the estimated maximum annual operation emissions from the Avoidance of Donated and Acquired Lands Alternative would remain well below the General Conformity Rule applicability thresholds.

The results of the Avoidance of Donated and Acquired Lands Alternative would be the following:

- The worst-case short-term construction emissions and ground level pollutant concentration impacts would be nearly the same as the proposed project and would require the same level of mitigation. The total construction period and total construction emissions and long-term ground level pollutant concentration impacts would be marginally reduced from those required to construct the proposed project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated, but mainly out of air basin, criteria pollutant emissions would be slightly reduced.
- The impacts of the proposed project would not occur on the donated or acquired lands. However, the land on which the project is proposed may become available to other uses that are consistent with BLM's land use plan, including another solar project.

If the Avoidance of Donated and Acquired Lands Alternative were approved, other renewable projects may be developed on other sites in the in San Bernardino County, the Mojave Desert, or in adjacent states to fill the 130 MW gap not supplied by the proposed project as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

C.1.6.3 CEQA LEVEL OF SIGNIFICANCE

The level of significance under CEQA for the Avoidance of Donated and Acquired Lands Alternative would be the same as for the proposed project, with the same significance rationale, where if left unmitigated there is the potential for significant NOx and PM emission impacts during the Alternative project's construction and operation.

The mitigation that would be proposed for the Avoidance of Donated and Acquired Lands Alternative would be the same as that proposed for the proposed project (staff recommended conditions **AQ-SC1** to **AQ-SC8**).

C.1.7 NO PROJECT / NO ACTION ALTERNATIVE

There are three No Project / No Action Alternatives evaluated as follows:

No Project / No Action Alternative #1: No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

The results of No Project / No Action Alternative #1 would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another renewable energy project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

In No Project / No Action Alternative #1, the proposed action would not be undertaken. Unless BLM implements an amendment to the California Desert Conservation Area plan, the BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of No Project / No Action Alternative #1 would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another renewable energy project.
- The benefits of the proposed project in reducing fossil fuel use and greenhouse gas emissions from gas-fired generation would not occur (see **Appendix Air-1 - Greenhouse Gas Emissions**). Both State and Federal law support the increased use of renewable power generation.

If the proposed project is not approved, renewable projects would likely be developed on other sites in San Bernardino County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are several pending solar and wind projects in the Newberry Springs/Ludlow Area that would be located within a few miles of the Calico Solar Project site, and there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District.

No Project / No Action Alternative #2: No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. As a result, GHG emissions would result from the construction and operation of the solar technology and would likely be similar to the GHG emissions from the proposed project. Different solar technologies require different amounts of construction and operations maintenance; however, it is expected that all the technologies would provide the more significant benefit, like the proposed project, of displacing fossil fuel fired generation and reducing associated GHG emissions. As such, this No Project/No Action Alternative could result in GHG benefits similar to those of the proposed project.

No Project / No Action Alternative #3: No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the greenhouse gas emissions from the site, including carbon uptake, is not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in the GHG benefits from the proposed project. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.1.8 PROJECT-RELATED FUTURE ACTIONS - AIR QUALITY

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/DEIS. This analysis examines the construction and operation impacts of two upgrade scenarios

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the transmissions interconnection (gen-tie) from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE Right of Ways (ROWs).
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.1.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

The 275 MW Early Interconnection upgrades and the Lugo-Pisgah No. 2 500 kV transmission line fall within the Mojave Desert Air Basin (MDAB) and within the Mojave Desert Air Quality Management District (MDAQMD).

Air Quality Overview. The vicinity surrounding the Lugo-Pisgah transmission corridor has an identical CAAQS and NAAQS attainment status as the Calico Solar site (see **Air Quality Table 3**). The specific pollutant levels would vary along the Lugo-Pisgah transmission corridor, where the areas closer to the Lugo substation would experience greater impacts from pollutant transport from the South Coast Air Basin (Los Angeles Metropolitan Area).

Climate and Meteorology Overview. The Lugo-Pisgah transmission corridor is entirely within the Mojave Desert and would experience climate and meteorological conditions that are very similar to the Calico Solar site. However, there would be some minor variability in temperatures, rainfall amounts, wind directions, etc. due to changes in topography along and surrounding the transmission route. For example, hourly meteorological data obtained from the MDAQMD monitoring site in Victorville shows that wind blows primarily from the south or south-southwest, while winds near Barstow show a more dominate westerly flow; and rainfall in Hesperia is approximately 2 inches a year greater than in Barstow.

C.1.8.2 ENVIRONMENTAL IMPACTS

The construction activities caused by the SCE upgrades would generate emissions at the locations of the work along the transmission line and telecommunication ROWs and at the Pisgah Substation site. The impacts from both the 275 MW Early Interconnection and the 850 MW Full Build-Out options within the ROWs would principally consist of exhaust emissions from heavy-duty diesel and gasoline-powered construction equipment use, diesel and gasoline fueled on-road delivery trucks, and helicopter use for line stringing or structure construction; and fugitive dust (particulate matter) emissions from construction activities and from vehicle travel on unpaved surfaces. Beyond the boundaries of the ROW and substations, exhaust and paved road fugitive dust emissions would also be caused by workers commuting to and from the work sites, from trucks hauling conductor, pole segments, and other materials to the sites, and crew trucks (*e.g.,* derrick trucks, bucket trucks, pickups).

Due to the reduced construction scope of the 275 MW Early Interconnection upgrades, which would not require construction of the new 500 kV line and removal of the existing 220 kV structures, emissions and other air quality impacts would be less than for the construction of the 850 MW Full Build-Out Option. Under the 850 MW Full Build-Out option, the Lugo-Pisgah No. 2 500 kV transmission line upgrades would consist of constructing 66.9 miles of a single circuit 500 kV transmission line. Construction would include approximately 10 miles of new ROW along the Lugo-Pisgah and El Dorado-Lugo lines, rehabilitation and extension of existing access and spur roads, removal of existing 220 kV structures and two 500 kV structures, construction of approximately 258 single-circuit 500 kV towers, and stringing of approximately 420 miles of conductor (+2.5 miles for El Dorado-Lugo).

Odors of diesel exhaust from construction equipment would be reduced by the California’s requirements for mandatory use of either low-sulfur or ultra-low-sulfur fuel. No substances used or activities involved with the SCE project would have the capability to produce offensive odors. As such, the impacts of odors would be less than significant for both options.

Once construction and structure removal is complete, operation emissions for both options would result from vehicle and helicopter use for periodic maintenance, repair, and inspection of the system components. These mobile source emissions would be the only direct source of emissions related to SCE project operation, and they would be minor. System monitoring, control, and inspections would induce light and medium-heavy duty truck traffic and periodic helicopter use. The air quality impact caused by emissions from SCE project vehicular traffic for maintenance activities would be less than significant.

C.1.8.3 MITIGATION

The SCE project would be required to comply with all MDAQMD rules, including portable equipment rules, which would dictate how the equipment could be operated. Mitigation measures would be implemented in compliance with the MDAQMD Ozone State

Implementation Plan (SIP) to reduce the emissions generated during project construction and operation.

Construction phase emissions are generally short-term in duration. Effective and comprehensive control measures would be needed to reduce equipment and fugitive dust emissions to the extent feasible. For the proposed project staff has recommended control measures in condition of certification **AQ-SC5** to reduce construction equipment exhaust emissions, which would reduce emissions by requiring the use of newer and cleaner engines and other various control measures such as engine idle time restrictions, engine maintenance, and others. Staff has recommended control measures in condition of certification **AQ-SC3** to reduce fugitive dust emissions by requiring the use of soil binders on unpaved roads, watering active construction areas, trackout controls, and many others. Construction equipment exhaust emissions are controlled through the use of newer cleaner engines and other various control measures such as idle time restrictions, engine maintenance, and others. Recent transmission line projects, such as the Tehachapi Renewable Transmission Project included control measures similar to those proposed in **AQ-SC3** and **AQ-SC5**.

With effective and comprehensive control measures such as those recommended in this section for the proposed Calico Solar Project, dust and equipment exhaust impacts would be reduced to a less than significant level.

C.1.8.4 CONCLUSION

The construction and structure removal activities associated with the SCE Lugo-Pisgah transmission line upgrades would cause emissions due to heavy-duty diesel and gasoline-powered construction equipment use, diesel and gasoline fueled on-road trucks and employee vehicle travel, helicopter use for line stringing or structure construction, and fugitive dust emissions from construction activities and from vehicle travel on unpaved and paved surfaces. With effective and comprehensive control measures such as those recommended in this SA/DEIS for the proposed Calico Solar Project, fugitive dust and equipment exhaust impacts would likely be reduced to a less than significant level under CEQA and there would likely be less than adverse impacts under NEPA.

C.1.9 CUMULATIVE IMPACTS

Cumulative impacts are defined by CEQA as “two or more individual effects which, when considered together, are considerable or . . . compound or increase other environmental impacts.” (CEQA Guidelines, § 15355.) A cumulative impact consists of an impact that is created as a result of a combination of the project evaluated in the EIR together with other projects causing related impacts.” (CEQA Guidelines, § 15130(a)(1).) Such impacts may be relatively minor and incremental, yet still be significant because of the existing environmental background, particularly when one considers other closely related past, present, and reasonably foreseeable future projects.

Cumulative effects are defined by the Council on Environmental Quality NEPA regulations as “…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions" (40 CFR 1508.7).

This analysis is concerned with criteria air pollutants. Such pollutants have impacts that are usually (though not always) cumulative by nature. Rarely would a project by itself cause a violation of a federal or state criteria pollutant standard. However, a new source of pollution may contribute to violations of criteria pollutant standards because of the existing background sources or foreseeable future projects. Air districts attempt to attain the criteria pollutant standards by adopting attainment plans, which comprise a multi-faceted programmatic approach to such attainment. Depending on the air district, these plans typically include requirements for air offsets and the use of Best Available Control Technology (BACT) for new sources of emissions, and restrictions of emissions from existing sources of air pollution.

Thus, much of the preceding discussion is concerned with cumulative impacts. The "Existing Ambient Air Quality" subsection describes the air quality background in the San Bernardino County portion of the Mojave Desert Air Basin, including a discussion of historical ambient levels for each of the significant criteria pollutants. The "Construction Impacts and Mitigation" subsection discusses the proposed project's contribution to the local existing background caused by project construction. The "Operation Impacts and Mitigation" subsection discusses the proposed project's contribution to the local existing background caused by project operation. The following subsection includes two additional analyses:

- a summary of projections for criteria pollutants by the air district and the air district's programmatic efforts to abate such pollution; and
- an analysis of the proposed project's *localized cumulative impacts*, the proposed project's direct operating emissions combined with other local major emission sources.

C.1.9.1 SUMMARY OF PROJECTIONS

The San Bernardino County portion of the MDAB is designated as non-attainment for both federal (8-hour) and State (1-hour) ozone and state PM10 standards, and for state PM2.5 standard. NO_2 and SO_2 are considered to be attainment by both federal and State standards, and PM2.5 are considered to be attainment by federal standard only.

Ozone

Since the San Bernardino County portion of Mojave Desert is currently classified as non-attainment for the federal 8-hour ozone standard, the District is required to prepare and adopt an ozone attainment plan for submittal to the U.S.EPA describing how it will attain the federal 8-hour standard. The MDAQMD has adopted State and Federal attainment plans for the region within its jurisdiction. The MDAQMD adopted the MDAQMD 2004 Ozone Attainment Plan (approved by U.S.EPA), and has updated it with the MDAQMD Federal 8-hour Ozone Attainment Plan 2008 to demonstrate that the MDAQMD will meet the required Federal ozone planning milestones and attain the 8-hour ozone NAAQS by June 2021. There are no additional control measures for direct ozone precursor reductions required as part of the update. However, the MDAQMD is committed to have all applicable Federal RACT rules as proposed in 8-hour Reasonably Available Control Technology – State Implementation Plan Analysis (RACT SIP Analysis) adopted in 2006. In addition, the MDAQMD updated and indentified new measures in 2007, which will be adopted through 2014, as the State of California mandates including all feasible ozone precursor control measures. The enhanced vapor recovery for fuel storage tanks measure would be applicable to the proposed project's gasoline tank.

Particulate Matter

The District is currently classified as nonattainment for the state and the federal 24-hour PM10 air quality standard. The District first adopted a Federal Particulate Matter (PM10)

Attainment Plan (PMAP) in July 31, 1995. However, some experts are critical of the federal standards as not being sufficiently health protective. California has adopted far more stringent standards for PM10. Currently, virtually all air districts in the state (the lone exception being Lake County) are designated nonattainment of the state PM10 standard. There is no legal requirement for air districts to provide plans to attain the state PM10 standard, so air districts have not developed such plans.

In 1997 the federal government adopted PM2.5 standards, as did the state in 2003. The EPA has determined that the area is unclassified, or attainment for both the annual and the 24-hour federal PM2.5 standard. However, the ARB classifies the area as nonattainment of the annual state PM2.5 air quality standard.

The PMAP states that "(t)he air quality of the MDAQMD is impacted by both fugitive dust from local sources and occasionally by region-wide wind blown dust during moderate to high wind episodes. This region-wide or "regional" event includes contributions from both local and distant dust sources which frequently result in violations of the NAAQS that are multi-district and interstate in scope." It also states that "(i)t is not feasible to implement control measures to reduce dust from regional wind events." Therefore, the District would have put considerable effort to reduce the emissions from "…unpaved road travel, construction, and local disturbed areas in the populated areas, and certain stationary sources operating in the rural Lucerne Valley*."*

As a solar power generation facility, the direct air pollutant emissions from power generation are negligible and the emission source would be limited to auxiliary equipment and maintenance activities. The emissions from the proposed project would be minimal compared to the other power generation facilities, and it is unlikely that the proposed project would have significant impact on particulate matter emissions.

Summary of Conformance with Applicable Air Quality Plans

The applicable air quality plans do not outline any new control measures applicable to the proposed project's operating emission sources. Therefore, compliance with existing District rules and regulations would ensure compliance with those air quality plans.

C.1.9.2 LOCALIZED CUMULATIVE IMPACTS

Since the power plant air quality impacts can be reasonably estimated through air dispersion modeling (see the "Operation Modeling Analysis" subsection) the proposed project contributions to localized cumulative impacts can be estimated. To represent *past* and, to an extent, *present projects* that contribute to ambient air quality conditions, the Energy Commission staff recommends the use of ambient air quality monitoring data (see the “Existing Ambient Air Quality” subsection), referred to as the *background*. The staff takes the following steps to estimate what are additional appropriate “present projects” that are not represented in the background and “reasonably foreseeable projects”:

- First, the Energy Commission staff (or the applicant) works with the air district to identify all projects that have submitted, within the last year of monitoring data, new applications for an authority to construct (ATC) or permit to operate (PTO) and applications to modify an existing PTO within 6 miles of the project site. Based on staff’s modeling experience, beyond 6 miles there is no statistically significant concentration overlap for non-reactive pollutant concentrations between 2 stationary emission sources.
- Second, the Energy Commission staff (or the applicant) works with the air district and local counties to identify any new area sources within 6 miles of the project site. As opposed to point sources, area sources include sources like agricultural fields, residential developments or other such sources that do not have a distinct point of emission. New area sources are typically identified through draft or final Environmental Impact Reports (EIRs) that are prepared for those sources. The initiation of the EIR process is a reasonable basis on which to determine what is “reasonably foreseeable” for new area sources.
- The data submitted, or generated from the applications with the air district for point sources or initiating the EIR process for area sources, provides enough information to include these new emission sources in air dispersion modeling. Thus, the next step is to review the available EIR(s) and permit application(s), determine what sources must be modeled and how they must be modeled.
- Sources that are not new, but may not be represented in ambient air quality monitoring are also identified and included in the analysis. These sources include existing sources that are co-located with or adjacent to the proposed source (such as an existing power plant). In most cases, the ambient air quality measurements are not recorded close to the proposed project, thus a local major source might not be well represented by the background air monitoring. When these sources are included, it is typically a result of there being an existing source on the project site and the ambient air quality monitoring station being more than 2 miles away.
- The modeling results must be carefully interpreted so that they are not skewed towards a single source, in high impact areas near that source’s fence line. It is not truly a cumulative impact of the Calico Solar Project if the high impact area is the result of high fence line concentrations from another stationary source and Calico Solar is not providing a substantial contribution to the determined high impact area.

Once the modeling results are interpreted, they are added to the background ambient air quality monitoring data and thus the modeling portion of the cumulative assessment is complete. Due to the use of air dispersion modeling programs in staff’s cumulative impacts analysis, the applicant must submit a modeling protocol, based on information requirements for an application, prior to beginning the investigation of the sources to be modeled in the cumulative analysis. The modeling protocol is typically reviewed, commented on, and eventually approved in the Data Adequacy phase of the licensing procedure. Staff typically assists the applicant in finding sources (as described above), characterizing those sources, and interpreting the results of the modeling. However, the actual modeling runs are usually left to the applicant to complete. There are several reasons for this: modeling analyses take time to perform and require significant expertise, the applicant has already performed a modeling analysis of the proposed project alone (see the “Operation Modeling Analysis” subsection), and the applicant can act on its own to reduce stipulated emission rates and/or increase emission control requirements as the results warrant. Once the cumulative project emission impacts are determined, the necessity to mitigate the proposed project emissions can be evaluated, and the mitigation itself can be proposed by staff and/or the applicant (see the “Operation Mitigation” subsection).

The applicant, in consultation with MDAQMD and San Bernardino County Land Use Service Department, confirmed that there are no projects within a 6 miles radius from the Calico Solar Project site that are under construction or have received permits to be built or operate in the foreseeable future. Therefore, it has been determined that no stationary sources requiring a cumulative modeling analysis exist within a 6 mile radius of the proposed project site.

In addition to the projects determined through consultation with the District, there are several pending solar and wind projects in the Newberry Springs/Ludlow Area that would be located within a few miles of the Calico Solar Project site, and there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District. This potential for significant additional development within the air basin and corresponding increase in air basin emissions is a major part of staff’s rationale for recommending Conditions of Certification **AQ-SC6** and **AQ-SC7** that are designed to mitigate the proposed project’s cumulative impacts by reducing the dedicated on-site vehicle emissions and fugitive dust emissions during site operation.

Staff has considered the minority population surrounding the site (see **Socioeconomics Figure 1**). Since the project’s cumulative air quality impacts have been mitigated to less than significant, there is no environmental justice issue for air quality.

C.1.10 COMPLIANCE WITH LORS

The Mojave Desert Air Quality Control District issued a Preliminary Determination of Compliance (PDOC) for the Calico Solar Project on June 4, 2009 (MDAQMD 2009b) and a Final Determination of Compliance on January 27, 2010 (MDAQMD 2010a). Compliance with all District rules and regulations was demonstrated to the District’s satisfaction in the FDOC. The District’s FDOC conditions are presented in the Conditions of Certification (**AQ-1** to **AQ-15**).

C.1.10.1 FEDERAL

The District is responsible for issuing the federal New Source Review (NSR) permit and has been delegated enforcement of the applicable New Source Performance Standard

(Subpart IIII). However, this project does not require a federal NSR or Title V permit and this project would not require a PSD permit from U.S.EPA prior to initiating construction.

The proposed project is located in a federal nonattainment area and requires the approval of a federal agency (BLM). Therefore, the proposed project is subject to the general conformity regulations (40 CFR Part 93). The project area is classified as moderate nonattainment of the federal ozone ambient air quality standards and moderate nonattainment of the federal PM10 ambient air quality standards, and the general conformity emissions applicability thresholds for these nonattainment classifications is 100 tons/year of direct and indirect ozone precursor emissions (NOx and VOC), 100 tons/year of direct and indirect PM10 emissions, and 100 tons/year of direct and indirect PM10 precursors identified as major PM10 contributors in the SIP. The currently applicable PM10 SIP does not identify secondary pollutants (NOx, SOx, and VOC) as major contributors to ambient PM10 concentrations.

Without appropriate mitigation, the proposed project's maximum annual direct and indirect emissions of PM10 during construction and operation would have the potential to exceed 100 tons per year, and the NOx emissions during construction would have the potential to exceed 100 tons per year. However, with the applicant-proposed and staff recommended mitigation the PM10, NOx and VOC emissions during construction and operation would all remain below their General Conformity applicability thresholds, as shown in **Air Quality Tables 7**, **9** and **11**. Therefore, the proposed project's mitigated emissions have been determined to be below the applicable General Conformity applicability thresholds, the proposed project is not required to complete a conformity analysis, and conformance with the State Implementation Plan is assumed.

C.1.10.2 STATE

The project owner will demonstrate that the proposed project will comply with Section 41700 of the California State Health and Safety Code, which restricts emissions that would cause nuisance or injury, with the issuance of the District's Final Determination of Compliance and the Energy Commission's affirmative finding for the project.

The emergency generator is also subject to the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines. This measure limits the types of fuels allowed, establishes maximum emission rates, establishes recordkeeping requirements. The proposed Tier 3 engine meets the current emission limit requirements of this measure. This measure would also limit the engine's testing and maintenance operation to no more than 50 hours per year.

C.1.10.3 LOCAL

The District rules and regulations specify the emissions control and offset requirements for new sources such as the Calico Solar. Best Available Control Technology would be implemented, and emission reduction credits (ERCs) are not required to offset the proposed project's emissions by District rules and regulations based on the permitted stationary source emission levels for the proposed project. Compliance with the District's new source requirements would ensure that the proposed project would be consistent with the strategies and future emissions anticipated under the District's air quality attainment and maintenance plans.

The applicant provided an air quality permit application to the MDAQMD and the District issued a PDOC (MDAQMD 2009b) on June 4, 2009 and a FDOC (MDAQMD 2010a) on January 27, 2009. The FDOC states that the proposed project is expected to comply with all applicable District rules and regulations. The DOC evaluates whether and under what conditions the proposed project would comply with the District's applicable rules and regulations, as described below.

Regulation II – Permits

Rule 201 and 203 – Permit to Construct and Permit to Operate

Rule 201 establishes the emission source requirements that must be met to obtain a Permit to Construct. Rule 203 prohibits use of any equipment the use of which may emit air contaminants without obtaining Permit to Operate. The applicant has complied with this rule by submitting the AFC and District permit applications materials.

Regulation IV – Prohibitions

Rule 401 - Visible Emissions

This rule limits visible emissions from emissions sources, including stationary source exhausts and fugitive dust emission sources. Compliance with this rule is expected. In the PDOC, the District has determined that the facility is expected to comply with this rule.

Rule 402 - Nuisance

This rule restricts discharge of emissions that would cause injury, detriment, annoyance, or public nuisance. The facility is expected to comply with this rule (identical to California Health and Safety Code 41700).

Rule 403 - Fugitive Dust

This rule limits fugitive emissions from certain bulk storage, earthmoving, construction and demolition, and manmade conditions resulting in wind erosion. With the implementation of recommended staff conditions **AQ-SC3**, **AQ-SC4**, and **AQ-SC7** the facility is expected to comply with this rule.

Rule 403.2 - Fugitive Dust Control for the Mojave Desert Planning Area

Rule 403.2 limits fugitive dust emissions and requires implementation of the control measures contained in the Mojave Desert Planning Area Federal PM10 Attainment Plan to prevent exceedance of the NAAQS for PM10 within the Mojave Desert Planning Area. The project site is located just east of the Rule-defined Mojave Desert Planning Area, so this regulation is not applicable; however, the staff recommended fugitive dust control conditions would meet or exceed the control requirements of this rule.

Rule 404 - Particulate Matter Concentration

The rule limits particulate matter (PM) emissions to less than 0.05 grains per standard cubic foot of gas discharged at standard conditions. In the PDOC, the District has determined that the applicable equipment's (emergency engine) PM emission concentration are less than the limits established by this rule.

Rule 406 - Specific Contaminants

The rule prohibits sulfur emissions, calculated as SO_2, in excess of 500 ppmv. Compliance with this rule is assured with the required use of California low sulfur diesel fuel for the emergency engine.

Rule 407 - Liquid and Gaseous Air Contaminants

The rule prohibits carbon monoxide emissions in excess of 2,000 ppmv. The emergency engine would have CO emissions well below this concentration limit. Compliance with this rule is expected.

Rule 409 - Fuel Burning Equipment - Combustion Contaminants

This rule limits discharge into the atmosphere from fuel burning equipment combustion contaminants exceeding in concentration at the point of discharge, 0.1 grain per cubic foot of gas calculated to 12% of carbon dioxide (CO_2) at standard conditions. In the FDOC, the District has determined that the emergency generator PM emission concentration are less than 0.05 gr/scf and so would be below the limit established by this rule.

Rule 431 - Sulfur Content of Fuels

The rule prohibits the burning of gaseous fuel with a sulfur content of more than 800 ppm and liquid fuel with a sulfur content of more than 0.5% sulfur by weight. Compliance with this rule is assured with the required use of California low sulfur diesel fuel for the emergency engine.

Rule 461 – Gasoline Transfer and Dispensing

This rule is to limit the emissions of volatile organic compounds (VOC) and toxic compounds during the storage, transfer and dispensing of gasoline. The FDOC includes conditions to assure compliance with this rule.

Regulation IX – Standards of Performance for New Stationary Sources

Rule 900 – Standard of Performance For New Stationary Source (NSPS)

This rule incorporates the Federal NSPS (40 CFR 60) rules by reference. The proposed Tier 3 engine meets the current emission limit requirements of the only NSPS ((Subpart IIII) that applies to the proposed Calico Solar equipment. The exact model and size of the engine is only estimated at this time and has variously been noted as 335 hp or 345 hp in submittals from the applicant and is noted as 399 hp in the FDOC. Additionally, it is uncertain exactly when the emergency engine would be purchased and whether Tier 4 engine emission limits may apply at that time, so staff has added a requirement in the verification of District Condition of Certification (**AQ-7**) to ensure that the engine purchased meets the appropriate NSPS standards for new engines at the time of purchase and to provide information on the final engine parameters.

Regulation XIII – New Source Review

Rule 1303 – New Source Review

This rule requires implementation of BACT for any emission source unit which emits or has the potential to emit 25 lbs/day or more and requires offsets if specific annual emission limits are exceeded. The FDOC concluded that the emergency engine triggered BACT and the engine complies. The gasoline tank did not trigger BACT but nevertheless the tank would comply with BACT requirements. The FDOC concluded that offsets were not required for the proposed project.

Rule 1306 – Electric Energy Generating Facilities

This rule describes actions to be taken for permitting of power plants. Compliance with this rule was achieved with the completion of the FDOC.

C.1.11. NOTEWORTHY PUBLIC BENEFITS

Renewable energy facilities, such as Calico Solar, are needed to meet California's mandated renewable energy goals. While there are no local area air quality public benefits[17] resulting from the proposed project, it would indirectly reduce criteria pollutant emissions within the Southwestern U.S. by reducing fossil fuel fired generation.

C.1.12 MITIGATION MEASURES/ PROPOSED CONDITIONS OF CERTIFICATION

C.1.12.1 STAFF CONDITIONS OF CERTIFICATION

Staff conditions **AQ-SC1** through **AQ-SC4** and **AQ-SC7** are both CEQA and NEPA mitigation conditions. Staff conditions **AQ-SC5**, **AQ-SC6**, and **AQ-SC8** are CEQA-only conditions. Note that the term "CPM" refers to the Energy Commission's Compliance Project Manager.

AQ-SC1 Air Quality Construction Mitigation Manager (AQCMM): The project owner shall designate and retain an on-site AQCMM who shall be responsible for directing and documenting compliance with Conditions of Certification **AQ-SC3**, **AQ-SC4** and **AQ-SC5** for the entire project site and linear facility construction. The on-site AQCMM may delegate responsibilities to one or more AQCMM Delegates. The AQCMM and AQCMM Delegates shall have full access to all areas of construction on the project site and linear facilities, and shall have the authority to stop any or all construction activities as warranted by applicable construction mitigation conditions. The AQCMM and AQCMM Delegates may have other responsibilities in addition to those described in this condition. The AQCMM shall not be terminated without written consent of the Compliance Project Manager (CPM).

[17] Air quality benefits should not be confused with greenhouse gas/climate change benefits, which are discussed in Appendix AIR-1.

Verification: At least 60 days prior to the start of ground disturbance, the project owner shall submit to the BLM's Authorized Officer and CPM for approval, the name, resume, qualifications, and contact information for the on-site AQCMM and all AQCMM Delegates.

AQ-SC2 Air Quality Construction Mitigation Plan (AQCMP): The project owner shall provide an AQCMP, for approval, which details the steps that will be taken and the reporting requirements necessary to ensure compliance with Conditions of Certification **AQ-SC3**, **AQ-SC4,** and **AQ-SC5**.

Verification: At least 60 days prior to the start of any ground disturbance, the project owner shall submit the AQCMP to the BLM's Authorized Officer and CPM for approval. The AQCMP shall include effectiveness and environmental data for the proposed soil stabilizer. The BLM's Authorized Officer or CPM will notify the project owner of any necessary modifications to the plan within 30 days from the date of receipt.

AQ-SC3 Construction Fugitive Dust Control: The AQCMM shall submit documentation to the BLM's Authorized Officer and CPM in each Monthly Compliance Report that demonstrates compliance with the Air Quality Construction Mitigation Plan (AQCMP) mitigation measures for the purposes of minimizing fugitive dust emission creation from construction activities and preventing all fugitive dust plumes from leaving the project. Any deviation from the AQCMP mitigation measures shall require prior BLM Authorized Officer and CPM notification and approval.

Verification: The AQCMM shall provide the BLM's Authorized Officer and the CPM a Monthly Compliance Report (**COMPLIANCE-7**) to include the following to demonstrate control of fugitive dust emissions:

A. A summary of all actions taken to maintain compliance with this condition;

B. Copies of any complaints filed with the District in relation to project construction; and

C. Any other documentation deemed necessary by the BLM Authorized Officer, CPM, and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

1. The following fugitive dust mitigation measures shall be included in the Air Quality Construction Mitigation Plan (AQCMP) required by **AQ-SC2**.

   A. The main access roads through the facility to the power block areas will be either paved or stabilized using soil binders, or equivalent methods, to provide a stabilized surface that is similar for the purposes of dust control to paving, that may or may not include a crushed rock (gravel or similar material with fines removed) top layer, prior to initiating construction in the main power block area, and delivery areas for operations materials (chemicals, replacement parts, etc.) will be paved prior to taking initial deliveries.

   B. All unpaved construction roads and unpaved operation site roads, as they are being constructed, shall be stabilized with a non-toxic soil stabilizer or soil weighting agent that can be determined to be both as efficient or more efficient for fugitive dust control as ARB approved soil stabilizers, and shall not increase any other environmental impacts including loss of vegetation. All other disturbed areas in the project and linear construction sites shall be watered as frequently as necessary during grading; and after active construction activities shall be stabilized with a non-toxic soil stabilizer or soil weighting agent, or alternative approved soil stabilizing methods, in order to comply with the dust mitigation objectives of Condition of Certification **AQ-SC4**. The frequency of watering can be reduced or eliminated during periods of precipitation.

C. No vehicle shall exceed 10 miles per hour on unpaved areas within the construction site, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions.

D. Visible speed limit signs shall be posted at the construction site entrances.

E. All construction equipment vehicle tires shall be inspected and washed as necessary to be cleaned free of dirt prior to entering paved roadways.

F. Gravel ramps of at least 20 feet in length must be provided at the tire washing/cleaning station.

G. All unpaved exits from the construction site shall be graveled or treated to prevent track-out to public roadways.

H. All construction vehicles shall enter the construction site through the treated entrance roadways, unless an alternative route has been submitted to and approved by the CPM and BLM Authorized Officer.

I. Construction areas adjacent to any paved roadway below the grade of the surrounding construction area or otherwise directly impacted by sediment from site drainage shall be provided with sandbags or other equivalently effective measures to prevent run-off to roadways, or other similar run-off control measures as specified in the Storm Water Pollution Prevention Plan (SWPPP), only when such SWPPP measures are necessary so that this condition does not conflict with the requirements of the SWPPP.

J. All paved roads within the construction site shall be swept daily or as needed (less during periods of precipitation) on days when construction activity occurs to prevent the accumulation of dirt and debris.

K. At least the first 500 feet of any paved public roadway exiting the construction site or exiting other unpaved roads en route from the construction site or construction staging areas shall be swept as needed (less during periods of precipitation) on days when construction activity occurs or on any other day when dirt or runoff resulting from the construction site activities is visible on the public paved roadways.

L. All soil storage piles and disturbed areas that remain inactive for longer than 10 days shall be covered, or shall be treated with appropriate dust suppressant compounds.

M. All vehicles that are used to transport solid bulk material on public roadways and that have potential to cause visible emissions shall be provided with a cover, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to provide at least 2 feet of freeboard.

N. Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) shall be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition shall remain in place until the soil is stabilized or permanently covered with vegetation.

AQ-SC4 Dust Plume Response Requirement: The AQCMM or an AQCMM Delegate shall monitor all construction activities for visible dust plumes. Observations of visible dust plumes that have the potential to be transported (A) off the project site and within 400 feet upwind of any regularly occupied structures not owned by the project owner or (B) 200 feet beyond the centerline of the construction of linear facilities indicate that existing mitigation measures are not resulting in effective mitigation. The AQCMP shall include a section detailing how the additional mitigation measures will be accomplished within the time limits specified. The AQCMM or Delegate shall implement the following procedures for additional mitigation measures in the event that such visible dust plumes are observed:

Step 1: The AQCMM or Delegate shall direct more intensive application of the existing mitigation methods within 15 minutes of making such a determination.

Step 2: The AQCMM or Delegate shall direct implementation of additional methods of dust suppression if Step 1, specified above, fails to result in adequate mitigation within 30 minutes of the original determination.

Step 3: The AQCMM or Delegate shall direct a temporary shutdown of the activity causing the emissions if Step 2, specified above, fails to result in effective mitigation within one hour of the original determination. The activity shall not restart until the AQCMM or Delegate is satisfied that appropriate additional mitigation or other site conditions have changed so that visual dust plumes will not result upon restarting the shutdown source. The owner/operator may appeal to the CPM or BLM Authorized Officer any directive from the AQCMM or Delegate to shut down an activity, if the shutdown shall go into effect within one hour of the original determination, unless overruled by the CPM or BLM Authorized Officer before that time.

Verification: The AQCMM shall provide the BLM's Authorized Officer and the CPM a Monthly Compliance Report (**COMPLIANCE-7**) to include:

A. a summary of all actions taken to maintain compliance with this condition;

B. copies of any complaints filed with the District in relation to project construction; and

C. any other documentation deemed necessary by the CPM and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC5 Diesel-Fueled Engine Control: The AQCMM shall submit to the CPM, in the Monthly Compliance Report, a construction mitigation report that demonstrates compliance with the AQCMP mitigation measures for purposes of controlling diesel construction-related emissions. Any deviation from the AQCMP mitigation measures shall require prior and CPM notification and approval.

Verification: The AQCMM shall include in the Monthly Compliance Report (**COMPLIANCE-7**) the following to demonstrate control of diesel construction-related emissions:

A. A summary of all actions taken to control diesel construction related emissions;

B. A list of all heavy equipment used on site during that month, including the owner of that equipment and a letter from each owner indicating that equipment has been properly maintained; and

C. Any other documentation deemed necessary by the CPM, and the AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

The following off-road diesel construction equipment mitigation measures shall be included in the Air Quality Construction Mitigation Plan (AQCMP) required by **AQ-SC2**.

a. All diesel-fueled engines used in the construction of the facility shall have clearly visible tags issued by the on-site AQCMM showing that the engine meets the conditions set forth herein.

b. All construction diesel engines with a rating of 50 hp or higher shall meet, at a minimum, the Tier 3 California Emission Standards for Off-Road Compression-Ignition Engines, as specified in California Code of Regulations, Title 13, section 2423(b)(1), unless a good faith effort to the satisfaction of the CPM that is certified by the on-site AQCMM demonstrates that such engine is not available for a particular item of equipment. In the event that a Tier 3 engine is not available for any off-road equipment larger than 100 hp, that equipment shall be equipped with a Tier 2 engine, or an engine that is equipped with retrofit controls to reduce exhaust emissions of nitrogen oxides (NOx) and diesel particulate matter (DPM) to no more than Tier 2 levels unless certified by engine manufacturers or the on-site AQCMM that the use of such devices is not practical for specific engine types. For purposes of this condition, the use of such devices is "not practical" for the following, as well as other, reasons.

1. There is no available retrofit control device that has been verified by either the California Air Resources Board or U.S. Environmental Protection Agency to control the engine in question to Tier 2 equivalent emission levels and the highest level of available control using retrofit or Tier 1 engines is being used for the engine in question; or

2. The construction equipment is intended to be on site for 5 days or less.

3. The CPM may grant relief from this requirement if the AQCMM can demonstrate a good faith effort to comply with this requirement and that compliance is not practical.

c. The use of a retrofit control device may be terminated immediately, provided that the CPM is informed within 10 working days of the termination and that a replacement for the equipment item in question meeting the controls required in item “b” occurs within 10 days of termination of the use, if the equipment would be needed to continue working at this site for more than 15 days after the use of the retrofit control device is terminated, if one of the following conditions exists :

1. The use of the retrofit control device is excessively reducing the normal availability of the construction equipment due to increased down time for maintenance, and/or reduced power output due to an excessive increase in back pressure.

2. The retrofit control device is causing or is reasonably expected to cause engine damage.

3. The retrofit control device is causing or is reasonably expected to cause a substantial risk to workers or the public.

4. Any other seriously detrimental cause which has the approval of the CPM prior to implementation of the termination.

d. All heavy earth-moving equipment and heavy duty construction-related trucks with engines meeting the requirements of (b) above shall be properly maintained and the engines tuned to the engine manufacturer’s specifications.

e. All diesel heavy construction equipment shall not idle for more than 5 minutes. Vehicles that need to idle as part of their normal operation (such as concrete trucks) are exempted from this requirement.

f. Construction equipment will employ electric motors when feasible.

AQ-SC6 The project owner, when obtaining dedicated on-road or off-road vehicles for mirror washing activities and other facility maintenance activities, shall only obtain new model year vehicles that meet California on-road vehicle emission standards or appropriate U.S.EPA/California off-road engine emission standards for the model year when obtained.

<u>Verification:</u> At least 60 days prior to the start commercial operation, the project owner shall submit to the CPM a copy of the plan that identifies the size and type of the on-site vehicle and equipment fleet and the vehicle and equipment purchase orders and contracts and/or purchase schedule. The plan shall be updated every other year and submitted in the Annual Compliance Report (**COMPLIANCE-8**).

AQ-SC7 The project owner shall provide a site Operations Dust Control Plan, including all applicable fugitive dust control measures identified in the verification of **AQ-SC3** that would be applicable to minimizing fugitive dust emission creation from operation and maintenance activities and preventing all fugitive dust plumes from leaving the project site; that:

A. describes the active operations and wind erosion control techniques such as windbreaks and chemical dust suppressants, including their ongoing maintenance procedures, that shall be used on areas that could be disturbed by vehicles or wind anywhere within the project boundaries; and

B. identifies the location of signs throughout the facility that will limit traveling on unpaved portion of roadways to solar equipment maintenance vehicles only. In addition, vehicle speed shall be limited to no more than 10 miles per hour on these unpaved roadways, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions.

The site operations fugitive dust control plan shall include the use of durable non-toxic soil stabilizers on all regularly used unpaved roads and disturbed off-road areas, or alternative methods for stabilizing disturbed off-road areas, within the project boundaries, and shall include the inspection and maintenance procedures that will be undertaken to ensure that the unpaved roads remain stabilized. The soil stabilizer used shall be a non-toxic soil stabilizer or soil weighting agent that can be determined to be both as efficient or more efficient for fugitive dust control as ARB approved soil stabilizers, and shall not increase any other environmental impacts including loss of vegetation.

The performance and application of the fugitive dust controls shall also be measured against and meet the performance requirements of condition **AQ-SC4**. The measures and performance requirements of **AQ-SC4** shall also be included in the operations dust control plan.

<u>Verification:</u> At least 60 days prior to start of commercial operation, the project owner shall submit to the BLM's Authorized Officer and the CPM for review and approval a copy of the site Operations Dust Control Plan that identifies the dust and erosion control procedures, including effectiveness and environmental data for the proposed soil stabilizer, that will be used during operation of the project and that identifies all locations of the speed limit signs. At least 60 days after commercial operation, the project owner shall provide to the BLM's Authorized Officer and the CPM a report identifying the locations of all speed limit signs, and a copy of the project employee and contractor training manual that clearly identifies that project employees and contractors are required to comply with the dust and erosion control procedures and on-site speed limits.

AQ-SC8 The project owner shall provide the CPM copies of all District issued Authority-to-Construct (ATC) and Permit-to-Operate (PTO) documents for the facility.

The project owner shall submit to the CPM for review and approval any modification proposed by the project owner to any project air permit. The project owner shall submit to the CPM any modification to any permit proposed by the District or U.S. Environmental Protection Agency (U.S. EPA), and any revised permit issued by the District or U.S. EPA, for the project.

<u>Verification:</u> The project owner shall submit any ATC, PTO, and proposed air permit modifications to the CPM within 5 working days of its submittal either by 1) the project owner to an agency, or 2) receipt of proposed modifications from an agency. The project owner shall submit all modified air permits to the CPM within 15 days of receipt.

C.1.12.2 DISTRICT CONDITIONS

<u>DISTRICT FINAL DETERMINATION OF COMPLIANCE CONDITIONS (MDAQMD 2010a)</u>

District conditions **AQ-1** through **AQ-15** are CEQA-only required conditions.

Application No. 00010423 (Emergency Generator)

<u>EQUIPMENT DESCRIPTION:</u>

Cummins, Model QSL9-G3 NR3, which is an ARB Certified Tier III engine, serial number unknown, Year of manufacture unknown, 399 bhp, Direct Injected, Turbo Charged, operating at a maximum of 1800 rpm, fueled on ARB diesel, with a maximum fuel consumption rate of 19.2 gph, powering an electrical generator.

AQ-1 Engine may operate in response to notification of impending rotating outage if the area utility has ordered rotating outages in the area where the engine is located or expects to order such outages at a particular time, the engine is located in the area subject to the rotating outage, the engine is operated no more than 30 minutes prior to the forecasted outage, and the engine is shut down immediately after the utility advises that the outage is no longer imminent or in effect.

<u>Verification:</u> The project owner shall maintain engine operating records as required in **AQ-6** and shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-2 This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15 ppm) on a weight per weight basis per ARB Diesel or equivalent requirements.

<u>Verification:</u> The project owner shall maintain the fuel sulfur content records for diesel fuel deliveries on site as required in **AQ-6** and shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-3 This equipment shall be installed, operated and maintained in strict accord with those recommendations of the manufacturer/supplier and/or sound engineering principles which produce the minimum emissions of contaminants. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-4 A non-resettable four-digit (9,999) hour timer shall be installed and maintained on this unit to indicate elapsed engine operating time.

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB, and the Energy Commission.

AQ-5 This unit shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than 50 hours per year, and no more than 0.5 hours per day for testing and maintenance, excluding compliance source testing. Time required for source testing will not be counted toward the 50 hour per year limit.

Verification: The project owner shall maintain engine use records on site as required in **AQ-6** and shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-6 The project owner shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:

a. Date of each use and duration of each use (in hours);
b. Reason for use (testing & maintenance, emergency, required emission testing);
c. Calendar year operation in terms of fuel consumption (in gallons) and total hours; and,
d. Fuel sulfur concentration (the project owner may use the supplier's certification of sulfur content if it is maintained as part of this log).

Verification: The project owner shall submit records required by this condition that demonstrating compliance with the sulfur content and engine use limitations of conditions **AQ-2** and **AQ-5** in the Annual Compliance Report (**COMPLIANCE-8**), including a photograph showing the annual reading of engine hours. The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-7 This genset is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (Title 17 CCR 93115). In the event of conflict between these conditions and the ATCM, the more stringent requirements shall govern.

Verification: The project owner shall submit the engine specifications at least 30 days prior to purchasing the engines for review and approval demonstrating that the engines meet both ATCM and New Source Performance Standard (NSPS) subpart IIII emission limit requirements at the time of engine purchase. The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-8 This unit shall not be used to provide power during a voluntary agreed to power outage and/or power reduction initiated under an Interruptible Service Contract (ISC); Demand Response Program (DRP); Load Reduction Program (LRP) and/or similar arrangement(s) with the electrical power supplier.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

Application No. 00010422 (5,000 gallon Above Ground Non-Retail Gasoline Dispensing Facility)

EQUIPMENT DESCRIPTION:

An Oldcastle Aboveground Below-Grade Fuel Vault with Balance Vapor Recovery System and Buried Vapor Return Piping, 5,000 gallon capacity.

AQ-9 The toll-free telephone number that must be posted is 1-800-635-4617.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-10 The project owner shall maintain a log of all inspections, repairs, and maintenance on equipment subject to Rule 461. Such logs or records shall be maintained at the facility for at least two (2) years and shall be available to the District upon request.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-11 Any modifications or changes to the piping or control fitting of the vapor recovery system require prior approval from the District.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-12 The vapor vent pipes are to be equipped with pressure relief valves.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-13 The project owner shall perform the following tests within 60 days of construction completion and annually thereafter in accord with the following test procedures:

a. Static Pressure Decay Test per ARB test method TP-201.3B (2-inch test);

b. Dynamic Back Pressure test per TP-201.4;

c. Liquid Removal Test (if applicable) per TP-201.6;

d. Fuel dispensing rate not to exceed 10 gpm, verified per EO G-70-200-C Exhibit 4, and;

e. Emergency vents and manways shall be leak free when tested at the operating pressure of the tank in accordance with ARB test methods, as specified in Title 17, California Code of Regulations.

The District shall be notified a minimum of 10 days prior to performing the required tests with the final results submitted to the District within 30 days of completion of the tests.

The District shall receive passing test reports no later than six (6) weeks prior to the expiration date of this permit.

Verification: The project owner shall notify the District at least 10 days prior to performing the required tests. The test results shall be submitted to the District within 30 days of completion of the tests and shall be made available to the CPM if requested.

AQ-14 The annual throughput of gasoline shall not exceed 500,000 gallons per year. Throughput Records shall be kept on site and available to District personnel upon request. Before this annual throughput can be increased the facility may be required to submit to the District a site specific Health Risk Assessment in accord with a District approved plan. In addition public notice and/or comment period may be required.

Verification: The project owner shall submit to the CPM gasoline throughput records demonstrating compliance with this condition as part of the Annual Compliance Report (**COMPLIANCE-8**). The project owner shall maintain on site the annual gasoline throughput records and shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-15 The project owner shall; install, maintain, and operate this equipment in compliance with ARB Executive Order G-70-200-C or Enhanced Vapor Recovery (EVR) Phase I and EVR Phase II, and Standing Loss requirements in affect at the time of construction.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

C.1.13 CONCLUSIONS

Staff has made the following conclusions about the Calico Solar Project:

- The proposed project would not have the potential to exceed PSD emission levels during direct source operation and the facility is not considered a major stationary source with potential to cause adverse NEPA air quality impacts. However, without adequate fugitive dust mitigation, the proposed project would have the potential to exceed the General Conformity PM10 applicability threshold during construction and operation and the NOx applicability threshold during construction, and could cause potential localized exceedances of the PM10 NAAQS during construction and operation. Recommended Conditions of Certification **AQ-SC1** through **AQ-SC4**, for construction, and **AQ-SC7**, for operation, will adequately mitigate these potentially adverse NEPA impacts.

- The proposed project would comply with applicable District Rules and Regulations and staff recommends the inclusion of the District's FDOC conditions as Conditions of Certification **AQ-1** through **AQ-15.**
- Without adequate mitigation, the proposed project's construction activities would likely contribute to significant CEQA adverse PM10 and ozone impacts. Staff recommends **AQ-SC1** to **AQ-SC5** to mitigate the potential impacts.
- The proposed project's operation would not cause new violations of any NO_2, SO_2, PM2.5 or CO ambient air quality standards. Therefore, the project-direct operation NOx, SOx, PM2.5 and CO emission impacts are not CEQA significant. However, the analyses did not include the new federal 1-hour NO_2 ambient air quality standard.
- The proposed project's direct and indirect, or secondary emissions contribution to existing violations of the ozone and PM10 ambient air quality standards are likely CEQA significant if unmitigated. Therefore, staff recommends **AQ-SC6** to mitigate the onsite maintenance vehicle emissions and **AQ-SC7** to mitigate the operating fugitive dust emissions to ensure that the potential ozone and PM10 CEQA impacts are mitigated to less than significant over the life of the project.
- The proposed project would be consistent with the requirements of SB 1368 and the Emission Performance Standard for greenhouse gases (see **Appendix Air-1**).

C.1.14 REFERENCES

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APPENDIX AIR-1 - GREENHOUSE GAS EMISSIONS

Testimony of William Walters, P.E.

SUMMARY OF CONCLUSIONS

The Calico Solar Project is a proposed addition to the state's electricity system. Calico Solar is a solar concentrating thermal power plant, which is comprised of 34,000 solar dish Stirling systems (referred to as SunCatchers) that focus solar energy that power a 25-kilowatt Stirling engine. As a solar project its greenhouse gas (GHG) emissions would be considerably less than the existing statewide average GHG emissions per unit of generation and considerably less than the GHG emissions from existing fossil fuel fired power plants providing generation to California, and thus would contribute to continued reduction of GHG emissions in the interconnected California and the western United States electricity systems.

While Calico Solar would emit some GHG emissions, the contribution to the system build-out of renewable resources to meet the goals of the Renewable Portfolio Standard (RPS) in California would result in a net cumulative reduction of energy generation and GHG emissions from new and existing fossil-fired electricity resources. Electricity is produced by operation of inter-connected generation resources. Operation of one power plant, like Calico Solar, affects all other power plants in the interconnected system. Calico Solar would be a must-take facility and its operation would affect the overall electricity system operation and GHG emissions in several ways:

- Calico Solar would provide low-GHG, renewable generation.
- Calico Solar would facilitate to some degree the replacement of high GHG emitting (e.g., out-of-state coal) electricity generation that must be phased out to meet the State's 2006 Emissions Performance Standard.
- Calico Solar could facilitate to some extent the replacement of generation provided by aging fossil-fired power plants that use once-through cooling.

These system impacts would result in a net reduction in GHG emissions across the electricity system providing energy and capacity to California. Thus, staff concludes that the proposed project would result in a cumulative overall reduction in GHG emissions from power plants, does not worsen current conditions, and would not result in impacts that are cumulatively CEQA significant.

Staff concludes that the short-term minor emission of greenhouse gases during construction that are necessary to create this new, low GHG-emitting power generating facility would be sufficiently reduced by "best practices" and would be more than offset by GHG emission reductions during operation. Thus, construction GHG emissions would not be CEQA significant.

The Calico Solar Project, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]).

The California Air Resources Board (ARB) has promulgated regulations for mandatory GHG emission reporting to comply with the California Global Warming Solutions Act of 2006 (AB 32 Núñez, Statutes of 2006, Chapter 488, Health and Safety Code sections 38500 et seq.) (ARB 2008a). The Calico Solar Project, which solely generates electricity from solar power, is exempt from the mandatory GHG emission reporting requirements for electricity generating facilities [CCR Title 17 §95101(c)(1)]. However, the proposed project may be subject to future reporting requirements and GHG reductions or trading requirements as additional state or federal GHG regulations are developed and implemented.

INTRODUCTION

Greenhouse gas (GHG) emissions are not criteria pollutants, but they are discussed in the context of cumulative impacts. However, on April 2, 2007, the U.S. Supreme Court found that GHGs are pollutants that must be covered by the federal Clean Air Act. In response, on September 30, 2009, the U.S. Environmental Protection Agency proposed to apply Prevention of Significant Deterioration (PSD) requirements to facilities whose carbon dioxide-equivalent emissions exceed 25,000 tons per year (U.S.EPA 2009c). The rule making is not finalized, but the GHG emissions for Calico Solar are not expected to exceed this amount.

The state has demonstrated a clear willingness to address global climate change through research, adaptation and inventory reductions. In that context, staff evaluates the GHG emissions from the proposed project, presents information on GHG emissions related to electricity generation, and describes the applicable GHG standards and requirements.

Generation of electricity can produce greenhouse gases with the criteria air pollutants that have been traditionally regulated under the federal and state Clean Air Acts. For fossil fuel-fired power plants, the GHG emissions include primarily carbon dioxide, with much smaller amounts of nitrous oxide (N_2O, not NO or NO_2, which are commonly known as NOx or oxides of nitrogen), and methane (CH_4 – often from unburned natural gas). For solar energy generation projects the stationary source GHG emissions are much smaller than fossil fuel-fired power plants, but the associated maintenance vehicle emissions are higher. Other sources of GHG emissions include sulfur hexafluoride (SF_6) from high voltage equipment and hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) from refrigeration/chiller equipment. GHG emissions from the electricity sector are dominated by CO_2 emissions from carbon-based fuels; other sources of GHG emissions are small and also are more likely to be easily controlled or reused or recycled, but are nevertheless documented here as some of the compounds have very high global warming potentials.

Global warming potential is a relative measure, compared to carbon dioxide, of a compound's residence time in the atmosphere and ability to warm the planet. Mass emissions of GHGs are converted into carbon dioxide equivalent (CO2E) metric tonnes (MT) for ease of comparison.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local laws and policies in **Greenhouse Gas Table** 1 pertain to the control and mitigation of greenhouse gas emissions. Staff's analysis examines the proposed project's compliance with these requirements.

GLOBAL CLIMATE CHANGE AND ELECTRICITY PRODUCTION

There is general scientific consensus that climate change is occurring and that human activity contributes in some measure (perhaps substantially) to that change. Man-made emissions of greenhouse gases, if not sufficiently curtailed, are likely to contribute further to continued increases in global temperatures. Indeed, the California Legislature finds that "[g]lobal warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California" (Cal. Health & Safety Code, sec. 38500, division 25.5, part 1).

Greenhouse Gas Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
40 Code of Federal Regulations (CFR) Part 98	This rule requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 metric tons of CO_2 equivalent emissions per year.
State	
California Global Warming Solutions Act of 2006, AB 32 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)	This act requires the California Air Resources Board (ARB) to enact standards that will reduce GHG emission to 1990 levels by 2020. Electricity production facilities will be regulated by the ARB.
California Code of Regulations, tit. 17, Subchapter 10, Article 2, sections 95100 et. seq.	These ARB regulations implement mandatory GHG emissions reporting as part of the California Global Warming Solutions Act of 2006 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)
Title 20, California Code of Regulations, section 2900 et seq.; CPUC Decision D0701039 in proceeding R0604009	The regulations prohibit utilities from entering into long-term contracts with any base load facility that does not meet a greenhouse gas emission standard of 0.5 metric tonnes carbon dioxide per megawatt-hour (0.5 $MTCO_2$/MWh) or 1,100 pounds carbon dioxide per megawatt-hour (1,100 lbs CO_2/MWh).

In 1998, the Energy Commission identified a range of strategies to prepare for an uncertain climate future, including a need to account for the environmental impacts associated with energy production, planning, and procurement (CEC 1998, p.5). In 2003, the Energy Commission recommended that the state require reporting of greenhouse gases (GHG) or global climate change[18] emissions as a condition of state licensing of new electric generating facilities (CEC 2003, IEPR p. 42). In 2006, California enacted the California Global Warming Solutions Act of 2006 (AB 32). It requires the California Air Resources Board (ARB) to adopt standards that will reduce statewide GHG emissions to statewide GHG emissions levels in 1990, with such

[18] Global climate change is the result of greenhouse gases, or air emissions with global warming potentials, affecting the global energy balance, and thereby, climate of the planet. The term greenhouse gases (GHG) and global climate change (GCC) gases are used interchangeably.

reductions to be achieved by 2020.[19] To achieve this, ARB has a mandate to define the 1990 emissions level and achieve the maximum technologically feasible and cost-effective GHG emission reductions.

The ARB adopted early action GHG reduction measures in October 2007, adopted mandatory reporting requirements and the 2020 statewide target in December 2007, and adopted a statewide scoping plan in December 2008 to identify how emission reductions will be achieved from major sources of GHG via regulations, market mechanisms, and other actions. ARB staff is developing regulatory language to implement its plan and holds ongoing public workshops on key elements of the recommended GHG reduction measures, including market mechanisms (ARB 2006). The regulations must be effective by January 1, 2011 and mandatory compliance commences on January 1, 2012. The mandatory reporting requirements are effective for electric generating facilities with a nameplate capacity equal or greater than 1 megawatt (MW) capacity if their emissions exceed 2,500 metric tonnes per year. The due date for initial reports by existing facilities was June 1, 2009.

Examples of strategies that the state might pursue for managing GHG emissions in California, in addition to those recommended by the Energy Commission and the Public Utilities Commission, were identified in the California Climate Action Team's Report to the Governor (CalEPA 2006). The scoping plan approved by ARB in December 2008 builds upon the overall climate policies of the Climate Action Team report and shows the recommended strategies to achieve the goals for 2020 and beyond. Some strategies focus on reducing consumption of petroleum across all areas of the California economy. Improvements in transportation energy efficiency (fuel economy), land use planning, and alternatives to petroleum-based fuels are slated to provide substantial reductions by 2020 (CalEPA 2006). The scoping plan includes a requirement for 33% of California's electrical energy to be provided from renewable sources by 2020 (implementing California's 33% RPS goal), aggressive energy efficiency targets, and a cap-and-trade system that includes the electricity sector (ARB 2008b).

It is likely that GHG reductions mandated by ARB will not be uniform across emitting sectors, in that reductions will be based on cost-effectiveness (i.e., the greatest effect for the least cost). For example, the ARB proposes a 40% reduction in GHG from the electricity sector, even though that sector currently only produces about 25% of the state's GHG emissions. In response, in September 2008 the Energy Commission and the Public Utilities Commission provided recommendations (CPUC 2008) to ARB on how to achieve such reductions through both programmatic and regulatory approaches, and identified regulation points should ARB decide that a multi-sector cap and trade system is warranted.

The Energy Commission's *2007 Integrated Energy Policy Report* (IEPR) also addressed climate change within the electricity, natural gas, and transportation sectors (CEC 2007). For the electricity sector, it recommended such approaches as pursuing all cost-effective energy efficiency measures and meeting the Governor's stated goal of a 33% renewable portfolio standard. The Energy Commission's *2009 Integrated Energy Policy*

[19] Governor Schwarzenegger has also issued Executive Order S-3-05 establishing a goal of 80% below 1990 levels by 2050.

Report continues to emphasize the important of meeting greenhouse gas emissions reduction goals along with other important statewide issues such as backing out use of once-through cooling in coastal California power plants (CEC 2009d).

SB 1368[20], enacted in 2006, and regulations adopted by the Energy Commission and the Public Utilities Commission pursuant to the bill, prohibits California utilities from entering into long-term commitments with any base load facilities that exceed the Emission Performance Standard of 0.500 metric tonnes CO_2 per megawatt-hour[21] (1,100 pounds CO_2/MWh). Specifically, the SB 1368 Emission Performance Standard (EPS) applies to base load power from new power plants, new investments in existing power plants, and new or renewed contracts with terms of 5 years or more, including contracts with power plants located outside of California.[22] If a project, instate or out of state, plans to sell base load electricity to a California utility that utility will have to demonstrate that the project meets the EPS. *Base load* units are defined as units that operate at a capacity factor higher than 60%. As a renewable electricity generating facility, Calico Solar is determined by rule to be compliant with the SB 1368 EPS.

In addition to these programs, California is involved in the Western Climate Initiative, a multi-state and international effort to establish a cap and trade market to reduce greenhouse gas emissions in the Western United States and the Western Electricity Coordinating Council (WECC). The timelines for the implementation of this program are similar to those of AB 32, with full roll-out beginning in 2012. And as with AB 32, the electricity sector has been a major focus of attention.

ELECTRICITY PROJECT GREENHOUSE GAS EMISSIONS

Electricity use can be as simple as turning on a switch to operate a light or fan. The system to deliver adequate and reliable electricity supply is complex and variable. But it operates as an integrated whole to meet demand, such that the dispatch of a new source of generation generally curtails or displaces one or more less efficient or less competitive existing sources. Within the system, generation resources provide electricity, or energy, generating capacity, and ancillary services to stabilize the system and facilitate electricity delivery, or movement, over the grid. *Capacity* is the instantaneous output of a resource, in megawatts. *Energy* is the capacity output over a unit of time, for example an hour or year, generally reported as megawatt-hours or gigawatt-hours (GWh). Ancillary services[23] include regulation, spinning reserve, non-spinning reserve, voltage support, and black start capability. Individual generation resources can be built and operated to provide only one specific service. Alternatively, a resource may be able to provide one or all of these services, depending on its design and constantly changing system needs and operations.

California is actively pursuing policies to reduce GHG emissions that include adding non-GHG emitting renewable generation resources to the system mix. The generation

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[20] Public Utilities Code § 8340 et seq.

[21] The Emission Performance Standard only applies to carbon dioxide, and does not include emissions of other greenhouse gases converted to carbon dioxide equivalent.

[22] See Rule at http://www.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/64072.htm

[23] See CEC 2009b, page 95.

of electricity using fossil fuels, even in a back-up generator at a thermal solar plant, produces air emissions known as greenhouse gases in addition to the criteria air pollutants that have been traditionally regulated under the federal and state Clean Air Acts. Greenhouse gas emissions contribute to the warming of the earth's atmosphere, leading to climate change.

PROJECT CONSTRUCTION

Construction of industrial facilities such as power plants requires coordination of numerous equipment and personnel. The concentrated on-site activities result in short-term, unavoidable increases in vehicle and equipment emissions that include greenhouse gases. The greenhouse gas emissions estimate, determined for the entire construction period[24], is presented below in **Greenhouse Gas Table 2,** where the GHG emissions were converted by staff into MTCO2E and totaled.

Greenhouse Gas Table 2
Estimated Calico Solar Potential Construction Greenhouse Gas Emissions

Construction Element	CO2-Equivalent (MTCO2E) [a,b]
On-Site Construction Equipment	4,988.20
On-Site Delivery Trucks	1,678.36
On-Site Construction/Worker/Security Vehicles	1,805.69
Off-Site Worker/Security Vehicles	13,954.82
Off-Site Delivery Trucks	17,028.23
On-site/Off-site Train for Water Delivery	2,115.71
Construction Total	41,571.01

Source: TS 2010q
[A] **ONE METRIC TONNE (MT) EQUALS 1.1 SHORT TONS OR 2,204.6 POUNDS OR 1,000 KILOGRAMS**
[b] The vast majority of the CO2E emissions, over 99%, are CO_2 from these combustion sources.

PROJECT OPERATIONS

Operations GHG emissions are shown in **Greenhouse Gas Table 3**. Operation of the proposed Calico Solar Project would cause GHG emissions from the facility maintenance fleet and employee trips, emergency generator engine, and sulfur hexafluoride emissions from new electrical component equipment.

[24] The construction period originally evaluated was 41 months in duration. The applicant has revised the construction period duration to 59 months (TS 2010g). The project construction requirements have not increased from those evaluated, but it is not clear whether the total GHG emissions would be impacted by this assumed lengthening of the construction schedule.

Greenhouse Gas Table 3
Estimated Calico Solar Potential Operating Greenhouse Gas Emissions

Operating Element	Annual CO_2-Equivalent (MTCO2E)[a]
On-site Stationary Equipment Combustion [b]	0.82
On-site Vehicle Combustion [b]	1,634.51
On-site Train for Water Delivery [b]	153.75
Off-site Vehicle Combustion [b]	1,174.54
Off-site Train for Water Delivery [b]	140.19
Equipment Leakage (SF_6)	384.42
Total Project GHG Emissions – MTCO2E [b]	**3,488.22**
Facility MWh per year [c]	1,840,000
Facility GHG Performance (MTCO2E/MWh)	0.00190

Source: TS 2010q
[a] One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.
[b] the vast majority of the co2e emissions, over 99%, are co_2 from these emission sources.
[c] Approximately a 25% capacity factor.

Greenhouse Gas Table 3 shows what the proposed project, as permitted, could potentially emit in greenhouse gases on an annual basis. All emissions are converted to CO_2-equivalent and totaled. Electricity generation GHG emissions are generally dominated by CO_2 emissions from the carbon-based fuels; other sources of GHG are typically small and also are more likely to be easily controlled or reused/recycled. For this solar project the primary fuel, solar energy, is greenhouse gas free, but there is direct and indirect gasoline and diesel fuel use in the maintenance vehicles, offsite delivery vehicles, staff and employee vehicles, and a 335-hp diesel-fueled emergency engine. Another GHG emission source for the proposed project is the SF_6 equipment leakage.

The proposed project is estimated to emit, directly from primary and secondary emission sources on an annual basis, nearly 3,500 metric tonnes of CO_2-equivalent GHG emissions per year. The Calico Solar Project, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]). Regardless, Calico Solar has an estimated GHG emission rate of 0.00190 MTCO2E/MWh, well below the Greenhouse Gas Emission Performance Standard of 0.500 MTCO2/MWh.

Solar Project Energy Payback Time

The beneficial energy and greenhouse gas impacts of renewable energy projects can also be measured by the *energy payback time*[25]. **Greenhouse Gas Tables 2** and **3** provide an estimate of the onsite construction and operation emissions, employee transportation emissions, and the final segment of offsite materials and consumables transportation. However, there are additional direct transportation and indirect manufacturing GHG emissions associated with the construction and operation of the proposed project, which are all considered in the determination of the energy payback

[25] The energy payback time is the time required to produce an amount of energy as great as what was consumed during production, which in the context of a solar power plant includes all of the energy required during construction and operation.

time. A document sponsored by Greenpeace estimates that the energy payback time for concentrating solar power plants, such as Calico Solar, to be on the order of 5 months (Greenpeace 2005, Page 9); and the project life for Calico Solar is estimated to be 40 years (SES 2008a, p. 3-77). Therefore, the proposed project's GHG emissions reduction potential from energy displacement would be substantial[26].

Natural Carbon Uptake Reduction

This proposed project would cause the clearing of land and removal of vegetation, which would reduce the ongoing natural carbon uptake by vegetation. A study of the Mojave Desert indicated that the desert may uptake carbon in amounts as high as 100 grams per square meter per year (Wohlfahrt et. al. 2008). This would equate to a maximum reduction in carbon uptake, calculated as CO_2, of 1.48 MT of CO_2 per acre per year for areas with complete vegetation removal. For this 8,230 acre proposed project, which actually does not require the complete removal of vegetation over most of the project site, the maximum equivalent loss in carbon uptake assuming complete vegetation removal would be 12,180 MT of CO_2 per year, which would correspond to 0.007 MT of CO_2 per MWh generated. Therefore, the natural carbon uptake loss is negligible in comparison with the reduction in fossil fuel CO_2 emissions, which can range from 0.35 to 1.0 MT of CO_2 per MWh depending on the fuel and technology, that is enabled by this proposed project.

CLOSURE AND DECOMMISSIONING

Closure and decommissioning, as a one-time limited duration event, would have emissions that are similar in type and magnitude, but likely lower than, the construction emissions as discussed above.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff assesses four kinds of impacts: construction, operation, closure and decommissioning, and cumulative effects. As the name implies, construction impacts result from the emissions occurring during the construction of the proposed project. The operation impacts result from the emissions of the proposed project during operation. Cumulative impacts analysis assesses the impacts that result from the proposed project's incremental effect viewed over time. The impact of GHG emissions caused by this solar facility is characterized by considering how the power plant would affect the overall electricity system. The integrated electricity system depends on non-fossil and fossil-fueled generation resources to provide energy and satisfy local capacity needs. As directed by the Energy Commission's adopted order initiating an informational (OII) proceeding (08-GHG OII-1) (CEC 2009a), staff is refining and implementing the concept of a "blueprint" that describes the long-term roles (i.e., retirements and displacement) of

[26] The GHG displacement for the project would be similar to, but not exactly the same as, the amount of energy produced after energy payback is achieved multiplied by the average GHG emissions per unit of energy displaced. The average GHG emissions for the displaced energy over the project life is not known but currently fossil fuel fired power plants have GHG emissions that range from 0.35 MT/MWh CO2E for the most efficient combined cycle gas turbine power plants to over 1.0 MT/MWh for coal fired power plants.

fossil-fueled power plants in California's electricity system as we move to a high-renewable, low-GHG electricity system, which would include projects like Calico Solar.

PROPOSED PROJECT

Construction Impacts

Staff concludes that the GHG emission increases from construction activities would not be CEQA significant for several reasons. First, the period of construction would be short-term and the emissions intermittent during that period, not ongoing during the life of the proposed project. Second, best practices control measures that staff recommends, such as limiting idling times and requiring, as appropriate, equipment that meet the latest emissions standards, would further minimize greenhouse gas emissions since the use of newer equipment would increase efficiency and reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of the ARB regulations to reduce GHG from construction vehicles and equipment. And lastly, these temporary GHG emissions are necessary to create this renewable energy source that would provide power with a very low GHG emissions profile, and the construction emissions would be more than offset by the reduction in fossil fuel fired generation that would be enabled by this proposed project. If the proposed project construction emissions were distributed over the 40 year life of the proposed project they would only increase the project life time annual facility GHG emissions rate by 0.00056 MT CO_{2}-eq per MW.

Direct/Indirect Operation Impacts and Mitigation

The proposed Calico Solar Project promotes the state's efforts to move towards a high-renewable, low-GHG electricity system, and, therefore, reduces both the amount of natural gas used by electricity generation and greenhouse gas emissions.

Net GHG emissions for the integrated electric system will decline when new renewable power plants are added to: 1) move renewable generation towards the 33% target; 2) improve the overall efficiency, or GHG emission rate, of the electric system; or 3) serve load growth or capacity needs more efficiently, or with fewer GHG emissions.

The Role of Calico Solar in Renewables Goals/Load Growth

As California moves towards an increased reliance on renewable energy by implementing the Renewables Portfolio Standard (RPS), non-renewable energy resources will be displaced. These reductions in non-renewable energy, shown in **Greenhouse Gas Table 4**, could be as much as 36,500 GWh. These assumptions are conservative in that the forecasted growth in electricity retail sales assumes that the impacts of planned increases in expenditures on (uncommitted) energy efficiency are already embodied in the current retail sales forecast[27]. Energy Commission staff estimates that as much as 18,000 GWh of additional savings due to uncommitted

[27] Energy efficiency savings are already represented in the current Energy Commission demand forecast adopted December 2009 (CEC 2009c).

energy efficiency programs may be forthcoming.[28] This would reduce non-renewable energy needs by a further 12,000 GWh given a 33% RPS.

Greenhouse Gas Table 4
Estimated Changes in Non-Renewable Energy Potentially Needed to Meet California Loads, 2008-2020

California Electricity Supply	Annual GWh	
Statewide Retail Sales, 2008, estimated [a]	264,794	
Statewide Retail Sales, 2020, forecast [a]	289,697	
Growth in Retail Sales, 2008-20	24,903	
Growth in Net Energy for Load [b]	29,840	
California Renewable Electricity	**GWh @ 20% RPS**	**GWh @ 33% RPS**
Renewable Energy Requirements, 2020 [c]	57,939	95,600
Current Renewable Energy, 2008	29,174	
Change in Renewable Energy-2008 to 2020 [c]	28,765	66,426
Resulting Change in Non-Renewable Energy [d]	176	(36,586)

Source: Energy Commission staff 2010.
Notes:
a. 2009 IPER Demand Forecast, Form 1.1c. Excludes pumping loads for entities that do not have an RPS.
b. 2009 IEPR Demand Forecast, Form 1.5a.
c. RPS requirements are a percentage of retail sales.

The Role of Calico Solar in Retirements/Replacements

Calico Solar would be capable of annually providing 1,840 GWh of renewable generation energy to replace resources that are or will likely be precluded from serving California loads. State policies, including GHG goals, are discouraging or prohibiting new contracts and new investments in high GHG-emitting facilities such as coal-fired, generation, generation that relies on water for once-through cooling, and aging power plants (CEC 2007). Some of the existing plants that are likely to require substantial capital investments to continue operation in light of these policies may be unlikely to undertake the investments and will retire or be replaced.

Replacement of High GHG-Emitting Generation

High GHG-emitting resources, such as coal, are effectively prohibited from entering into new long-term contracts for California electricity deliveries as a result of the Emissions Performance Standard adopted in 2007 pursuant to SB 1368. Between now and 2020, more than 18,000 GWh of energy procured by California utilities under these contracts will have to reduce GHG emissions or be replaced; these contracts are presented in **Greenhouse Gas Table 5**.

[28] See *Incremental Impacts of Energy Efficiency Policy Initiatives Relative to the 2009 Integrated Energy Policy Report Adopted Demand Forecast* (CEC-200-2010-001-D, January, 2010), page 2. Table 1 indicates that additional conservation for the three investor-owned utilities may be as high as 14,374 GWh. Increasing this value by 25 percent to account for the state's publicly-owned utilities yields a total reduction of 17,967 GWh.

Greenhouse Gas Table 5
Expiring Long-term Contracts with Coal-fired Generation 2009 – 2020

Utility	Facility [a]	Contract Expiration	Annual GWh Delivered to CA
PG&E, SCE	Misc In-state Qual.Facilities [a]	2009-2019	4,086
LADWP	Intermountain	2009-2013	3,163 [b]
City of Riverside	Bonanza, Hunter	2010	385
Department of Water Resources	Reid Gardner	2013 [c]	1,211
SDG&E	Boardman	2013	555
SCE	Four Corners	2016	4,920
Turlock Irrigation District	Boardman	2018	370
LADWP	Navajo	2019	3,832
		TOTAL	**18,522**

Source: Energy Commission staff based on Quarterly Fuel and Energy Report (QFER) filings.
Notes:
a. All facilities are located out-of-state except for the Miscellaneous In-state Qualifying Facilities.
b. Estimated annual reduction in energy provided to LADWP by Utah utilities from their entitlement by 2013.
c. Contract not subject to Emission Performance Standard, but the Department of Water Resources has stated its intention not to renew or extend.

This represents almost half of the energy associated with California utility contracts with coal-fired resources that will expire by 2030. If the State enacts a carbon adder[29], all the coal contracts (including those in **Greenhouse Gas Table 5**, which expire by 2020 and, other contracts that expire beyond 2020 and are not shown in the table) may be retired at an accelerated rate as coal-fired energy becomes uncompetitive due to the carbon adder or the capital needed to capture and sequester the carbon emissions. Also shown are the approximate 500 MW of in-state coal and petroleum coke-fired capacity that may be unlikely to contract with California utilities for baseload energy due to the SB1368 Emission Performance Standard. As these contracts expire, new and existing generation resources will replace the lost energy and capacity. Some will come from renewable generation such as the proposed project; some will come from new and existing natural gas fired generation. All of these new facilities will have substantially lower GHG emissions rates than coal and petroleum coke-fired facilities, which typically averages about 1.0 $MTCO_2$/MWh without carbon capture and sequestration. Thus, new renewable facilities will result in a net reduction in GHG emissions from the California electricity sector.

Retirement of Generation Using Once-Through Cooling

The State Water Resource Control Board (SWRCB) has proposed major changes to once-through cooling (OTC) units, shown in **Greenhouse Gas Table 6**, which would likely require extensive capital to retrofit, or retirement, or substantial curtailment of dozens of generating units. In 2008, these units collectively produced almost 58,000 GWh. While the more recently built OTC facilities may well install dry or wet cooling

[29] A carbon adder or carbon tax is a specific value added to the cost of a project for per ton of associated carbon or carbon dioxide emissions. Because it is based on, but not limited to, actual operations and emission and can be trued up at year end, it is considered a simple mechanism to assign environmental costs to a project.

towers and continue to operate, the aging OTC plants are not likely to be retrofit to use dry or wet cooling towers without the power generation also being retrofit or replaced to use a more efficient and lower GHG emitting combined cycle gas turbine technology. Most of these existing OTC units operate at low capacity factors, suggesting a limited ability to compete in the current electricity market. Although the timing would be uncertain, new resources would out-compete aging plants and would displace the energy provided by OTC facilities and likely accelerate their retirements.

Any additional costs associated with complying with the SWRCB regulation would be amortized over a limited revenue stream today and into the foreseeable future. Their energy and much of their dispatchable, load-following capability will have to be replaced. These units constitute over 15,000 MW of merchant capacity and 17,800 GWh of merchant energy. Of this, much but not all of the capacity and energy are in local reliability areas, requiring a large share of replacement capacity – absent transmission upgrades – to locations in the same local reliability area. **Greenhouse Gas Table 6** provides a summary of the utility and merchant energy supplies affected by the OTC regulations.

New renewable generation resources will emit substantially less GHG emissions on average than other energy generation sources. Existing aging and OTC natural gas facility generation typically averages 0.6 to 0.7 MTCO2/MWh, which is much less efficient, higher GHG emitting than a renewable energy project like Calico Solar. A project like Calico Solar, located far from the coastal load pockets like the Los Angeles Local Reliability Area (LRA), would more likely provide energy support to facilitate the retirement of some aging and/or OTC power plants, but would not likely provide any local capacity support at or near the coastal OTC units. Regardless, due to its low greenhouse gas emissions, Calico Solar would serve to reduce GHG emissions from the electricity sector.

Closure and Decommissioning

Eventually the facility would close, either at the end of its useful life or due to some unexpected situation such as a natural disaster or catastrophic facility breakdown. When the facility closes, all sources of air emissions would cease to operate and thus impacts associated with those greenhouse gas emissions would no longer occur. The only other expected, albeit temporary, GHG emissions would be equipment exhaust (off-road and on-road) from dismantling activities. These activities would be of much a shorter duration than construction of the proposed project, equipment used to dismantle the facility are assumed to have lower comparative GHG emissions due to technology advancement, and would be required to be controlled in a manner at least equivalent to that required during construction. It is assumed that the beneficial GHG impacts of this facility, displacement of fossil fuel fired generation, would be replaced by the construction of newer more efficiency renewable energy or other low GHG generating technology facilities. Also, the recycling of the facility components (steel, concrete, etc.) could indirectly reduce GHG emissions from decommissioning activities. Therefore, while there would be temporary adverse greenhouse gas CEQA impacts during decommissioning they are determined to be less than significant.

Greenhouse Gas Table 6
Aging and Once-Through Cooling Units: 2008 Capacity and Energy Output [a]

Plant, Unit Name	Owner	Local Reliability Area	Aging Plant?	Capacity (MW)	2008 Energy Output (GWh)	GHG Emission Rate(MTCO2/MWh)
Diablo Canyon 1, 2	Utility	None	No	2,232	17,091	Nuclear
San Onofre 2, 3	Utility	L.A. Basin	No	2,246	15,392	Nuclear
Broadway 3 [b]	Utility	L.A. Basin	Yes	75	90	0.648
El Centro 3, 4 [b]	Utility	None	Yes	132	238	0.814
Grayson 3-5 [b]	Utility	LADWP	Yes	108	150	0.799
Grayson CC [b]	Utility	LADWP	Yes	130	27	0.896
Harbor CC	Utility	LADWP	No	227	203	0.509
Haynes 1, 2, 5, 6	Utility	LADWP	Yes	1,046	1,529	0.578
Haynes CC	Utility	LADWP	No	560	3,423	0.376
Humboldt Bay 1, 2 [a]	Utility	Humboldt	Yes	107	507	0.683
Olive 1, 2 [b]	Utility	LADWP	Yes	110	11	1.008
Scattergood 1-3	Utility	LADWP	Yes	803	1,327	0.618
Utility-Owned				**7,776**	**39,988**	**0.693**
Alamitos 1-6	Merchant	L.A. Basin	Yes	1,970	2,533	0.661
Contra Costa 6, 7	Merchant	S.F. Bay	Yes	680	160	0.615
Coolwater 1-4 [b]	Merchant	None	Yes	727	576	0.633
El Segundo 3, 4	Merchant	L.A. Basin	Yes	670	508	0.576
Encina 1-5	Merchant	San Diego	Yes	951	997	0.674
Etiwanda 3, 4 [b]	Merchant	L.A. Basin	Yes	666	848	0.631
Huntington Beach 1, 2	Merchant	L.A. Basin	Yes	430	916	0.591
Huntington Beach 3, 4	Merchant	L.A. Basin	No	450	620	0.563
Mandalay 1, 2	Merchant	Ventura	Yes	436	597	0.528
Morro Bay 3, 4	Merchant	None	Yes	600	83	0.524
Moss Landing 6, 7	Merchant	None	Yes	1,404	1,375	0.661
Moss Landing 1, 2	Merchant	None	No	1,080	5,791	0.378
Ormond Beach 1, 2	Merchant	Ventura	Yes	1,612	783	0.573
Pittsburg 5-7	Merchant	S.F. Bay	Yes	1,332	180	0.673
Potrero 3	Merchant	S.F. Bay	Yes	207	530	0.587
Redondo Beach 5-8	Merchant	L.A. Basin	Yes	1,343	317	0.810
South Bay 1-4	Merchant	San Diego	Yes	696	1,015	0.611
Merchant-Owned				**15,254**	**17,828**	**0.605**
Total In-State OTC				**23,030**	**57,817**	

Source: Energy Commission staff based on Quarterly Fuel and Energy Report (QFER) filings.
a. OTC Humboldt Bay Units 1 and 2 are included in this list. They must retire in 2010 when the new Humboldt Bay Generating Station (not ocean-cooled), currently under construction, enters commercial operation.
b. Units are aging but are not OTC.

REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would consist of 11,000 SunCatchers with a net generating capacity of approximately 275 MW occupying approximately 2,600 acres of land (see Alternatives Figure 1). The Reduced Acreage Alternative would transmit power to the grid through the SCE Pisgah Substation and would require infrastructure similar to the proposed 850 MW project, including water storage tanks, road access, and main services complex. However, the Reduced Acreage Alternative would not require the 65-mile upgrade to the 220 kV SCE Pisgah-Lugo SCE transmission line.

The Reduced Acreage Alternative would retain 32% of the SunCatchers and power generating potential of the proposed 850 MW project, and would affect 32% of the land of the proposed project. In terms of GHG emissions, the Reduced Acreage Alternative is estimated to create an approximately linear amount of construction emissions based on size (32% of proposed project construction GHG emissions) and less than linear operation GHG emissions[30] (20% of proposed project operation GHG emissions) due to the elimination of the sulfur hexafluoride containing equipment. While there may be inefficiencies regarding scale and staffing, the more compact and less complex nature of this alternative's project site boundaries are assumed to compensate for the loss of efficiencies due to economy of scale.

The results of the Reduced Acreage Alternative would be the following:

- The impacts of the proposed project would not occur on the lands not used due to the smaller project size. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would be reduced. The overall efficiency would increase slightly, or the GHG emission rate per unit of generation would increase slightly, due to reduction operating emissions due to the more compact site. Both State and Federal law support the increased use of renewable power generation.

If the Reduced Acreage Alternative were approved, other renewable projects would likely be developed that would compensate for the loss of generation compared to the proposed project on other sites in San Bernardino County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are several pending solar and wind projects in the Newberry Springs/Ludlow Area that would be located within a few miles of the Calico Solar Project site, and there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District.

AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would consist of 28,800 SunCatchers with a net generating capacity of approximately 720 MW occupying the entire proposed project footprint but avoiding use of any lands that were donated to BLM or acquired by BLM through the Land and Water Conservation Fund program, which reduces the total project development to approximately 7,050 acres. This alternative is shown in **Alternatives Figure 2**. The Avoidance of Donated and Acquired Lands Alternative would transmit power to the grid through the SCE Pisgah Substation and would require infrastructure similar to the proposed 850 MW project, including water

[30] The applicant estimated GHG construction and operation emissions for two alternatives, the original Phase 1 (500 MW) only, and original Phase 2 (350 MW) only, that were not analyzed as project alternatives. The GHG emission estimates from for those two alternatives (SES 2009ee) were interpolated or extrapolated and interpreted by staff to determine the GHG emissions estimates for the project alternatives analyzed.

storage tanks, road access, main services complex, and would require the upgrade to the 220 kV SCE Pisgah-Lugo SCE transmission line.

The Avoidance of Donated and Acquired Lands Alternative would retain approximately 85% of the SunCatchers and power generating potential, and would need approximately 86% of the land of the proposed 850 MW project. In terms of GHG emissions, the Avoidance of Donated and Acquired Lands Alternative is estimated by staff to create approximately 88% of the construction GHG emissions and 90% of the operation GHG emissions[31] due to reduced efficiency of scale and staffing, a requirement for certain facilities and other activities regardless of project size, and an increase in the complexity of the project site layout.

The results of the Avoidance of Donated and Acquired Lands Alternative would be the following:

- The impacts of the proposed project would not occur on the lands not used due to the smaller project size, and these lands are assumed not to be available for other uses as they would be within the proposed project's controlled fence line.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would be slightly reduced. The overall efficiency would decrease slightly, or the GHG emission rate per unit of generation would increase slightly, due to reduction in efficiencies of scale and increase in site complexity. Both State and Federal law support the increased use of renewable power generation.

If the Avoidance of Donated and Acquired Lands Alternative were approved, other renewable projects may be developed that would compensate for the loss of generation compared to the proposed project on other sites in San Bernardino County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are several pending solar and wind projects in the Newberry Springs/Ludlow Area that would be located within a few miles of the Calico Solar Project site, and there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District.

NO PROJECT / NO ACTION ALTERNATIVE

There are three No Project / No Action Alternatives evaluated as follows:

No Project / No Action Alternative #1: No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed project would not be approved by the Energy Commission and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

[31] Please see the previous footnote.

The results of this alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another renewable energy project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If the proposed project is not approved, renewable energy projects would likely be developed on other sites in San Bernardino County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are several pending solar and wind projects in the Newberry Springs/Ludlow Area that would be located within a few miles of the Calico Solar Project site, and there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District.

No Project / No Action Alternative #2: No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed project would not be approved by the Energy Commission and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. As a result, GHG emissions would result from the construction and operation of the solar technology and would likely be similar to the GHG emissions from the proposed project. Different solar technologies require different amounts of construction and operations maintenance; however, it is expected that all the technologies would provide the more significant benefit, like the proposed project, of displacing fossil fuel fired generation and reducing associated GHG emissions. As such, this No Project/No Action Alternative could result in GHG benefits similar to those of the proposed project.

No Project / No Action Alternative #3: No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed project would not be approved by the Energy Commission and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the greenhouse gas emissions from the site, including carbon uptake, is not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in the GHG benefits from the proposed project. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

PROJECT-RELATED FUTURE ACTIONS

The proposed project and the Avoidance of Donated and Acquired Lands Alternative would both require that major upgrades be performed to the existing 220 kV SCE Pisgah-Lugo SCE transmission line. The Reduced Acreage Alternative and No Project / No Action Alternative would not require any upgrades to the existing Pisgah-Lugo transmission line.

Upgrades to the SCE Pisgah-Lugo SCE transmission line would cause construction related GHG emissions and may marginally increase the inspection and maintenance emission from the transmission corridor. However, the magnitude of these construction and operation emissions are minimal in comparison to the increased GHG emissions reductions that would be caused by the two larger project alternatives, so this project-related future action does not affect staff's greenhouse gas significance impact findings for the proposed project.

CUMULATIVE IMPACTS

Cumulative impacts are defined as "two or more individual effects which, when considered together, are considerable or . . . compound or increase other environmental impacts" (CEQA Guidelines § 15355). "A cumulative impact consists of an impact that is created as a result of a combination of the project evaluated in the EIR together with other projects causing related impacts" (CEQA Guidelines § 15130[a][1]). Such impacts may be relatively minor and incremental, yet still be significant because of the existing environmental background, particularly when one considers other closely related past, present, and reasonably foreseeable future projects. This definition is consistent with NEPA cumulative impact assessment requirements/guidance.

This entire GHG assessment is a cumulative impact assessment and the findings described elsewhere in this section are cumulative impact findings. The proposed project alone would not be sufficient to change global climate, but would emit greenhouse gases and therefore has been analyzed as a potential cumulative impact in the context of existing GHG regulatory requirements and GHG energy policies.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Calico Solar, as a solar energy generation project, is exempt from the mandatory GHG emission reporting requirements for electricity generating facilities as currently required by the California Air Resources Board (ARB) for compliance with the California Global

Warming Solutions Act of 2006 (AB 32 Núñez, Statutes of 2006, Chapter 488, Health and Safety Code sections 38500 et seq.) (ARB 2008a).

The Calico Solar Project, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]).

Since the proposed project would have emissions that are below 25,000 MT/year of CO2E, it would not be subject to federal mandatory reporting of greenhouse gases. It would also be exempt from the state's greenhouse gas reporting requirements.

NOTEWORTHY PUBLIC BENEFITS

Greenhouse gas related noteworthy public benefits include the construction of renewable and low-GHG emitting generation technologies and the potential for successful integration into the California and greater WECC electricity systems. Additionally, the project would contribute to meeting the state's AB 32 goals.

CONCLUSIONS

The Calico Solar Project would emit considerably less greenhouse gases (GHG) than existing power plants and most other generation technologies, and thus would contribute to continued improvement of the overall western United States, and specifically California, electricity system GHG emission rate average. The proposed project would lead to a net reduction in GHG emissions across the electricity system that provides energy and capacity to California. Thus, staff concludes that the proposed project's operation would result in a cumulative overall reduction in GHG emissions from the state's power plants that would create a beneficial effect under both CEQA and NEPA, would not worsen current conditions, and would thus not result in CEQA impacts that are cumulatively significant or adverse NEPA impacts.

Staff concludes that the GHG emission increases typical from construction and decommissioning activities would not be CEQA significant for several reasons. First, the periods of construction and decommissioning would be short-term and not ongoing during the life of the proposed project. Second, the best practices control measures that staff recommends, such as limiting idling times and requiring, as appropriate, equipment that meets the latest emissions standards, would further minimize greenhouse gas emissions since the use of newer equipment would increase efficiency and reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of the ARB regulations to reduce GHG from construction vehicles and equipment. Finally, the construction and decommissioning emissions are miniscule when compared to the reduction in fossil-fuel power plant greenhouse gas emissions during project operation. For all these reasons, staff would conclude that the short-term emission of greenhouse gases during construction would be sufficiently reduced and would be offset during proposed project operations and would, therefore, not be CEQA significant.

The Calico Solar Project, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]).

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

No Conditions of Certification related to project greenhouse gas emissions are proposed because the proposed project would create beneficial GHG impacts. The project owner would have to comply with any future applicable GHG regulations formulated by the ARB or the U.S.EPA, such as GHG reporting or emissions cap and trade markets.

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ACRONYMS

Acronym	Definition
AAQS	Ambient Air Quality Standard
AERMOD	ARMS/EPA Regulatory Model
AFC	Application for Certification
AQCMM	Air Quality Construction Mitigation Manager
AQCMP	Air Quality Construction Mitigation Plan
AQMD	Air Quality Management District
ARB	California Air Resources Board
ATC	Authority to Construct
ATCM	Airborne Toxic Control Measure
BACT	Best Available Control Technology
bhp	brake horsepower
BLM	Bureau of Land Management
CAAQS	California Ambient Air Quality Standard
CalEPA	California Environmental Protection Agency
CCR	California Code of Regulations
CDD	California Desert District
CEC	California Energy Commission (or Energy Commission)
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CPM	(CEC) Compliance Project Manager
CPUC	California Public Utilities Commission
EIR	Environmental Impact Report (CEQA)
EIS	Environmental Impact Statement (NEPA)
EPS	Emission Performance Standard
ERC	Emission Reduction Credit
FDOC	Final Determination Of Compliance
GHG	Greenhouse Gas
gr	Grains (1 gr $\cong$ 0.0648 grams, 7000 gr = 1 pound)
GSU	Generator Set-up Unit
GWh	Gigawatt-hour
H_2S	Hydrogen Sulfide
HFCs	Hydrofluorocarbons

Acronym	Definition
hp	horsepower
HSC	Health and Safety Code
IEPR	Integrated Energy Policy Report
kV	KiloVolt
LADWP	Los Angeles Department of Water and Power
lbs	Pounds
LORS	Laws, Ordinances, Regulations and Standards
LRAs	Local Reliability Areas
MCR	Monthly Compliance Report
MDAB	Mojave Desert Air Basin
MDAQMD	Mojave Desert Air Quality Management District
$\mu g/m^3$	Microgram per cubic meter
mg/m^3	milligrams per cubic meter
MTCO2E	Carbon dioxide equivalent metric tonnes
MW	Megawatts (1,000,000 Watts)
MWh	Megawatt-hour
N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standard
NEPA	National Environmental Policy Act
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NOx	Oxides of Nitrogen *or* Nitrogen Oxides
NSPS	New Source Performance Standard
NSR	New Source Review
NWS	National Weather Service
O_2	Oxygen
O_3	Ozone
OII	Order Initiating an Informational
OLM	Ozone Limiting Method
OTC	Once-Through Cooling
PCU	Power Conversion Unit
PDOC	Preliminary Determination Of Compliance
PFCs	Perfluorocarbons
PG&E	Pacific Gas and Electric Company
PM	Particulate Matter
PM10	Particulate Matter less than 10 microns in diameter

Acronym	Definition
PM2.5	Particulate Matter less than 2.5 microns in diameter
PMAP	Particulate Matter Attainment Plan
ppm	Parts Per Million
ppmv	Parts Per Million by Volume
ppmvd	Parts Per Million by Volume, Dry
PSA	Preliminary Staff Assessment (this document)
PSD	Prevention of Significant Deterioration
PTO	Permit to Operate
QFER	Quarterly Fuel and Energy Report
RPS	Renewables Portfolio Standard
SCE	Southern California Edison
scf	Standard Cubic Feet
SDG&E	San Diego Gas and Electric
SF_6	Sulfur hexafluoride
SO_2	Sulfur Dioxide
SO_4	Sulfate
SOx	Oxides of Sulfur
SWRCB	State Water Resource Control Board
tpy	tons per year
U.S.EPA	United States Environmental Protection Agency
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds
WECC	Western Electricity Coordinating Council

C.2 – BIOLOGICAL RESOURCES

Testimony of Chris Huntley, Scott D. White, and Carolyn Chainey-Davis

C.2.1 SUMMARY OF CONCLUSIONS

This section summarizes the Energy Commission and BLM staff's (hereafter jointly referred to as "staff" unless otherwise noted) analysis and conclusions about the impacts of the Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) and describes appropriate mitigation for those impacts in accordance with the requirements of the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). This section provides a summary of the analyses discussed in this document but does not make final decisions for either agency.

The summary provides a general overview of the project impacts to each of the resources that are present or have the potential to be present on the project site; describes outstanding issues or data gaps; and indicates the surveys or data submittals required to be submitted or completed by the applicant prior to the completion of the Final Staff Assessment/Environmental Impact Statement. This summary also describes potential mitigation measures that may be employed to reduce or eliminate project impacts. Because the applicant intends to apply for stimulus funding under the American Recovery and Reinvestment Act (ARRA), and must begin construction by the end of the year to qualify, biological surveys for a variety of species will be conducted concurrently with the review of this document. These survey activities include, but are not limited to, preconstruction surveys for specific resources (i.e., rare plants, nesting birds, desert tortoise, etc.).

<u>Vegetation and Rare Plants</u>: The Calico Solar Project would have major impacts to the biological resources of the Newberry Springs/Ludlow area of the Mojave Desert, affecting many sensitive plant and wildlife species and eliminating a broad expanse of relatively undisturbed Mojave Desert habitat. Construction of the project would result in the permanent land use conversion of approximately 8,230 acres of the Mojave Desert to support operation of the solar field and appurtenant structures. The applicant has indicated that the project site supports 7,901.1 acres of creosote bush scrub (88.6 acres of this disturbed); 237.3 acres of salt bush scrub; 67.6 acres of non-vegetated areas; and 24 acres of developed areas. Staff's observations of the project site in January 2010 are generally consistent with mapping by the applicant; however, staff found numerous smaller patches of vegetation associations not shown in the applicant's vegetation map. Staff did not quantify species composition or map these smaller associations but notes that these associations are microphyll woodlands typically associated with dry desert washes and include catclaw acacia thorn scrub, lower elevation wash and sandfield vegetation, smoke tree woodland, and big galleta shrub-steppe.

Although construction would not result in the complete loss of vegetation, staff considers the construction of exclusion fencing (designed to prevent desert tortoise from entering the project site), mowing, introduction of shade and added moisture from washing, noise from individual SunCatcher engines (i.e., each engine would have a noise level of approximately 84 dBA Leq at 50 feet, which is equivalent to a compressor), level of maintenance activity, and risk of invasion by weedy annuals to effectively eliminate the functional use of the site for all but the most disturbance-tolerant species. To reduce project effects on vegetation communities, staff has proposed Conditions of Certification **BIO-1** through **BIO-9, BIO-10** (Revegetation and Compensation for Impacts to Native Vegetation), and **BIO-11** (Weed Management Plan). To address specific construction-related impacts to native vegetation communities and habitat loss, staff has incorporated existing measures provided by the applicant and proposed supplemental measures into the following Condition of Certification **BIO-17** (Tortoise Habitat Compensation).

The Calico Solar Project site supports numerous special-status plant species. Nine special-status plant species, one of which is also considered sensitive by the Bureau of Land Management (BLM), but none of which are listed under the federal Endangered Species Act, were identified onsite and would be directly impacted by construction of the Calico Solar Project. Staff is also concerned that several of the rare plant species identified on the project site were not mapped, quantified (i.e., numbers of occurrences) or addressed by the applicant in their Application for Certification or Biological technical reports. Staff believes that impacts to these species (small-flowered androstephium, Emory's crucifixion thorn, foxtail cactus, winged cryptantha, Utah vine milkweed, crowned muilla, white-margined beardtongue, Coves' cassia, and small-flowered sand-verbena) can be reduced to be less-than-significant levels according to California Environmental Quality Act (CEQA) guidelines with the implementation of staff's proposed avoidance and minimization measures. These measures are detailed in staff's Conditions of Certification **BIO-1** through **BIO-12** and **BIO-17**. One requirement of these conditions is the completion of focused botanical surveys in the spring of 2010 and the submittal of updated vegetation and rare plant occurrence maps.

<u>Common Wildlife and Nesting Birds</u>: Construction of the Calico Solar Project will adversely affect common wildlife and nesting birds due to ground disturbance, operation, and the placement of permanent exclusion fencing around the perimeter of the site. Species that are not capable of dispersing to surrounding areas will be confined within the project boundaries by the exclusionary fencing, and would be subject to increased risks of road kill and repeated disturbance from human activities during construction and operation. The project exclusion fencing will also exclude species from the entire 13-square-mile site, resulting in loss of habitat and disruption of movement within the area. Some special-status species, such as Nelson's bighorn sheep, would experience loss of habitat combined with interference with movement patterns, essentially resulting in a decrease in the range of local populations. Noise levels of 60 dBA Leq would also occur approximately 850 feet from the project fence line, which would be expected to adversely affect Nelson's bighorn sheep. To reduce project effects on wildlife, staff has proposed Conditions of Certification **BIO-1** through **BIO-9, BIO-10** (Revegetation and Compensation for Impacts to Native Vegetation), and **BIO-11** (Weed Management Plan). Impacts to habitat loss would be minimized by the application of Condition of Certification **BIO-17** (Tortoise Habitat Compensation) however; overall effects to wildlife within the project perimeter are expected to be severe.

Construction of the project is expected to result in adverse effects on avian species. It is currently unknown how avian species will respond to the project once operational, due to the fact that SunCatcher technology has not been implemented and studied on a large scale. Therefore, staff cannot assess the potential for collisions and mortality associated with these structures at this time. As a result, staff have proposed Condition of Certification **BIO-23**, which would require the applicant to prepare and implement a Bird Monitoring Study to monitor the death and injury of birds from collisions with facility features such as reflective mirror-like surfaces and from heat, and bright light from concentrating sunlight. In addition, while some disturbance-tolerant birds are expected to continue foraging on the project site once it is developed, it is unknown at this time the degree to which the site may be used by avian species. The noise levels within the proposed project site would be in excess of 85 dBA Leq at each SunCatcher, and would be expected to adversely affect birds. It is clear that many avian species are known to avoid developed areas within urban settings; these species may avoid the SunCatchers similarly.

Desert Tortoise: Implementation of the Calico Solar Project will result in adverse effects to desert tortoise (federally and State listed as a threatened species). Construction of the proposed project would result in the permanent loss of approximately 8,230 acres of occupied desert tortoise habitat (5,829 acres of good quality habitat north of the Burlington Northern Santa Fe (BNSF) Railroad and 2,390 acres of less suitable habitat south of the BNSF tracks). In addition, the applicant has indicated that approximately 100 desert tortoises would need to be translocated outside of the Calico Solar Project site. Currently staff, CDFG, and USFWS are working with the applicant to develop a Desert Tortoise Translocation Plan for the project. The translocation of tortoise and other construction related impacts of the proposed project pose substantial effects to this species. To reduce these effects staff has proposed Conditions of Certification **BIO-1** through **BIO-9**, which apply to protection of desert tortoise and other biological resources in and near the Calico Solar Project area, and Conditions of Certification **BIO-15** through **BIO-17**, which are specific to desert tortoise. To reduce effects of the large scale land use conversion, staff, CDFG, and USFWS are requiring compensatory mitigation. This compensatory mitigation is designed to fully offset impacts as defined under the California Endangered Species Act (CESA), and requires a full mitigation finding, which usually contemplates a mitigation ratio greater than 1:1 for compensation lands (i.e., acquisition or preservation of one acre of compensation lands for every acre lost). On past energy projects considered by the Energy Commission, the California Department of Fish and Game (CDFG) has required a 3:1 ratio to meet the CESA full mitigation standard for good quality habitat such as that found at the Calico Solar Project site. The higher ratio reflects the limits to increases in carrying capacity that can be achieved on the acquired lands, even with implementation of all possible protection and enhancement measures. The BLM applies a 1:1 compensation ratio because they generally pursue desert tortoise recovery goals not through parcel-by-parcel acquisitions and management, but rather through implementation of region-wide management plans and land use planning as described in the West Mojave Plan (BLM et al. 2005; BLM 2006) and the Desert Tortoise Recovery Plan (USFWS 1994b).

Energy Commission staff proposes compensation to achieve full mitigation at a 3:1 ratio for loss of desert tortoise habitat north of the BNSF Railroad and for other CEQA significant impacts for the Calico Solar Project. In addition, 1,180 acres of donated and acquired lands occur within the project boundary, which were obtained as mitigation/conservation lands for a previous project. These lands are also proposed to be mitigated at an additional 3:1 ratio, for a total mitigation ratio of 6:1 for these 1,180 acres. These mitigation ratios include the 1:1 mitigation ration proposed by the BLM for impacts to desert tortoise habitat as well as additional mitigation proposed by the Energy Commission staff for impacts to listed species and previous mitigation lands. Staff has proposed that impacts to the area south of the BNSF Railroad be mitigated at a 1:1 ratio, as this area supports lower-quality habitat for the desert tortoise, and the site is enclosed to the north and south by the BNFS Railroad and the I-40, respectively. These features act as barriers to movement for the tortoise in this area.

Mojave Fringe-Toed Lizard: The Mojave fringe-toed lizard, a BLM sensitive species and California Species of Special Concern, is known to occur onsite, and inhabits areas of fine wind-blown (aeolian) sand deposits such as dunes and sandy patches within scrubby vegetation. This species can also utilize sandy washes. The project would interfere with both aeolian and fluvial sand deposits on and near the site, which would result in habitat loss and degradation for this and other sand-associated species and would result in direct impacts to occupied habitat. In addition, the applicant reported approximately 16.9 acres of Mojave fringe-toed lizard habitat onsite, which is concentrated in a small dune complex in the southern portion of the site. However, during site visits conducted by staff in January 2010, it was noted that the amount of habitat for this species appeared to be under-reported. Staff noted several areas in addition to the dune complex that could support this species, including sandy drainages and small patches of aeolian sand deposits with micro-dunes that are scattered extensively throughout the southern portion of the site. Staff considers it likely that even if this portion of the site is avoided, this population would be lost over time from habitat fragmentation, road kill, and predation. Staff has proposed Condition of Certification **BIO-13,** which requires the acquisition of suitable dune/sand habitat at a 5:1 ratio.

Burrowing Owl: Implementation of the proposed Calico Solar Project would likely result in direct loss of foraging habitat for the burrowing owl (a BLM sensitive species and a California Species of Special Concern). This species was observed onsite and at least two burrowing owls and eleven active burrows were recorded by the applicant. Staff's proposed Condition of Certification **BIO-22** provides minimization and avoidance measures for this species, and prescribes that the applicant must establish the breeding status of the owls onsite. Depending on how owls use the site, relocation events would be structured to accommodate the full life cycle of the species. Staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan for desert tortoise, would likely offset burrowing owl habitat loss provided the species occurs on the potential relocation sites.

Golden Eagle: Golden eagles, a BLM sensitive and California fully protected species, are known to nest within 5 miles of the project site and have been observed foraging over the project area. The large scale land use conversion for the Calico Solar Project would in essence remove approximately 8,230 acres of foraging habitat for this species. New regulations proposed by the USFWS indicate the USFWS may consider this loss to constitute substantial interference with normal breeding, feeding, or sheltering behavior, which would be considered a "take." Staff has proposed Condition of Certification **BIO-21.** This condition will likely require substantial revision, or it may not be required pending the outcome of ongoing discussions with USFWS staff. Although the federal government may issue a take permit for this species, the direct take of golden eagles would not be authorized by the CDFG. This species, is designated as "fully protected" (California Fish & Game Code §§ 3511) and thus may not be taken or possessed. The USFWS has also raised concerns regarding potential collision threats associated with solar and renewable technologies. To address potential collision concerns (discussed below under operational effects) staff has proposed Conditions of Certification **BIO-23** (Monitoring Bird Impacts from Solar Technology). This requires a monitoring and reporting program that would document and report potential collision mortality from the proposed solar fields.

Nelson's Bighorn Sheep: Nelson's bighorn sheep, a BLM sensitive species, is well known from the Cady Mountains and the project area overlaps with the known occupied year-round use area for the Cady Mountains population of at least 300 Nelson's bighorn sheep (SES 2009aa; DW 2010). During surveys conducted in winter 2010 for golden eagles, the applicant detected 62 sheep within 10 miles of the proposed project.

Direct effects to Nelson's bighorn sheep include the loss of approximately 458.5 acres of foraging habitat from the construction of perimeter fencing. Indirect effects to habitat include an additional 404.5 acres of habitat that occurs within the 1,000-foot buffer of the proposed project. Additional indirect effects include noise from the SunCatcher engines; avoidance of areas near manmade structures; increased traffic on desert roads by the public; and the spread of non-native, invasive plants. Portions of the Calico Solar Project site provide seasonal forage for Nelson's bighorn sheep on the lower reaches of the Cady Mountains. Construction of the project would reduce the availability of seasonal forage for Nelson's bighorn sheep and expose sheep to human disturbance. The project could also act as a barrier to movement for sheep using the south side of the Cady Mountains or their foothills to traverse to winter ranges in the Bristol Mountains. In order to minimize effects of the project on bighorn sheep the applicant has proposed the placement of a new water source within the Cady Mountains to draw sheep away from the project site. The applicant has also proposed general monitoring of sheep that occur within 200 feet of construction activities. Staff has incorporated the applicant's proposal into Condition of Certification **BIO-24** and recommended additional measures. This measure would compensate for the project's contributions to cumulative impacts to bighorn sheep by creation of a new water source in the eastern part of the Cady Mountains.

American Badger and Kit Fox: American badgers and kit fox were detected on the Calico Solar Project site and the area supports suitable foraging and denning habitat for these species. Construction of the proposed project is expected to result in direct effects to badgers and kit fox. Because of the large size of the project, numerous badgers or kit foxes may be affected. Animals confined within the exclusionary fence will be subject to ongoing long-term impacts that may result in mortality from road kill, loss or alteration of foraging habitat, overlapping territories and barriers to dispersal. Staff believes that avoidance of badgers and kit fox alone will not mitigate the direct, indirect, and operational effects of the Calico Solar Project. Staff's proposed Condition of Certification **BIO-25** requires that prior to ground disturbance, a qualified biologist perform a preconstruction survey for badger and kit fox dens in the project area, including areas within 250 feet of all project facilities, utility corridors, and access roads. If present, the applicant will flag and avoid occupied badger and kit fox dens during ground-disturbing activities and establish a buffer to avoid loss of maternity dens. Should the applicant need to work in an area with occupied badger dens the applicant will slowly excavate the den in accordance with Condition of Certification **BIO-25**. Staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan for desert tortoise habitat, would offset the loss of habitat for these species and reduce the impact from habitat loss to less-than-significant levels under CEQA.

<u>Jurisdictional Waters</u>: The project would directly or indirectly affect numerous ephemeral washes that occur on the Calico Solar Project site. Of the 1,099 acres of State waters present on the project site, construction activities would result in 356 acres of temporary impacts and 258 acres of permanent impacts, respectively. In total, this would result in direct impacts to 56% of the State jurisdictional drainages on site. However, because of the altered hydrology staff considers that the project would result in impacts to all 1,099 acres of washes present on the site. In addition, washes located downstream of the project would be subject to impacts related to the modification of drainage patterns onsite. The attenuation of peak storm flows and the subsequent loss of sediment to the system from the detention basins can adversely affect biological resources dependent on these features.

The applicant has not yet proposed specific mitigation to reduce impacts to State waters during construction of the proposed project. However, it is expected that the applicant will submit a formal application to the CDFG that contains Best Management Practices designed to minimize the potential effects to State waters. Because outstanding data requests remain, staff has proposed Condition of Certification **BIO-27**, and has provided additional recommendations and guidance consistent with typical CDFG Streambed Alteration Agreement requirements. These include the acquisition of offsite habitat, the implementation of Best Management Practices, and the replacement of lost smoke tree and catclaw acacia habitats at a 3:1 ratio. It is possible that the applicant could meet these requirements with the implementation of Condition of Certification **BIO-17,** which requires compensatory mitigation lands for desert tortoise. With implementation of staff's proposed Condition of Certification **BIO-27**, impacts to State jurisdictional waters associated with the desert washes would be mitigated to less-than-significant levels under CEQA. Should the project be terminated or cease operation, staff has identified Condition of Certification **BIO-29** (Channel Decommissioning and Reclamation Plan).

<u>Outstanding Issues</u>: Several outstanding issues remain, and the applicant needs to provide additional information in order for staff to be able to complete the staff analysis. The needed information includes: vegetation mapping of the jurisdictional drainages (**BIO-27**); botanical surveys of the entire project area (**BIO-12**); desert tortoise surveys of the entire project area (**BIO-16**); and an assessment of the breeding status of burrowing owl on the project site (**BIO-23**). Staff requires these items, as the information collected during these additional studies/surveys would be included in the Supplemental Staff Assessment/Final Environmental Impact Statement (SSA/FEIS) for this project. Staff considers the translocation effort for desert tortoise to be the critical path for commencement of construction activities. Currently the applicant is conducting one hundred percent surveys of the project site in order to accurately assess the potential for desert tortoise. Based on this information staff, CDFG, and USFWS will determine the locations of the proposed translocation sites and whether disease testing would be required. An important issue that requires further clarification is that the CDFG considers the 5 km limit for disease testing too far to reduce the potential for disease

transmission between populations. Currently the CDFG, USFWS, and BLM are evaluating the proposed strategy for disease testing and this information will be included in the SSA/FEIS for this project.

Staff has concluded that without mitigation, the Calico Solar Project would be a substantial contributor to the cumulatively significant loss of the Mojave Desert's biological resources, including the State and federally threatened desert tortoise and other special-status species. Impact avoidance and minimization measures described in staff's analysis and included in the conditions of certification would help reduce impacts to sensitive biological resources. These compensatory measures are necessary to offset project-related losses, and to assure compliance with State and federal laws such as the federal and State Endangered Species Acts and regulations protecting waters of the State. Even with the implementation of these measures, the project would contribute cumulatively to significant impacts to desert tortoise, Mojave fringe-toed lizard, bighorn sheep, white-margined beardtongue, and wildlife movement because of the location of the project and the proposed development expected in the region.

C.2.2 INTRODUCTION

This section of the Staff Assessment/Draft Environmental Impact Statement (SA/DEIS) provides the California Energy Commission (Energy Commission) and the Bureau of Land Management (BLM) analysis of potential impacts to biological resources from the construction and operation of the proposed Calico Solar Project. Information provided in this document addresses potential impacts to vegetation communities, areas of critical biological concern, and special-status species. This analysis describes the biological resources at the project site and at the locations of ancillary facilities. This document explains the need for mitigation, evaluates the adequacy of mitigation proposed by the applicant, and specifies additional mitigation measures designed to reduce impacts. It also describes compliance with applicable laws, ordinances, regulations, and standards (LORS) and includes staff's proposed conditions of certification.

This analysis is based, in part, upon information provided in the Calico Solar Project Application for Certification (SES 2008), Biological Resources Technical Report (SES 2009aa) and other submittals; responses to staff data requests (SES 2009b; 2009c; 2009d; 2009g; 2009h; 2009j; 2009p; 2009q; 2009r; 2009s; 2009v; 2009y), and staff workshops and informational hearings (SES 2009n; 2009t); responses to interveners' data requests (SES 2009e; 2009f; 2009i; 2009m; 2009o; 2009u; 2009w; 2009x); scoping comments (DW 2009a; SCBS 2009; WC 2009a; WS 2009; USEPA 2009; WWP 2009); site visits by staff in January 2010; communications with representatives from the California Department of Fish and Game (CDFG) and the U. S. Fish and Wildlife Service (USFWS); and staff's independent research.

C.2.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The determination of whether a project has a significant effect on biological resources is based on the best scientific and factual data that staff could review for the project. Significance criteria are defined in the general context of the California Environmental Quality Act (CEQA) and other relevant federal and State laws, ordinances, regulations, and standards. To satisfy CEQA requirements, conclusions are made regarding the significance of each identified impact that would result from the proposed project and alternatives. Significance criteria have been identified and utilized to make these significance conclusions. In comparison, NEPA states that "'Significantly' as used in NEPA requires considerations of both context and intensity…" (40 CFR 1508.27). Therefore, thresholds serve as a benchmark for determining if a project action will result in a significant adverse environmental impact when evaluated against the baseline. NEPA requires that an Environmental Impact Statement (EIS) is prepared when the proposed federal action (project) as a whole has the potential to "significantly affect the quality of the human environment."

The following significance criteria for biological resources were derived from the CEQA Guidelines (Appendix G, Environmental Checklist Form). Impacts of the proposed project or alternatives would be considered significant and would require mitigation if the project would:

- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the BLM, CDFG, or USFWS.
- Have an adverse effect, either directly or through habitat modifications, on any species listed as endangered, threatened, or proposed for listing or critical habitat for these species.
- Have a substantial adverse effect, either directly or through habitat modifications on any species identified as a candidate for listing, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFG, BLM, or USFWS.
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinances.
- Conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Communities Conservation Plan (NCCP), or other approved local, regional, Federal, or State HCP.

Significance conclusions for individual impacts are not required for compliance with NEPA. However, the SA/DEIS considers the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27. Therefore, conclusions presented in the following analysis regarding the significance of identified impacts are provided for the purposes of CEQA only.

C.2.4 PROPOSED PROJECT

C.2.4.1 SETTING AND EXISTING CONDITIONS

Regional Setting

Calico Solar, LLC proposes to construct an 850-megawatt (MW) solar power generation facility on public land administered by the BLM in the Mojave Desert in San Bernardino County, California. The project site is located approximately 37 miles east of the city of Barstow, just north of Interstate 40 (I-40). The Cady Mountain Wilderness Study Area (WSA) is located north of the Calico Solar Project site. The Pisgah Crater, within the BLM-designated Pisgah Area of Critical Environmental Concern (ACEC), is located south and east of the project (south of I-40 by several miles). Several underground and above ground utilities traverse the area.

The Mojave Desert is located between the Great Basin Desert to the north and the Colorado Desert to the south, and lies in the rain shadow of the Sierra Nevada and Transverse Mountain ranges. It is generally a large alluvial-filled basin with many isolated mountain ranges scattered throughout. The Mojave receives most precipitation during winter months, although summer thunderstorms also occur (Schoenherr 1992). The average annual precipitation at Daggett Airport, approximately 23 miles east of the project site, is approximately 3.8 inches, and average monthly temperatures at this location generally range between 36 and 104°F (WRCC 2010).

The project site is located northwest of the Pisgah Crater, also known as Pisgah Volcano. The volcano is the youngest vent in the Lavic Lake volcanic field. It is speculated that there may have been activity at this site as recently as 2,000 years ago, though more likely 20,000 to 50,000 years ago. The lava flows extend over 10 miles from the cone and are visible at the ground surface at some locations within the project boundary (SES 2008).

The Pisgah Area of Critical Environmental Concern (ACEC) is located adjacent to the southeast boundary of the Calico Solar Project site. This ACEC contains the Pisgah Crater and lava flow, and supports several sensitive species including Mojave fringe-toed lizard (*Uma scoparia*), desert tortoise (*Gopherus agassizii*), crucifixion thorn (*Castela emoryi*), white-margined beardtongue (*Penstemon albomarginatus*), and sand linanthus (*Linanthus arenicola*) (BLM et al. 2005). The ACEC designation is used by the BLM to identify areas with special management issues and priorities related to the conservation of important natural, cultural, and scenic resources, and to identify natural hazards. While no direct project impacts would occur to this ACEC, indirect impacts may occur as discussed below.

The Cady Mountains north of the project site have been designated as a Wilderness Study Area by the BLM. Wilderness Study Areas meet the criteria to be considered Wilderness Areas, but have not been designated as such by Congress. BLM is required to maintain the wilderness characteristics of a Wilderness Study Area until a final decision is made by Congress as to whether or not to include the area as part of the National Wilderness Preservation System (NWPS). A herd of Nelson's bighorn sheep inhabit the Cady Mountains Wilderness Study Area. While no direct project impacts would occur to this area, indirect impacts may occur as discussed below.

The Ord-Rodman Desert Wildlife Management Area (DWMA) is located adjacent to the southwest portion of the project site. This DWMA, which includes federally designated critical habitat for desert tortoise, was established by the West Mojave Plan for the conservation and recovery of the desert tortoise. Public lands within DWMAs are designated as ACECs (BLM et al. 2005). While no direct project impacts would occur to this DWMA, indirect impacts may occur as discussed below.

Project Area

The project area consists of the proposed Calico Solar Project solar fields and all associated buildings, substation, and linear facilities within the solar field footprint. The project area does not include any transmission upgrades, which would be permitted under a joint EIS/EIR prepared by the BLM and California Public Utilities Commission. The transmission upgrades are discussed as future connected actions below in Section C.2.8. The project area is primarily open, undeveloped land within the Mojave Desert. The site encompasses approximately 8,230 acres and ranges in elevation from approximately 1,925 to 3,050 feet (587 to 930 m) above mean sea level. The proposed project area is bordered by the Cady Mountains to the north, the Newberry Mountains to the west, an existing Southern California Edison (SCE) transmission line to the east, and I-40 to the south (SES 2008).

The project site lies within a broad alluvial plain that drains the Cady Mountains to the north. The applicant evaluated drainage features on site, and did not consider the features present to be well-defined channels that result from active flow. Rather, the applicant concluded that the onsite drainage features consist of discontinuous floodplains with areas that exhibit a mixed pattern of sheet flow or shallow concentrated flow across isolated, wide areas of land, and undefined drainage features occur over most of the site with evenly distributed desert scrub vegetation throughout. Therefore, the applicant concluded that no streams or washes that would meet the definition of State or federal waters occur on site (SES 2009aa). However, staff noted many defined drainages during site visits in January 2010, and the CDFG indicated that they would take jurisdiction over the drainages on the site, but for the Energy Commission's exclusive jurisdiction. Therefore, the applicant will prepare a Streambed Alteration Agreement for the Calico Solar Project.

Proposed Project

The original Phase I, identified in the AFC, called for construction of a 500-MW facility on 5,838 acres, with Phase II generating an additional 350 megawatts from the remaining 2,392 acres (SES 2008). However, the applicant subsequently revised the project to align the output of Phase I with the capacity of the Southern California Edison (SCE) transmission system early interconnect upgrade prior to the completion of a 500-kV upgrade to the Lugo-Pisgah Transmission line. The new Phase I would be limited to 275 MW, with the remaining 575 MW as part of Phase II. Each phase would be configured in 1.5-MW solar groups of 60 SunCatchers and Phase II would expand the project to a total of 34,000 SunCatchers configured in 567 (1.5-MW) solar groups with a total net generating capacity of 850 MW.

The total area within the project boundary that would be required for both phases, including the area for the operation and administration building, the maintenance building, and the onsite substation, is approximately 8,230 acres. This entire acreage is located on public lands administered by the BLM. The project would be connected to the SCE Pisgah Substation via an approximate 2-mile, single-circuit, 220-kV transmission line (SES 2008).

Major components of the proposed project include the following:

- Installation of 34,000, 38-foot solar dish Stirling systems (i.e., SunCatchers) and associated equipment;
- Onsite access and maintenance roads (both paved and unpaved), with a combination of roadway dips and elevated sections across drainage features;
- Water supply and treatment system, including two 175,000-gallon water storage tanks (40 feet in diameter) and two 17,000-gallon water storage tanks (18 feet in diameter);
- A buried septic tank system with a dual sanitary leach field;
- Main Services Complex;
- Hydrogen system;
- Electrical collection system (both underground and overhead);
- Calico Solar Substation (approximately 3 acres);
- Approximately 2-mile single-circuit 220-kV transmission line;
- Railroad overpass to cross the existing BNSF tracks;
- Two 3,000,000 gallon evaporation ponds;
- Stormwater detention basins, debris basins, and diversion channels; and
- Perimeter fencing

Water Supply and Discharge

The applicant proposes to obtain water for project use from the Cadiz Burlington Northern Santa Fe (BNSF) well, located approximately 64 miles southeast of the Calico Solar site. Once operational, project water demand is estimated to be approximately 20 acre-feet per year. This water would be obtained from the Cadiz BNSF well and brought to the project site via truck or rail (SES 2010). Water could also be obtained from the development of on-site wells.

Drainage, Erosion, and Sediment Control

The Calico Solar project would require the construction of a water diversion and sediment control facility to divert water and limit scour on the project site. This would involve the construction of debris and retention basins, and a linear storm water diversion system to transport water to approximately seven primary drainages that occur on the site. For a detailed description of the proposed drainage layout please see the **Soil and Water Resources** section in this document.

Evaporation Ponds

To support the routine washing requirements of the SunCatcher units a reverse osmosis system would be constructed on the site. Blow down water from this facility would be discharged into two 3,000,000 gallon evaporation ponds.

Construction Schedule, Workforce, Access, and Laydown Areas

Construction of the Calico Solar Project from site preparation and grading to commercial operation is expected to require approximately 41 months, with the overall project schedule lasting approximately 48 months (SES 2008). Heavy construction would be scheduled to occur between 0700 and 1900 Monday through Friday. Additional hours may be necessary to make up schedule deficiencies or to complete critical construction activities. Some activities would continue 24 hours per day, 7 days per week. These activities include, but are not limited to, SunCatcher assembly, refueling of equipment, staging of materials for the next day's construction activities, quality assurance/control, and commissioning. The size of the onsite workforce will range from a minimum of 131 to a maximum of 703. (SES 2008)

The project would have four laydown areas, two for each Phase. The southeast corner of Phase I would have a laydown area on approximately 26 acres and the other laydown area would be located on approximately 14 acres adjacent to the Main Services Complex. Phase II would have a laydown area on approximately 26 acres located just north of I-40 and immediately east of Hector Road and the other laydown area would be located on approximately 11 acres adjacent to the Satellite Services Complex. (SES 2008)

Operations/Maintenance Activities

The Calico Solar Project is designed for an operating life of 40 years and is expected to operate 7 days a week, generating electricity during normal daylight hours when solar energy is available. It is expected that the project would be operated with a staff of approximately 180 full-time employees. Maintenance activities would occur 7 days a week, 24 hours a day to ensure SunCatcher availability when solar energy is available.

The SunCatchers will be regularly washed to keep mirror surfaces free of dust buildup to optimize solar energy potential. It is assumed that each SunCatcher would receive a "normal" wash using 14 gallons of demineralized water on a monthly basis. During a 3-month period each year, every SunCatcher would receive a "scrub" wash that would require up to 42 gallons of water. (SES 2008)

Water consumption is estimated at an average of 20 acre-feet [6,517,020 gallons] of well water per year, with a annual maximum of 40 acre-feet [13,034,040 gallons], and would mainly be used to provide water for washing SunCatchers, for dust control, and for water treatment system discharge. (SES 2010)

The Calico Solar Project site would require routine inspections and maintenance which would be conducted nightly at various locations.

Vegetation and Wildlife

Plant Communities

The AFC and Biological Resources Technical Report (SES 2008; SES 2009aa) identified three vegetation communities on site, including desert saltbush scrub, Mojave creosote bush scrub, and un-vegetated habitat. In addition, the applicant identified 24 acres of developed land uses (e.g., roads, railroads, transmission lines, and underground gas pipelines) on the proposed project site (SES 2008; SES 2009aa). The Mojave creosote bush scrub and desert saltbush scrub descriptions correspond to natural communities described by Holland (1986). The applicant did not indicate vegetation mapping methodology or minimum mapping units.

Thomas et al. (2004) mapped and described vegetation throughout the central Mojave Desert, including the proposed project site. Their vegetation map generally corresponds to the vegetation map developed by the applicant (SES 2009aa). However, the Thomas et al. mapping of the project area is relatively coarse, combining several vegetation alliances into the broader category, creosote bush mixed scrub. They point out that they "did not find it possible to map most vegetation types directly to the alliance level." Neither the applicant's (SES 2009aa) nor the Thomas et al. (2004) vegetation maps are at a fine enough scale to identify small patches of other alliances within the mapped creosote bush or saltbush categories. The primary differences between the two maps is that the applicant (2009) mapped an area of saltbush scrub in the southwestern part of the proposed project site, not mapped by Thomas et al. (2004); and that Thomas et al. mapped a small area of desert wash in the south-central part of the project site and a small area of lava beds and cinder cone in the southeast corner of the site not mapped by the applicant. Staff noted both of these areas on the site during site visits in January 2010. The desert wash area corresponds, in part, to smoke tree woodland described below. The mapped lava beds and cindercone area as mapped by Thomas et al. (2004) are sparsely vegetated shrubland generally similar to the Saltbush (*Atriplex hymenelytra*) shrubland alliance (Thomas et al. 2004: Figure A7).

Staff's observations of the project site in January 2010 are generally consistent with mapping by the applicant (SES 2009aa) and Thomas et al. (2004) in broad descriptions and mapping units. However, staff also found numerous smaller patches of vegetation associations not shown in either prior vegetation map. Staff did not quantify species composition or map these smaller associations. Instead, these smaller units are named and described briefly below as subcategories within descriptions of the larger vegetation units.

<u>Mojave creosote bush scrub</u>: The majority of the project site (ca. 7800 acres) is mapped as Mojave creosote bush scrub (SES 2009aa; Thomas et al. 2004). Over most of the proposed project area, the dominant shrub species are creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). The applicant reports that other common shrubs include desert senna (*Senna armata*), Nevada ephedra (*Ephedra nevadensis*), encelia (*Encelia farinosa, E. actoni, E. frutescens*), and range ratany (*Krameria erecta, K. grayii*) (SES 2009aa). Shrubs are typically widely spaced and support a diverse assemblage of annual and perennial herbs in years of adequate seasonal precipitation.

Thomas et al. (2004) combine several alliances in the creosote bush mapping units. Depending on cover of other shrubs, the mapping units include the following shrubland alliances: *Larrea tridentata*; *Larrea tridentata-Ambrosia dumosa*; *Larrea tridentata-Encelia farinosa*; and occasionally *Ambrosia dumosa* or *Encelia farinosa*. These creosote bush shrublands have been described in other classification systems as Mojave creosote bush scrub (Cheatham and Haller 1975; Holland 1986; Thorne 1982). None of these alliances have special conservation status ranking (CDFG 2003; 2007).

Creosote bush is well known for forming “creosote rings,” which are very old plants growing from slowly-spreading root crowns. Creosote rings are protected under the San Bernardino County Plant Protection and Management Ordinance and were not evaluated in the Biological Resources Technical Report or the AFC (SES 2009aa; SES 2008). In some cases, these rings are more than 10,000 years old and apparently develop on the surfaces of very old bajadas (Vasek 1980).

Staff did not observe creosote rings at the project site and the project appears to be situated on younger alluvial surface than the sites where creosote rings have been recorded. Staff also reviewed aerial images of the proposed project site and did not observe any indication of creosote rings. Staff is not aware, however, whether the applicant conducted any surveys or analyses to determine the potential occurrences of creosote rings on the site.

<u>Catclaw acacia thorn scrub</u>: Within the mapped creosote bush scrub, dry desert washes in the northern portion of the proposed project site (i.e., foothills of the Cady Mountains and the upper bajada) often support catclaw acacia (*Acacia greggii*) in equal or greater cover and density than creosote bush. Scattered blue palo verde (*Parkinsonia florida*) and smoke tree (*Psorothamnus spinosus*) are also found in these washes. These stands match the Catclaw acacia thorn scrub (*Acacia greggii* shrubland alliance) described by Thomas et al. (2004) and Sawyer et al. (2009).

Catclaw acacia thorn scrub is synonymous, in part, with “Mojave wash scrub” and “Mojave desert wash scrub” as described by Holland (1986); “Desert dry wash woodland” described by Cheatham and Haller (1975); and “Desert microphyll woodland” described by Thorne (1982). Catclaw acacia is a large, deep-rooted shrub or small tree, characteristic of desert washes, occurring in habitats similar to other desert microphyllous wash woodland species. It resprouts rapidly following disturbance by floods, and seed dispersal and germination are apparently initiated by flooding. The seeds are apparently important to small mammals and, historically, to Native Americans (Turner et al. 1995). Catclaw acacia thorn scrub has no special conservation status ranking (CDFG 2003; 2007).

<u>Lower elevation wash and sandfield vegetation</u>: Areas mapped as creosote bush scrub in the southern part of the project area, generally from about 0.25 mile north of the BNSF railroad tracks and southward to the southern project area boundary, include patches of two additional vegetation associations not mapped by the applicant (SES 2009aa) or by Thomas et al. (2004), but observed on-site by staff biologists in January 2010. These areas are characterized by sandy soils, in deep sandy washes, open sandfields, and active windblown sandfields.

Sand transport from desert mountain ranges downslope to bajadas and, in some cases, dunelands, occurs throughout the deserts by fluvial and aeolian (i.e., water and wind) processes. Infrequent flooding transports sand downslope along desert washes. Prevailing winds sort sands according to grain size and further transport them downwind. Sediments from the Cady Mountains, upslope, are transported by fluvial and aeolian processes toward the southern part of the project site, particularly the southeastern part of the site, where fine windblown sands spread across the lower bajada and small hills in a small dune system, associated with active channels and partially stabilized sandfields. Vegetation types of these dunes, sandfields, and washes include smoke tree woodland, big galleta shrub-steppe, desert saltbush scrub, and unvegetated habitat. These vegetation types are described in the following paragraphs.

Smoke tree woodland (*Psorothamnus spinosus woodland alliance*): Smoke tree woodland is characteristic of desert washes and arroyos. Smoke tree is a shrub or small tree. It may be the dominant or co-dominant species, often occurring with other desert wash species (see catclaw acacia thorn scrub, above). Mixed stands, where smoke trees occur with smaller creosote bush or white bursage present, are classified as smoke tree woodland, even where smaller shrubs constitute as much as twice the overall cover (Thomas et al. 2004; Sawyer et al. 2009). On the project site, a few small smoke trees occur in washes of the upper bajadas, but they are not dominant there. In lower washes smoke tree is the visually dominant plant, even where it occurs with other shrubs.

Smoke tree is relatively short lived (to approximately 50 years), and is strongly tied to active washes. Its stands regenerate following floods, which abrade dormant seeds, permitting them to germinate (Sawyer et al. 2009). Smoke tree woodland is classed as "*Psorothamnus spinosus* Intermittently Flooded Shrubland" by Thomas et al. (2004). In their description, it "is strongly tied to active wash and arroyo channels where flooding is relatively common." In other classification systems, smoke tree woodland has been included within "Mojave wash scrub" and "Mojave Desert Wash Scrub" (Holland 1986); "Desert dry wash woodland" (Cheatham and Haller 1975); and "Desert microphyll woodland" (Thorne 1982). Smoke tree woodland has no special conservation status ranking (CDFG 2003; 2007). However, smoke trees are protected under the San Bernardino County Plant Protection and Management Ordinance.

Big galleta shrub-steppe (*Pleuraphis rigida* herbaceous alliance): On the proposed project site, big galleta (*Pleuraphis rigid = Hilaria rigida*) occurs in low sandy areas and around the margins of dunes in the southeastern portion of the site. In dune areas, it is often interspersed with small stands of the desert sand verbena (*Abronia villosa*) or desert panic grass (*Panicum urvilleanum*). Throughout the Mojave Desert, it commonly occurs in patches within creosote bush shrublands and has often been included within that vegetation description (Thomas et al. 2004). In some areas at higher elevations, big galleta shrub-steppe occurs in closed stands, but the occurrences on the project site match the description by Sawyer et al. (2009), as "open stands around dune margins and other sandy areas at low elevations." Staff distinguishes it from the broader creosote bush scrub description due to its occurrence on sandy substrates which provide a unique habitat type and support special-status species, particularly Mojave fringe-toed lizard, on the site. Some vegetation associations of sandy substrates dominated or co-dominated by big galleta are ranked as special-status vegetation types (CDFG 2003; 2007).

Desert saltbush scrub: The applicant mapped 237 acres of desert saltbush scrub on the project site (SES 2009aa). They compared this desert saltbush scrub to Holland's (1986) description of this vegetation, as strongly dominated by desert saltbush (*Atriplex polycarpa*) with white burrobush (*Hymenoclea salsola*) and inkweed (*Suadea moquinii*) at lower cover; generally occurring on fine-textured, poorly drained saline or alkaline soils. Thomas et al. (2004) and Sawyer et al. (2009) subdivide desert saltbush scrub further, recognizing several saltbush dominated alliances. On the project site, staff noted at least two *Atriplex*-dominated shrubland types in relictual wash or bajada surfaces in the southwestern part of the project site. These appeared to match the *Atriplex canescens* and *Atriplex polycarpa* Shrubland Alliances described by Sawyer et al. (2009), but plant identifications could not be confirmed in January. Staff noted that desert saltbush scrub grades into creosote bush scrub over a wide area in this part of the project site. Fourwing saltbush (*A. canescens*) is generally an indicator of deep fluvial or aeolian sand, whereas desert saltbush (*A. polycarpa*) is typical of playa/upland transition areas on granitic alluvium (Keeler-Wolf 2007). None of the Mojave desert saltbush shrublands have special conservation status (CDFG 2003; 2007).

Un-vegetated habitat: The applicant described rock outcrops in the northern part of the project site as "unvegetated" (SES 2009aa; SES 2008). These sites match the Thomas et al. (2004) category, Rock Outcrop Sparse Vegetation Alliance, but they did not describe this vegetation. Staff observed scattered small shrubs, including species named in the creosote bush shrubland discussion above, at low cover on these sites. These sparsely vegetated outcrops provide almost no vegetative cover. However, crevices, rock shelves, and small hollows or caves that occur throughout the outcrops may serve as denning sites for mammals such as coyote or kit fox; packrat nests; nest sites for burrowing owls or barn owls; roosting sites for bats; crevices where chuckwallas find protection from predators; or shaded pallet sites where desert tortoises may find thermal cover during active seasons.

Communities with High Inventory Priority

CDFG (2003) recognizes several vegetation associations in the central Mojave desert as "communities either known or believed to be of high priority for inventory" in the California Natural Diversity Database (CNDDB). Vegetation associations are fine-scale variation in species dominance, often at a localized level, within broader vegetation types. For example, creosote bush–white bursage vegetation is abundant throughout the Mojave Desert, but sites where it occurs with big galleta grass are either rare or are poorly inventoried. Thus, the creosote bush–white bursage–big galleta association is included below, among the communities with high inventory priority. Due to mapping scales, none of these associations were mapped on the proposed project site. But staff's observations and species lists provided by the applicant (SES 2009aa) indicate that any of these special-status vegetation types could occur on the site. These associations are listed below.

Associations of fine-textured sandy sites, described above as desert washes big galleta shrub-steppe, potentially occur in the southern portions of the proposed project area:

- Creosote bush – white ratteny – big galleta
- White bursage – big galleta
- Creosote bush – white bursage – California croton
- Creosote bush – white bursage – big galleta
- Creosote bush – white bursage – brittlebush
- Creosote bush – white bursage – Thurber's sandpaper plant

Associations of uplands and foothills, potentially occur in the upper bajadas or Cady Mountain foothills, north of the BNSF railroad tracks:

- Creosote bush – Mojave yucca – desert tea
- Creosote bush – white bursage – barrel cactus
- Creosote bush – white bursage – desert tea (California ephedra)
- California ephedra

Jurisdictional Waters

The project site is located on a large alluvial fan that supports numerous drainages that flow from the Cady Mountains. This watershed consists of 43 square miles and is capable of producing substantial flood flows during the 100-year storm event (SES 2009s). Because of the historic flow patterns, arid climate, and various levels of soil development desert washes can vary substantially in their characteristics.

Due to the arid conditions of the area, most of the surface waters that exist in the region are ephemeral streams. The ephemeral streams in the project site are typically dry washes that only flow in response to precipitation. Regional storms, which generally occur in the winter months, are typically of low intensity, but can create short-lived ephemeral streams and cause significant flooding on the playa lake beds. Alternatively, intense summer thunderstorms within the mountainous portions of the area can produce flooding in the low-lying valleys. During summer months, ephemeral streams may only last for a couple of hours, while during the winter, they have the potential to last up to several days. The West Mojave Plan (WMP) indicates the most important hydrologic features of these basins are the alluvial fans.

The AFC indicated that streams that would meet the criteria as Waters of the State or Waters of the United States were not present on the site. The Biological Technical Report indicated that no well-defined channels occur onsite, although some discontinuous flood terraces occur in a few areas, and water flow onsite is not of sufficient intensity or duration to maintain channels indicative of a stream or wash (SES 2009aa). Further, the applicant indicated that one of the techniques used to evaluate whether the site supported jurisdictional drainages was the CRAM method. While CRAM is a useful tool in evaluating stream health, this method is not suitable for determining jurisdictional status of a feature. CRAM is intended to be a diagnostic tool to provide an assessment of overall wetland condition (CWMW 2009). CRAM does not delineate jurisdiction, nor are CRAM assessments appropriate tools for the determination of jurisdiction (CWMW 2009). A site investigation conducted by staff identified numerous drainages with well defined banks and in some areas vegetation characteristic of desert washes. This included Catclaw acacia thorn scrub, smoke tree woodland, and big galleta shrub-steppe. CDFG has indicated that these drainages would meet the criteria as a Water of the State and the applicant has submitted a preliminary draft identifying the State jurisdictional waters on the project site. The US Army Corps of Engineers has determined that the site does not support waters meeting the definition of Waters of the United States (SES 2009j). Wetlands are not present in the project footprint.

Wildlife

The project area supports a broad diversity of wildlife species. With the exception of the areas surrounding the BNSF railroad and existing roads the majority of the site consists of relatively undisturbed desert scrub communities. While the site primarily supports creosote bush scrub, a number of unique features occur throughout the site, including outcrops of black volcanic rock associated with lava flows from Pisgah Crater and wind-blown sand dune habitats. Numerous sandy washes also occur throughout the site. These types of features increases the biodiversity of the site, as some habitat specialists use these areas exclusively, while other generalist species are more wide-ranging in the region. For example, the Mojave fringe-toed lizard is closely associated with sand dunes, sand sheets, and sandy soils in the Mojave Desert. In addition, genetic variants of several reptile and small mammal species have been recorded in association with the dark substrates from the Pisgah lava flows, including melanistic (e.g., darker colored) forms of desert horned lizard (*Phrynosoma platyrhinos*), side-blotched lizard (*Uta stansburiana*), and long-nosed leopard lizard (*Gambelia wislizenii*), and coat color variation in desert woodrats (*Neotoma lepida*) (Lieberman and Lieberman 1969; Rosenblum et al. 2004; SES 2009aa).

Some of the species detected by the applicant during the 2007/2008 surveys include desert tortoise (*Gopherus agassizii*), Mojave fringe-toed lizard (*Uma scoparia*), side-blotched lizard, desert iguana (*Dipsosaurus dorsalis*), western whiptail (*Aspidoscelis tigris*), zebra-tailed lizard (*Callisaurus draconoides*), desert horned lizard, western banded gecko (*Coleonyx variegatus*), long-nosed leopard lizard, and sidewinder (*Crotalus cerastes*). Mammals recorded during the surveys include black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), round-tailed ground squirrel (*Spermophilus tereticaudus*), coyote (*Canis latrans*), American badger (*Taxidea taxus*), bobcat (*Lynx rufus*), and desert kit fox (*Vulpes macrotis*) (SES 2009aa).

Despite the moderate to low shrub density the project area provides forage, cover, roosting, and nesting habitat for a variety of bird species. In addition, many species, such as golden eagle (*Aquila chrysaetos*), are known to nest in the adjacent Cady Mountains and may forage extensively over the project area. Common resident and migratory birds detected in and near the Calico Solar Project site in 2007 and/or 2008 by the applicant include common nighthawk (*Chordeiles minor*), mourning dove (*Zenaida macroura*), white-crowned sparrow (*Zonotrichia leucophrys*), horned lark (*Eremophila alpestris*), black-throated sparrow (*Amphispiza bilineata*), and yellow-rumped warbler (*Dendroica coronata*). Common raven (*Corvus corax*), house finch (*Carpodacus mexicanus*), California quail (*Callipepla californica*), northern mockingbird (*Mimus polyglottos*), sage sparrow (*A. belli*), western kingbird (*Tyrannus verticalis*), western meadowlark (*Sturnella neglecta*), and violet-green swallow (*Tachycineta thalassina*) were also observed. Raptors and owls detected at the site include red-tailed hawk (*Buteo jamaicensis*), golden eagle, burrowing owl (*Athene cunnicularia*), Swainson's hawk (*Buteo swainsoni*), and turkey vulture (*Cathartes aura*). (SES 2009aa)

Special-Status Species

The project area is known to support a variety of sensitive plant and wildlife species. **Biological Resources Table 1** lists all special-status species evaluated during the analysis that are known to occur or could potentially occur in the project area and vicinity. Special-status species detected or considered possible or likely to occur based on known occurrences in the vicinity and suitable habitat present within the project area are discussed in more detail below. Sensitive plants considered possible or likely to occur were also evaluated from habitat descriptions and geographic ranges as summarized by Baldwin et al. (2001), Munz (1974), the California Native Plant Society (2010), the Consortium of California Herbaria (2010), and the California Natural Diversity Database (CDFG 2010a). Special-status species observed on the project site are indicated by bold-face type. Potential for occurrence is defined as follows:

Present: Species or sign of their presence observed on the site during surveys conducted for the proposed project (species that are present are noted in **bold text** in **Biological Resources Table 1**).

High: Species or sign not observed on the site, but reasonably certain to occur on the site based on conditions, species ranges, and recent records (within approximately 20 years and 10 miles of project site).

Moderate: Species or sign not observed on the site, but conditions suitable for occurrence and/or an historical record (greater than 20 years old) exists in the vicinity (within approximately 10 miles of project site).

Low: Species or sign not observed on the site, and conditions marginal for occurrence.

Not likely to occur: Species or sign not observed on the site, outside of the known range, and conditions unsuitable for occurrence.

Biological Resources Table 1
Special-Status Species, Their Status, and Potential Occurrence at the Calico Solar Project Site

Scientific Name	Common Name	Status	Potential For Occurrence On-Site
PLANTS			
Androstephium breviflorum	Pink funnel-lily, Small-flowered androstephium	CNPS 2.2	Present
Astragalus jaegerianus	Lane Mountain milk-vetch	FE, CNPS:1B.1	Low
Astragalus lentiginosus var. *borreganus*	Borrego milk-vetch	CNPS: 4.3	High
Blepharidachne kingii	King's eyelash grass	CNPS: 2.3	Low

Scientific Name	Common Name	Status	Potential For Occurrence On-Site
Calochortus striatus	Alkali mariposa lily	BLM S, CNPS: 1B.2	Moderate
Camissonia boothii var. *boothii*	Booth's evening primrose	CNPS: 2.3	Moderate
Cassia – see *Senna*			
Castela emoryi	**Emory's crucifixion thorn**	CNPS: 2.3	Present
Cleomella brevipes	Short-pedicelled cleomella	CNPS: 4.2	Moderate
***Coryphantha alversonii* [*Escobaria vivipara* var. *alversonii*]**	**Foxtail cactus**	CNPS: 4.3	Present
Coryphantha chlorantha [*Escobaria vivipara* var. *deserti*]	Desert pincushion	CNPS: 2.1	Low
Coryphantha vivipara var. *rosea* [*Escobaria vivipara* var. *rosea*]	Viviparous foxtail cactus	CNPS: 2.2	Low
Cryptantha holoptera	**Winged cryptantha**	CNPS: 4.3	Present
Cymopterus deserticola	Desert cymopterus	BLM S, CNPS: 1B.2	Low
Cymopterus multinervatus	Purple-nerve cymopterus	CNPS: 2.2	High
Cynanchum utahense	**Utah vine milkweed**	CNPS: 4.2	Present
Eriophyllum mohavense	Barstow woolly-sunflower	BLM S, CNPS: 1B.2	Moderate
Escobaria – see *Coryphantha*			
Gilia – see *Linanthus*			
Linanthus maculatus	Little San Bernardino Mountains linanthus	BLM S, CNPS: 1B.2	Not likely to occur
Loeflingia squarrosa var. *artemisiarum*	Sagebrush loeflingia	CNPS: 2.2	Not likely to occur
Mentzelia eremophila	Solitary blazing-star	CNPS: 4.2	High
Mentzelia tridentata	Creamy blazing-star	BLM S, CNPS: 1B.3	Moderate
Mimulus mohavensis	Mojave monkeyflower	BLM S, CNPS: 1B.2	Moderate
Muilla coronata	**Crowned muilla**	CNPS: 4.2	Present
Nemacaulis denudata var. *gracilis*	Slender woolly-heads	CNPS: 2.2	Low
Pediomelum castoreum	Beaver Dam breadroot	CNPS: 4.3	Low
Penstemon albomarginatus	**White-margined beardtongue**	BLM S, CNPS: 1B.1	Present
Phacelia coerulea	Sky-blue phacelia	CNPS: 2.3	Not likely to occur
Polygala acanthoclada	Thorny milkwort	CNPS: 2.3	Low
***Senna covesii* [*Cassia covesii*]**	**Coves' cassia**	CNPS: 2.2	Present
Sphaeralcea rusbyi var. *eremicola*	Rusby's desert mallow	BLM S, CNPS: 1B.2	Low
Tripterocalyx micranthus	**Small-flowered sand-verbena**	CNPS: 2.3	Present
Wislizenia refracta ssp. *refracta*	Jackass-clover	CNPS: 2.2	Moderate

Scientific Name	Common Name	Status	Potential For Occurrence On-Site
REPTILES			
Anniella pulchra pulchra	Silvery legless lizard	CSSC	Low
Gopherus agassizii	Desert tortoise	FT, ST	Present
Heloderma suspectum cinctum	Banded gila monster	BLM S, CSSC	Low
Lichanura trivirgata	Rosy boa	n/a	Moderate
Uma scoparia	Mojave fringe-toed lizard	BLM S, CSSC	Present
BIRDS			
Accipiter cooperii	Cooper's hawk	CDFG WL	Low
Aquila chrysaetos	Golden eagle	BLM S, SP, CDFG WL	Present (nesting)
Asio otus	Long-eared owl	CSSC	High
Athene cunicularia	Western burrowing owl	BLM S, CSSC	Present
Buteo regalis	Ferruginous hawk	CDFG WL	High
Buteo swainsoni	Swainson's hawk	BLM S, ST	Present (not nesting)
Chaetura vauxi	Vaux's swift	CSSC	Low
Charadrius montanus	Mountain plover	BLM S, CSSC	Moderate
Circus cyaneus	Northern harrier	CSSC	Low
Eremophila alpestris actia	California horned lark	CDFG WL	Low
Falco columbarius	Merlin	CDFG WL	High
Falco mexicanus	Prairie falcon	CDFG WL	High (not nesting)
Lanius ludovicianus	Loggerhead shrike	FBCC, CSSC	Present
Polioptila melanura	Black-tailed gnatcatcher	n/a	High
Toxostoma bendirei	Bendire's thrasher	BLM S, CSSC	Present
Toxostoma lecontei	LeConte's thrasher	BLM S, CDFG WL	Present
MAMMALS			
Antrozous pallidus	Pallid bat	BLM S, CSSC	Moderate
Corynorhinus townsendii	Townsend's big-eared bat	BLM S, CSSC	Present
Euderma maculatum	Spotted bat	BLM S, CSSC	Low
Eumops perotis	Western mastiff bat	BLM S, CSSC	High
Ovis Canadensis nelsoni	Nelson's bighorn sheep	BLM S	Present
Spermophilus mohavensis	Mohave ground squirrel	BLM S, ST	Not Likely to Occur
Taxidea taxus	American badger	CSSC	Present
Vulpes macrotis arsipus	Desert kit fox	n/a	Present

FE = Federally listed Endangered
FT = Federally listed Threatened
FD = Federally Delisted
FC = Federal Candidate
FBCC = Federal Bird of Conservation Concern
BLM S = BLM Sensitive
SE = State listed Endangered
ST = State listed Threatened (wildlife)
SR = State listed Rare (plants)
CSSC = California Species of Special Concern (wildlife)
SP = State Fully Protected Species
CDFG WL = California Department of Fish and Game Watch List species

Scientific Name	Common Name	Status	Potential For Occurrence On-Site

CNPS (California Native Plant Society) Designations:

List 1A = Plants presumed extinct in California
List 1B = Plants considered by CNPS to be rare, threatened, or endangered in California, and throughout their range
List 2 = Plants rare, threatened, or endangered in California, but more common elsewhere in their range
List 3 = Plants about which we need more information – a review list.
List 4 = Plants of limited distribution – a watch list

CNPS Threat Rank:

.1 = Seriously endangered in California (over 80% of occurrences threatened/high degree and immediacy of threat)
.2 = Fairly endangered in California (20-80% occurrences threatened)
.3 = Not very endangered in California (<20% of occurrences threatened or no current threats known)

Special-Status Plants

Appendix A of the applicant's Biological Resources Technical Report (SES 2009aa) indicates that five special-status plant species occur on the proposed project site: small-flowered androstephium, Emory's crucifiction-thorn, foxtail cactus, Utah vine milkweed, and white-margined beard-tongue. In addition to these five species, Appendix D of the Biological Resources Technical Report (SES 2009aa) indicates that four additional special-status plants occur on the project site: winged cryptantha, crowned muilla, Coves's cassia, and small-flowered sand verbena.

Small-Flowered Androstephium (*Androstephium breviflorum*)

This species is ranked on CNPS List 2.2 (i.e., rare, threatened or endangered in California but more common elsewhere) and as S2.1 by CDFG (2010b; i.e, fewer than 1000 known individuals or fewer than 2000 acres of occupied habitat). Small-flowered androstephium is a bulb, generally occurring in sandy or rocky soil, in open desert shrublands of eastern California, through the Great Basin, to western Colorado (Cronquist et al. 1977; Keator 2001). As of 1993, formal documentation of small-flowered androstephium occurrence in California was still needed (Keator 1993) and as of 1996 it was known in California from only four herbarium specimens and a photograph (White et al.,1996). Since then, botanical field surveys conducted to compile baseline data for numerous new land use proposals (e.g., Fort Irwin Land Expansion Project and various energy projects) have discovered numerous additional occurrences, documented in part by CNPS (2010) and the Consortium of California Herbaria (2010). The documentation of many new occurrences implies that small-flowered androstephium may be more common in California than previously thought. However, staff has noted that a large percentage (85%) of the occurrences documented in the CDFG's California Natural Diversity Database (CNDDB) is threatened by development (solar energy projects and Fort Irwin expansion).

Small-flowered androstephium is reported from 52 locations on the project site and 14 additional occurrences within a 1000-ft. buffer surrounding the site (SES 2009aa). Numerous additional occurrences were documented on public lands to the west and east, including many in the Pisgah ACEC.

Lane Mountain Milk-Vetch (*Astragalus jaegerianus*)

This species is the only listed (endangered) plant species with potential to occur in the project area. It was not found in or near the project site (SES 2009aa) and all known occurrences are 25 miles or farther from the site. Lane Mountain milk-vetch is locally endemic in the central Mojave Desert, generally on and near Fort Irwin. All known occurrences are about 25 miles northwest of the proposed project site, and at higher elevations (3100-4200 ft.; USFWS 2004; Charlton 2007) than occur on the site.

The Calico Solar Project site is not within designated critical habitat for Lane Mountain milk-vetch. The USFWS (2004) proposed four Critical Habitat Units for Lane Mountain milk-vetch, all to the north of the proposed project site. In 2005, the USFWS finalized its critical habitat designation for Lane Mountain milk-vetch, designating 0 acres of critical habitat (USFWS 2005).

Lane Mountain milk-vetch is a perennial herb that climbs up through desert shrubs. It flowers during spring and dies back during summer. It almost always occurs on shallow soils on low ridges or hills of granitic outcrops rather than bajadas (BLM 2001; USFWS 2004; Charlton 2007). Staff concludes that there is a low potential for occurrence of Lane Mountain milk vetch on the project site because of its distance from known occurrences and poorly suitable bajada habitat that occurs throughout most of the project site.

Emory's Crucifixion Thorn (*Castela emoryi*)

Crucifixion thorn is known from only a few widely scattered occurrences in the Sonoran Desert and southern Mojave Desert in eastern California, southwestern Arizona, northern Baja California, and western Sonora (Mexico). Most populations are fairly small, though one occurrence in Imperial County near the Mexican border includes about a thousand plants. That site is managed by the BLM as "Crucifixion Thorn Natural Area" (Turner et al. 1995). Crucifixion thorn is a leafless, densely spiny shrub, about 6 to 20 ft. tall. It occurs along washes or other places where water may accumulate on plains and bajadas. Its fruits are held on the plant for several years, and the seeds are surrounded by a thick carpel wall which must be eroded before germination occurs. Sanders (no date) speculated that seeds may have historically been dispersed by now-extinct Pleistocene grazing animals. The common name "crucifixion thorn" is also used for two unrelated plant species, *Koeberlinia spinosa* and *Canotia holacantha*.

Emory's crucifixion thorn was found at one location on the proposed project site (SES 2009aa). Potential habitat occurs more widely, throughout the desert washes and ephemeral channels. However, due to limitations of the botanical field surveys described below (Section C.2.4.2, Impacts to Special-Status Plants), staff cannot evaluate the total extent of habitat or numbers of Emory's crucifixion thorn within the proposed project area. Staff anticipates that more plants will be discovered upon further field surveys, though these would probably be few in number, limited to the washes in the upper reaches of the bajada and possibly in the lower portions of the site where numerous channels become confluent before flowing offsite to the west. Staff would not expect additional Emory's crucifixion thorn plants to be found on the broad bajada in the central region of the site.

Foxtail Cactus (*Coryphantha alversonii* = *Escobaria vivipara* var. *alversonii*)

Foxtail cactus is typically found in sandy and rocky areas consisting of granitic soils within Mojavean desert scrub habitat from 245-5000 feet in elevation (CNPS 2010). This species is recorded from the eastern Mojave and Colorado Deserts in Imperial, Riverside, and San Bernardino Counties, California. It is a stem succulent that is a

CNPS List 4.3 species. It flowers from April through June (CNPS 2010). This species is present on the Calico Solar Project site, and one occurrence was recorded during the 2008 surveys for the proposed project, though the occurrence was not mapped in the applicant's Biological Resources Technical Report (SES 2009aa). Suitable desert shrubland habitat occurs throughout site.

Winged Cryptantha (*Cryptantha holoptera*)

Winged cryptantha occurs on gravelly or rocky substrates in desert scrub communities at elevations of 328 to 5545 feet (CNPS 2010). It is known in California from the eastern Mojave Desert and Colorado Desert, and also occurs in Nevada, Arizona, Baja California, and Sonora (Mexico) (CNPS 2010). This species is an annual herb that blooms from March to April. It has grayish foliage and stands 0.5 to 1.5 feet tall (Jepson 1943). It is a stem succulent that is a CNPS List 4.3 species. Winged cryptantha is present on the Calico Solar Project site, and was reported in the applicant's list of plant species identified during surveys (SES 2009aa – Appendix D), though it was not mapped or quantified in the applicant's Biological Resources Technical Report.

Utah Vine Milkweed (*Cynanchum utahense*)

Utah vine milkweed is a perennial herb found in the Mojave Desert in San Bernardino County and in the Colorado Desert in Riverside, Imperial, and San Diego Counties. This species also occurs in Arizona, Nevada, and Utah (CDFG 2010a). In California its habitat is sandy and gravelly soils, often in washes climbing up through shrubs. Utah vine milkweed is a CNPS List 4.2 species. This species in present on the Calico Solar Project site, as the applicant reported one location onsite near I-40 (SES 2009aa). Additional suitable habitat is found in washes throughout the project area.

Crowned Muilla (*Muilla coronata*)

Crowned muilla is a CNPS List 4.2 species that occurs in the deserts of Inyo, Kern, Los Angeles, San Bernardino and Tulare Counties east into Nevada. It can be found in chenopod scrub, Joshua tree woodland, Mojavean desert scrub, and pinyon and juniper woodlands at elevations of 2510-6430 feet. It is a bulbiferous herb that blooms from March to April (CNPS 2010). Crowned muilla is present on the Calico Solar Project site, as it was reported in the applicant's list of plant species identified during surveys (SES 2009aa – Appendix D), though it was not mapped or quantified in the applicant's Biological Resources Technical Report.

White-Margined Beardtongue (*Penstemon albomarginatus*)

This species is the only CNPS List 1B species documented within the proposed project area (SES 2009aa). It is also managed by the BLM as a sensitive species. White-margined beardtongue occurs in the central Mojave Desert, in and around the Pisgah lava flow, in stabilized or drifting aeolian sand habitat (Jaeger 1941; Munz 1974; The Nature Conservancy 2007; CNPS 2010). It is a perennial herb, flowering in spring (between March and May) and dying back to the ground in summer. White-margined beardtongue is a locally endemic species in three widely disjunct locations in California, Nevada, and Arizona. In California, its known range is limited to the valley south of the Cady Mountains, near Hector, Lavic, and Ludlow (MacKay 2003; MacKay no date). The Consortium of California Herbaria (2010) reports 40 specimens, all from the same general area. There also is a report from Fenenr Valley in California (Nature Conservancy 2007) though that occurrence apparently is not supported by an herbarium specimen. Within California, most of its geographic range is within the BLM Pisgah ACEC. There is also one report from the "Baghdad Chase Mine," which was south of Ludlow on or near what is now 29 Palms Marine Base. But white-margined beardtongue was not reported on the 29 Palms Marine Base in the inventory of its natural resources which included extensive botanical surveys (Minnich et al. 1993). In Nevada, it is known only from several populations southeast of the I-15 Freeway, between Stateline and Las Vegas. These occurrences are threatened by a proposed new construction project (Christina Lund, BLM, pers. comm.). In Arizona, white-margined beardtongue occurs at Dutch Flat (Arizona Rare Plant Committee 2004), described as "a large plain extending west of the Hualapai Mtns." (i.e., east or southeast of Needles) (MacKay 2003). In Arizona, as in California, it is regarded it is "a rare species throughout its range" (Arizona Rare Plant Committee 2004).

This species is present on the Calico Solar Project site, as the applicant mapped one white-margined beardtongue occurrence within the proposed project area and numerous other occurrences off-site to the southeast (on lands managed by BLM as the Pisgah Area of Critical Environmental Concern) (SES 2009aa). However, due to limitations of the botanical field surveys described above, staff cannot evaluate the total extent of habitat or numbers of white-margined beardtongue plants within the proposed project area. White-margined beardtongue has the potential to occur anywhere in the lower elevation wash and sandfield vegetation described above. Staff anticipates that more plants will be discovered upon further field surveys, though these would probably be few in number, largely limited to the southeastern portion of the site nearest the Pisgah lava flow.

Coves' Cassia (*Senna covesii =Cassia covesii*)

Coves' cassia, a CNPS List 2.2 species, occurs in scattered California locations along the desert margin of the Peninsular ranges, interior desert ranges in Riverside County, and in extreme southeastern San Bernardino County. It is more common and widespread in Arizona and Baja California, and also occurs in Nevada and mainland Mexico (McMinn 1939; Shreve and Wiggins 1964; CNPS 2010). It occurs in desert washes, below about 2000 ft. elevation. It is a low shrub with velvety leaves and stems which distinguish it from the more common *Cassia armata*. The flowers are yellow, appearing in spring in racemes of few flowers each. Coves' cassia is present on the Calico Solar Project site, and has been reported from surveys of the project site in the Biological Resources Technical Report (SES 2009aa – Appendix D), though the locations are not mapped and there is no indication of numbers of plants or extent of distribution across the project site. This report is the first record of Coves' cassia in the central Mojave Desert. Due to the novelty of this report and absence of further information, Staff is unable to evaluate the extent of potential habitat throughout the project area.

Small-Flowered Sand-Verbena (*Tripterocalyx micranthus*)

This CNPS List 2.3 species is a taprooted perennial herb of desert dunes and sandy sites. It occurs in the eastern California deserts (where it has been reported from only two locations), eastward to the Rocky Mountain States. Its elevational range is approximately 1,800 to 2,800 feet. The only reliable prior reports in California are from the Kelso area (Spellenberg 2002; CNPS 2010) and Eureka Valley in Inyo County (Consortium of California Herbaria 2010). The small-flowered sand-verbena is present on the Calico Solar Project site, and has been reported from surveys of the project site in the Biological Resources Technical Report (SES 2009aa – Appendix D), though the locations are not mapped, nor is there an indication of numbers of plants or extent of distribution across the project site. This report is the first record of small-flowered sand-verbena in the central Mojave Desert. Due to the novelty of this report and absence of further information, Staff is unable to evaluate the extent of potential habitat throughout the project area.

Reptiles

Desert Tortoise (*Gopherus agassizii*)

The desert tortoise is an herbivore that may attain a carapace length of 9 to 15 inches. The tortoise is able to live where ground temperature may exceed 140° F because of its ability to dig burrows and escape intense solar radiation. At least 95% of its life is spent in burrows. The tortoise enters brumation (the reptilian form of hibernation) during the period from September to November and leaves the burrow during the period from February to April. In the spring this species becomes most active above ground from March through May when foraging opportunities are optimal. Tortoises remain active — though to a lesser extent — between June and October. During the active period in the warmer months of the year, tortoises retreat to burrows during periods of intense heat, to rest at night, and to aestivate during extended periods of heat and dryness. Tortoises may also utilize shady areas underneath bushes or rocks during the hottest parts of the day. A single tortoise may have a dozen or more burrows within its home range, and different tortoises may use these burrows at different times.

Range wide, occupied habitats include desert alluvial fans, washes, canyon bottoms, rocky hillsides, and other steep terrain. Tortoises are most common in desert scrub, desert wash, and Joshua tree habitats, but occur in almost every desert habitat except on the most precipitous slopes. Friable soils, such as sand and fine gravel, are an important habitat component, particularly for burrow excavation and nesting. The presence of soil suitable for digging burrows is a limiting factor to desert tortoise distribution (USFWS 1994a).

Plant species play a major role in defining desert tortoise habitat. Creosote bush, burrobush (*Ambrosia dumosa*), Mojave yucca (*Yucca schidigera*), and blackbrush (*Coleogyne ramosissima*) generally distinguish desert tortoise habitat. At higher elevations, Joshua tree and galleta grass are common plant indicators (USFWS 1994a).

The desert tortoise's range includes the Mojave Desert region of Nevada, southern California, and the southwest corner of Utah and the Sonoran Desert region of Arizona and northern Mexico. The desert tortoise range is divided into Mojave and Sonoran populations. The desert tortoise in the vicinity of the Calico Solar Project is part of the Mojave population, which is primarily found in creosote bush-dominated valleys with adequate annual forbs for forage.

Critical Habitat

The nearest designated critical habitat for this species is located approximately 0.5 mile south of the project site within the Ord-Rodman Desert Wildlife Management Area (DWMA). I-40 and the BNSF Railroad pose barriers to movement between this critical habitat and the Calico Solar Project area. However, suitable habitat (including Mojave creosote bush scrub and desert saltbush scrub) is present in the project area and desert tortoises are known to occur within the proposed Calico Solar Project footprint and in the adjacent desert areas. Based on a review of the applicant's survey data and methodology, staff, CDFG, and USFWS conclude that a minimum of 100 tortoises likely occupy the site. Most of the desert tortoises detected during project surveys were noted north of the BNSF Railroad. This area contains suitable habitat for desert tortoise and has less obstructed connectivity to adjacent natural lands. The area between the BNSF Railroad and I 40 provides is isolated by the highway and railroad and portions of the site have been subject to repeated disturbance from pipeline development. Nonetheless tortoise sign was detected in this area by staff and the applicant. While the railroad poses a substantial barrier to movement access is available through the many railroad trestles that span the drainages that flow across the site.

Banded Gila Monster *(Heloderma suspectum cinctum)*

The banded gila monster is considered rare in California with only 26 credible records of the species documented within the past 153 years (Lovich and Beaman 2007). This large and distinct lizard is difficult to observe even in areas where they have been recently recorded. As a result, little is known about this species' distribution, population status, and life history in California. Most of the historical observations in California occurred in mountainous areas of moderate elevations with rocky, incised topography, in large and relatively high ranges as well as riparian areas (Lovich and Beaman 2007). Despite the widespread distribution of potential habitat throughout the California desert, the few documented observations suggest the California populations may be confined to the eastern portion of the California desert (Lovich and Beaman 2007), and the current distribution is apparently a function of summer rainfall. As reported by Lovich and Beaman (2007), all California gila monster observations except one (Mojave River) occurred east of the 116° longitude in areas that received at least 25% of their annual precipitation during the summer months. Throughout their range, gila monsters appear to be most active during or following summer rain events.

Banded gila monsters were not detected onsite during surveys; however, scrub communities and rocky outcrops and lava flows present onsite could provide habitat. Although this species is not known from the area and the closest known sighting is an historic record from the Providence Mountains approximately 50 miles to the east of the project site (Lovich and Beaman 2007), this species is difficult to detect due to its secretive nature and tendency to remain in underground burrows for extended periods of time. Therefore, there is a low potential for this species to inhabit the project area.

Mojave Fringe-Toed Lizard *(Uma scoparia)*

Mojave fringe-toed lizards are known almost exclusively from California, primarily in San Bernardino and eastern Riverside Counties, but are also found to the north in southeastern Inyo County and historically to the west in eastern Los Angeles County (Jennings and Hayes 1994). Murphy et al. (2006) identified two maternal lineages of this species; the northern lineage is associated with the Amargosa River drainage system, and the southern with the Mojave River drainage system, Bristol Trough, Clark's Pass (including Palen Lake and Pinto Wash), and the Colorado River sand transport systems.

The Mojave fringe-toed lizard is a BLM sensitive species that is found in arid, sandy, sparsely vegetated habitats and is associated with creosote scrub throughout much of its range (Norris 1958; Jennings and Hayes 1994). This species is restricted to habitats containing fine, loose, aeolian sand, typically with sand grain size no coarser than 0.375 mm in diameter (Turner et al. 1984; Jennings and Hayes 1994; Stebbins 1944). It burrows in the sand to avoid predators and to thermoregulate (Stebbins 1944), though it will also seek shelter in rodent burrows. Sand dunes provide the primary habitat for this species, although it can also be found in the margins of dry lakebeds and washes and isolated pockets against hillsides (BLM et al. 2005). The most important factor in this species' habitat is the presence of fine sands.

The Mojave fringe-toed lizard is primarily insectivorous, but also eats plant food including leaves, seeds, and buds (Stebbins 1944). This species normally hibernates from November to February, and emerges from hibernacula from March to April. The breeding season is April to July, and adult Mojave fringe-toed lizards reach sexual maturity two summers after hatching. Females deposit 2-5 eggs in sandy hills or hummocks May through July (Mayhew 1964; Jennings and Hayes 1994). From April to May, while temperatures are relatively cool, this species is active during mid-day; from May to September, they are active in mornings and late afternoon, but seek cover during the hottest parts of the day. Common predators of the Mojave fringe-toed lizard include burrowing owls, leopard lizards, badgers, loggerhead shrikes, roadrunners, various snakes, and coyotes (Jennings and Hayes 1994).

The Mojave fringe-toed lizard is widespread geographically across the Mojave and northern Colorado deserts, but its distribution is highly fragmented because it is restricted to habitats containing loose sand, which is patchily distributed (Murphy et al. 2007). Many local populations of this species occur on small patches of sand and are quite small. This fragmented pattern of distribution leaves the species vulnerable to local extirpations from additional habitat disturbance and fragmentation as well as stochastic events (Murphy et al. 2007). The loose wind-blown sand habitat, upon which the Mojave fringe-toed lizard is dependent, is a fragile ecosystem requiring the protection against both direct and indirect disturbances (Weaver 1981; Beatley 1994; Barrows 1996). Environmental changes that stabilize sand, affect sand sources, or block sand movement corridors will also affect this species (Turner et al. 1984; Jennings and Hayes 1994). Threats to this species include habitat loss or damage from urban development, off-highway vehicles (OHV), and agriculture. Aside from the direct loss of land, development can also increase access by predators, such as the common raven, to occupied habitat. Potential indirect disturbances are associated with the disruption of the dune ecosystem source sand, wind transport, and sand transport corridors

The applicant reported that the Mojave fringe-toed lizard is present on the Calico Solar Project site, and has been documented in a partially stabilized dune complex located between the BNSF Railroad and I-40 on the project site (SES 2008). Surveys of the project site were conducted by the applicant in portions of the AFC Assessment Area from June 2, 2008 through June 6, 2008 (SES 2009aa). Prior to conducting the surveys, the applicant identified areas containing windblown sands. Based on the results of the surveys, the applicant considers the 8,260-acre project site to support approximately 16.9 acres of Mojave fringe-toed lizard habitat. However, staff conducted a reconnaissance survey of the Calico Solar Project site in January 2010, during which time staff inspected the dune complex. Staff believes the applicant has underestimated the amount of habitat that can be utilized by this species. Fine-grained friable sand occurs in many areas adjacent to the identified dune complex, both within the numerous drainages that cross the project site and in small patches of windblown sand. Similarly, soft friable sands with small patches of micro dunes occur within the creosote bush scrub habitat across much of the lower project site. Implementation of staff's proposed mitigation would compensate for the underestimation of suitable habitat.

Birds

Western Burrowing Owl *(Athene cunicularia)*

The burrowing owl is a small, terrestrial owl of open country. Burrowing owls favor flat, open grassland or gentle slopes and sparse shrubland ecosystems. These owls prefer annual and perennial grasslands, typically with sparse, or nonexistent, tree or shrub canopies (Clark and Plumpton 2005). In California, burrowing owls are found in close association with California ground squirrels (Coulombe 1971). Owls use the burrows of ground squirrels and other rodents for shelter and nesting (Martin 1973). Ground squirrels provide nesting and refuge burrows, and maintain areas of short vegetation height, which provide foraging habitat and allow for visual detection of avian predators by burrowing owls (Haug et al. 1993). Habitats lacking ground squirrel populations are usually unsuitable for occupancy by owls, although owls can also use man-made features as burrows (such as drain pipes, debris piles, etc). Burrowing owls are semi-colonial nesters, and group size is one of the most significant factors contributing to site constancy by breeding burrowing owls (Haug et al. 1993). The nesting season, as recognized by the California Burrowing Owl Consortium (CBOC 1993), runs from 1 February through 31 August.

In the Mojave Desert, burrowing owls generally occur at low densities in scattered populations, but they can be found in much higher densities near agricultural lands where rodent and insect prey tend to be more abundant (Gervais et al. 2008). The project area contains suitable foraging habitat and California ground squirrel burrows that could provide breeding habitat. This species is present on the project site, as one individual was observed in the north-central portion of the project site and another individual was observed in the Pisgah ACEC adjacent to the southeast of the project site during field surveys in 2008 (SES 2009aa). Protocol surveys for this species were conducted in January 2010, and staff has received a preliminary draft of this report. Preliminary information received from the applicant indicates that two burrowing owls and approximately eleven burrows with sign were detected on the project site during the 2010 surveys.

Swainson's Hawk *(Buteo swainsoni)*

The Swainson's hawk was once one of the most common birds of prey in the grasslands of California and nested in the majority of the lowland areas of the state. Currently, the nesting range is primarily restricted to portions of the Sacramento and

San Joaquin valleys, northeast California, and the Western Mojave, including the Antelope Valley (Bloom 1980). The Swainson's hawk requires large amounts of foraging habitat, preferably grassland or pasture habitats. Its preferred prey includes voles (*Microtus* spp.), gophers, birds, and insects such as grasshoppers (Estep 1989). It has adapted to the use of some croplands, particularly alfalfa, as well as grain, tomatoes, and beets (Estep 1989). Crops such as cotton, corn, rice, orchards, and vineyards are not suitable because they either lack suitable prey, or prey is unavailable to the hawks due to crop structure. Swainson's hawks often establish territories in riparian systems adjacent to suitable foraging habitats as well as utilizing lone trees or groves of trees in agricultural fields.

Within the West Mojave Plan area, the nearest documented nesting attempts have been recorded in Victorville, approximately 50 miles southwest of the project site (BLM et al. 2005); nesting is not known from east of this location within the planning area. Two Swainson's hawks were observed by the applicant during project surveys on March 30, 2008; thus the species is considered present within the project area, though it is not expected to nest there.

Prairie Falcon *(Falco mexicanus)*

Prairie falcons breed throughout California, with the exception of the northwest corner and along the immediate coast (Steenhoff 1998). This species is an uncommon resident that ranges from the southeastern deserts northwest through the Central Valley and along the inner Coast Ranges and Sierra Nevada. It is primarily associated with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas (Polite and Pratt 2005). Prairie falcons were not observed during the 2007 and 2008 project surveys. Nesting habitat does not occur onsite; however, suitable foraging habitat for this species occurs within the project site. This species likely nests in the nearby Cady Mountains. Thus, the potential for occurrence of this species within the project area has been determined to be high, though it is not expected to nest there.

Golden Eagle *(Aquila chrysaetos)*

Golden eagles are typically year-round residents throughout most of their western United States range. They breed from late January through August with peak activity March through July (Kochert et al. 2002). Migratory patterns are usually fairly local in California where adults are relatively sedentary, but dispersing juveniles sometimes migrate south in the fall. This species is generally considered to be more common in southern California than in the northern part of the state (USFS 2008).

Habitats for this species typically include rolling foothills, mountain areas, and deserts. Golden eagles need open terrain for hunting and prefer grasslands, deserts, savanna, and early successional stages of forest and shrub habitats. Golden eagles primarily prey on lagomorphs and rodents but will also take other mammals, birds, reptiles, and some carrion (Kochert et al. 2002). This species prefers to nest in rugged, open habitats with canyons and escarpments, with overhanging ledges and cliffs and large trees used as cover.

Absent interference from humans, breeding density is determined by either prey density or nest site availability, depending upon which is more limiting (USFWS 2009a). A compilation in Kochert et al. (2002) of breeding season home ranges from several western United States studies showed an average home range of 20–33 square kilometers (7.7 to 12.7 square miles) that ranged from 1.9 to 83.3 square kilometers (0.7 to 32.2 square miles). In San Diego, a study of 27 nesting pairs found breeding ranges to be an average of 36 square miles with a range from 19 to 59 square miles (Dixon 1937). Other studies from within and outside the United States include ranges from 9 to 74.2 square miles (McGahan 1968; Watson et al. 1992). U.S. Fish and Wildlife Service recommendations include a 0.5-mile nest protection buffer and evaluating an area of 4 miles from nests as foraging habitat (Strassburger, pers. com.)

Golden eagles were observed flying over the project site during both the 2007 and 2008 surveys (SES 2009aa), and this species is considered present within the project area and was documented in the vicinity of the project (within a 10-mile buffer area). Nesting habitat does not occur onsite, and the observed individuals likely nest in the nearby Cady Mountains and forage over the project area. Information provided by the BLM and the applicant indicate that up to six potential nesting sites occur within a 10-mile radius of the site. To document potential nest sites for golden eagles, the applicant conducted helicopter surveys for this species in March 2010. Two active nests were detected by the applicant within a 10-mile radius of the proposed project during the 2010 helicopter surveys.

Loggerhead Shrike *(Lanius ludovicianus)*

Loggerhead shrikes are uncommon residents throughout most of the southern portion of their range, including southern California. In southern California they are generally much more common in interior desert regions than along the coast (Humple 2008). In the Mojave Desert this species appears to be most numerous in flat or gently sloping deserts and desert/scrub edges, especially along the eastern slopes of mountainous areas (Humple 2008). Loggerhead shrikes initiate their breeding season in February and may continue with raising a second brood as late as July; they often re-nest if their first nest fails or to raise a second brood (Yosef 1996).

This species can be found within lowland, open habitat types, including creosote scrub and other desert habitats, sage scrub, non-native grasslands, chaparral, riparian, croplands, and areas characterized by open scattered trees and shrubs. Fences, posts, or other potential perches are typically present. In general, loggerhead shrikes prey upon large insects, small birds, amphibians, reptiles, and small rodents over open ground within areas of short vegetation, usually impaling prey on thorns, wire barbs, or sharp twigs to cache for later feeding (Yosef 1996).

Suitable habitat for loggerhead shrike occurs throughout the scrub habitats within the project area and one loggerhead shrike was observed in the project area between the BNSF Railroad and the I-40 during the 2008 surveys (SES 2009aa). Thus, this species is considered present, and it likely nests and forages onsite.

Bendire's Thrasher (*Toxostoma bendirei)*

Bendire's thrashers are known in California from scattered locations in Kern, Inyo, San Bernardino, and Riverside counties, and one documented outlier in San Diego County (Sterling 2008). This species is a summer resident in California from March to late

August, breeds from late March through July, and departs by mid- to late August. In the Mojave Desert, this species favors Mojave desert scrub, primarily in areas that contain large cholla, Joshua tree, Spanish bayonet, Mojave yucca, or other succulents (Sterling 2008). The status of populations of this species is poorly understood, but threats are believed to be loss of habitat due to urbanization and agricultural development, harvesting of yuccas and cholla cacti, and off-road vehicle activity (Sterling 2008).

Bendire's thrasher is present on the project site, as this species was observed during surveys in an area adjacent to the project site (SES 2009aa), and suitable nesting and foraging habitat occurs throughout the project area.

Le Conte's Thrasher (*Toxostoma lecontei*)

This species inhabits some of the hottest and driest habitats in the arid southwest, including the deserts of southeastern California where they occur year-round. Preferred habitats include sparse desert scrub, alkali desert scrub, and desert succulent scrub habitats with open desert washes. They seek gentle to rolling slopes associated with dry desert washes, conditions found on alluvial fans that are found in the project area. Nests are typically placed in prickly vegetation such as cacti or thorny shrubs (Sheppard 1996). The Le Conte's thrasher population densities are among the lowest of passerine (perching) birds, estimated at less than five birds per square kilometer in optimal habitats (Fitton 2008). This low population density decreases the probability of their detection during field surveys. The population decline is due in part to the conversion of habitat to agriculture and urbanization (Laudenslayer et al. 1992). Le Conte's thrashers are also affected by off-highway use during nesting season (Remsen 1978), which occurs on numerous unimproved roads throughout the project site. This species requires areas with an accumulated leaf litter under most plants as cover for its preferred arthropod prey; they also feed on seeds, insects, small lizards, and other small vertebrates.

Le Conte's thrasher is present on the project site, as one individual was observed within the project boundary during the 2008 surveys (SES 2009aa). This species may nest and forage on the project site.

Mammals

Nelson's Bighorn Sheep *(Ovis canadensis nelsoni)*

Bighorn sheep are typically found on open, rocky, steep areas used for escape cover and shelter, with available water and herbaceous vegetation for forage. Bighorn sheep are agile in steep, rocky terrain, allowing them to escape predators such as coyotes (*Canis latrans*), golden eagles (*Aquila chrysaetos*), and cougars (*Felis concolor*) (Wehausen 1992). Most of the bighorn sheep live between 300–4,000 feet in elevation where the annual precipitation is less than 4 inches and daily high temperatures average 104°F in the summer (Beacham 2000).

Bighorn sheep primarily browse shrubs and graze on native grasses throughout the year. The pulp and fruits of various cacti are eaten during the dry season (Beacham 2000). Bighorn sheep have a large rumen, relative to body size, which allows digestion of grasses, even in a dry state (Hanly 1982). This gives them flexibility to select diets that optimize nutrient content from available forage. Consequently, bighorn sheep feed on a large variety of plant species and diet composition varies seasonally and among locations. While diet quality varies greatly among years, it is most predictably high in late winter and spring (Wehausen 1992), and this period coincides with the peak of lambing. The lambing season of Nelson's bighorn sheep in the Mojave Desert is typically between December and June (BLM et al. 2005).

Surface water is another element of desert bighorn habitat considered important to population health. Bighorn sheep congregate near dependable water sources from May through October. These population aggregations during this period are due to a combination of breeding activities and diminishing water sources (Beacham 2000). It is common for males and females to segregate and occupy different habitats outside the breeding season (Bleich et al. 1997). Females tend to choose particularly steep, safe areas for bearing and initial rearing of lambs. Areas associated with ridge benches or canyon rims adjacent to steep slopes or escarpments are commonly preferred lambing areas if available. Males frequently occupy much less precipitous habitat during the lamb-rearing season (Bleich et al. 1997). Alluvial fan areas are also used for breeding and feeding activities (Beacham 2000).

The population of bighorn sheep in the Cady Mountains just north of the project area is a native population (not reintroduced or augmented), and was estimated to contain approximately 25 to 50 individuals in 1995 (Torres et al. 1994, 1996; BLM et al. 2005). By 2007, this population had grown to approximately 300 individuals (DW 2010). No Nelson's bighorn sheep were observed during the 2007 or 2008 Calico Solar Project surveys; however, surveys conducted by helicopter in 2010 observed 62 bighorn sheep (12 rams, 38 ewes, and 12 lambs) within 10 miles of the project site. Approximately 458.3 acres of suitable habitat is potentially being utilized by bighorn sheep along the foothills at the northeast boundary of the project site with an additional 404.5 acres of suitable habitat within the 1000-foot buffer around the project site (SES 2009aa).

Pallid Bat *(Antrozous pallidus)*

The pallid bat is a light brown or sandy colored, long-eared, moderate-sized bat that occurs throughout California with the exception of the northwest corner of the state and the high Sierra Nevada (Zeiner et al. 1990). Pallid bats are most commonly found in oak savannah and in open dry habitats with rocky areas, trees, buildings, or bridges for roosting. Coastal colonies commonly roost in deep crevices in rocky outcroppings, in buildings, under bridges, and in the crevices, hollows, and exfoliating bark of trees. Colonies can range from a few individuals to over a hundred (Barbour and Davis 1969) and usually this species occurs in groups larger than 20 individuals (Wilson and Ruff 1999). Although crevices are important for day roosts, night roosts often include open buildings, porches, garages, highway bridges, and mines. Pallid bats may travel up to several miles for water or foraging sites if roosting sites are limited. This bat prefers foraging on terrestrial arthropods in open habitats and regional populations and individuals may show selective prey preferences (Johnston and Fenton 2001). They may also occur in open coniferous forests. Pallid bat roosts are very susceptible to human disturbance, and urban development has been cited as the most significant factor contributing to their regional decline (Miner and Stokes 2005).

Although roosting habitat does not appear to exist onsite, there is a moderate potential for pallid bats to forage over the entire project area. Roosting habitat occurs nearby in the Cady Mountains and lava tubes associated with the Pisgah Crater.

Townsend's Big-Eared Bat *(Corynorhinus townsendii)*

The Townsend's big-eared bat is a colonial species that feeds primarily on moths and other soft-bodied insects. Females aggregate in the spring at nursery sites known as maternity colonies. Although the Townsend's big-eared bat is usually a cave-dwelling species, many colonies are found in anthropogenic structures such as the attics of buildings or old, abandoned mines. Roost sites in California include limestone caves, lava tubes, mine tunnels, buildings, and other structures (Williams 1986). Radiotracking studies suggest that movement from a colonial roost during the maternity season is confined to within 9 miles of the nursery. Townsend's big-eared bats are very susceptible to human disturbance, and females are known to completely abandon their young when disturbed. The loss of maternity and hibernation roosts has been cited as the most significant factor contributing to their decline throughout their range (Miner and Stokes 2005). In Southern California, Townsend's big-eared bat was once common in the coastal plains of Southern California where mines or caves were prevalent (Krutzsch 1948). However, this species has declined substantially in the region and is now primarily limited to the foothill and mountain regions of Southern California (Miner and Stokes 2005). Townsend's big-eared bat is present on the project site, as this species was detected onsite during surveys in 2008. Although roosting habitat does not appear to exist onsite, Townsend's big-eared bats are expected to forage over the entire project area. Roosting habitat occurs nearby in the Cady Mountains and lava tubes associated with the Pisgah Crater.

American Badger *(Taxidea taxus)*

American badgers were once fairly widespread throughout open grassland habitats of California. They are now uncommon, permanent residents throughout most of the state, with the exception of the northern North Coast area. Known to occur in the Mojave Desert, they are most abundant in the drier open stages of most shrub, forest, and herbaceous habitats with friable soils. In the southwest, badgers are typically associated with Mojave creosote bush scrub and sagebrush. Mating occurs in late summer or early fall and two to three young are born in March or April (Long 1973). Badgers are fossorial, digging large burrows in dry, friable soils and will use multiple dens/cover burrows within their home range. They typically use a different den every day, although they can use a den for a few days at a time (Sullivan 1996). Cover burrows are an average of 30 feet in length and are approximately 3 feet in depth. Natal dens are larger and more complex than cover dens. In undisturbed, high-quality habitat, badger dens can average 0.64 dens per acre, but are usually at much lower density in highly disturbed areas (Sullivan 1996).

American badger is present within the project area, as one individual was detected at its burrow during project surveys in May 2008, and suitable desert scrub habitats are present throughout the project area.

Desert Kit Fox *(Vulpes macrotis arsipus)*

The desert kit fox can be found in much of the same habitat as the badger in the Mojave Desert. While the desert kit fox is not listed as a special-status species by the State of California or the USFWS, it is protected under Title 14, California Code of Regulations (Title 14, Section 460). Kit foxes are primarily nocturnal, and inhabit open level areas with patchy shrubs. Friable soils are necessary for the construction of dens, which are used throughout the year for cover, thermoregulation, water conservation, and rearing pups. Kit foxes typically produce one litter of about four pups per year, with most pups born February through April (Ahlborn 2000). Desert kit fox is present within the project site, as this species was detected onsite during surveys.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

The applicant will need to abide by the laws, ordinances, regulations, and standards (LORS) during project construction and operation, as listed in **Biological Resources Table 2**.

Biological Resources Table 2
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
FEDERAL	
Federal Endangered Species Act (Title 16, United States Code, section 1531 et seq., and Title 50, Code of Federal Regulations, part 17.1 et seq.)	Designates and provides for protection of threatened and endangered plant and animal species and their critical habitat. “Take” of a federally-listed species is prohibited without an incidental take permit, which may be obtained through Section 7 consultation (between federal agencies) or a Section 10 Habitat Conservation Plan.
Migratory Bird Treaty Act (Title 16, United States Code, sections 703 through 711)	Makes it unlawful to take or possess any migratory bird (or any part of such migratory bird including active nests) as designated in the Migratory Bird Treaty Act unless permitted by regulation (e.g., duck hunting).
Clean Water Act (Title 33, United States Code, sections 1251 through 1376, and Code of Federal Regulations, part 30, section 330.5(a)(26))	Requires the permitting and monitoring of all discharges to surface water bodies. Section 404 requires a permit from the U.S. Army Corps of Engineers (USACE) for a discharge from dredged or fill materials into waters of the U.S., including wetlands. Section 401 requires a permit from a regional water quality control board (RWQCB) for the discharge of pollutants. By federal law, every applicant for a federal permit or license for an activity that may result in a discharge into a California water body, including wetlands, must request State certification that the proposed activity will not violate State and federal water quality standards.
Bald and Golden Eagle Protection Act (Title 16, United States Code section 668)	Provides for the protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the take, possession, and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the act or regulations issued pursuant thereto and strengthened other enforcement measures. Rewards are provided for information leading to arrest and conviction for violation of the act.

Applicable Law	Description
California Desert Conservation Area Plan 1980, as amended (reprinted in 1999)	Administered by the BLM, the CDCA Plan requires that proposed development projects are compatible with policies that provide for the protection, enhancement, and sustainability of fish and wildlife species, wildlife corridors, riparian and wetland habitats, and native vegetation resources.
California Desert Protection Act of 1994	An Act of Congress which established 69 wilderness areas, the Mojave National Preserve, expanded Joshua Tree and Death Valley National Monuments and redefined them as National Parks. Lands transferred to the National Park Service were formerly administered by the BLM and included significant portions of grazing allotments, wild horse and burro Herd Management Areas, and Herd Areas.
West Mojave Plan	As an amendment to the CDCA Plan, the BLM produced the West Mojave Plan (WEMO) (BLM 2006). The WEMO is a federal land use plan amendment that (1) presents a comprehensive strategy to conserve and protect the desert tortoise, the Mohave ground squirrel (MGS) and nearly 100 other plants and animals and the natural communities of which they are part, and (2) provides a streamlined program for complying with the requirements of the California and federal Endangered Species Acts" (BLM et al. 2005).
STATE	
California Endangered Species Act of 1984 (Fish and Game Code, sections 2050 through 2098)	Protects California's rare, threatened, and endangered species. "Take" of a State-listed species is prohibited without an Incidental Take Permit.
California Code of Regulations (Title 14, sections 670.2 and 670.5)	Lists the plants and animals of California that are declared rare, threatened, or endangered.
Fully Protected Species (Fish and Game Code, sections 3511, 4700, 5050, and 5515)	Designates certain species as fully protected and prohibits the take of such species or their habitat unless for scientific purposes (see also California Code of Regulations, Title 14, section 670.7).
Nest or Eggs (Fish and Game Code section 3503)	Protects California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird.
Birds of prey (Fish and Game Code section 3503.5)	Birds of prey are protected in California making it "unlawful to take, possess, or destroy any birds of prey (in the order Falconiformes or Strigiformes)."
Migratory Birds (Fish and Game Code section 3513)	Protects California's migratory birds by making it unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame birds.
Significant Natural Areas (Fish and Game Code section 1930 et seq.)	Designates certain areas such as refuges, natural sloughs, riparian areas, and vernal pools as significant wildlife habitat.
California Environmental Quality Act (CEQA), CEQA Guidelines section 15380	CEQA defines rare species more broadly than the definitions for species listed under the State and federal Endangered Species Acts. Under section 15830, species not protected through State or federal listing but nonetheless demonstrable as "endangered" or "rare" under CEQA should also receive consideration in environmental analyses. Included in this category are many plants considered rare by the California Native Plant Society (CNPS) and some animals on the CDFG's Special Animals List.

Applicable Law	Description
Streambed Alteration Agreement (Fish and Game Code sections 1600 et seq.)	Regulates activities that may divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake in California designated by CDFG in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit. Impacts to vegetation and wildlife resulting from disturbances to waterways are also reviewed and regulated during the permitting process.
California Native Plant Protection Act of 1977 (Fish and Game Code section 1900 et seq.)	Designates State rare, threatened, and endangered plants.
California Desert Native Plants Act of 1981 (Food and Agricultural Code section 80001 et seq. and California Fish and Game Code sections 1925-1926)	Protects non-listed California desert native plants from unlawful harvesting on both public and private lands in Imperial, Inyo, Kern, Los Angeles, Mono, Riverside, San Bernardino, and San Diego counties. Unless issued a valid permit, wood receipt, tag, and seal by the commissioner or sheriff, harvesting, transporting, selling, or possessing specific desert plants is prohibited.
Local	
San Bernardino County General Plan: Conservation/Open Space Element of the County General Plan (County of San Bernardino 2007)	Includes objectives to preserve water quality and open space to benefit biological resources, and specific policies and goals for protecting areas of sensitive plant, soils and wildlife habitat and for assuring compatibility between natural areas and development. Although the Calico Solar Project is not located on lands under county jurisdiction, the general plan provides objectives which are consistent with some of the LORS listed above.

C.2.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Direct and Indirect Impacts and Mitigation

The CEQA Guidelines define *direct impacts* as those impacts that result from the project and occur at the same time and place. *Indirect impacts* are caused by the project, but can occur later in time or farther removed in distance while still reasonably foreseeable and related to the project. The potential impacts discussed in this analysis are those most likely to be associated with construction and operation of the project.

Operational impacts would include both *direct* and *indirect* impacts to biological resources. Ongoing operations and maintenance impacts would occur during routine inspection and maintenance of the proposed project facilities and would include such activities as mirror washing, SunCatcher maintenance, vegetation mowing, and routine inspection. Operational impacts would remain an ongoing source of disturbance for many plants and wildlife species that occur within the fenced facility perimeter and in and adjacent habitat. For example, the AFC indicated that the proposed 8,230 acres facility would operate 7 days per week with a staff of approximately 180 full-time employees. Maintenance activities will occur 7 days a week, 24 hours a day to ensure SunCatcher availability when solar energy is available (SES 2008). Operational impacts within the facility would include lighting effects from night time maintenance activities, trampling or crushing of native vegetation and wildlife by vehicular or foot traffic, alterations in topography and hydrology, increased erosion and sedimentation, and the introduction of non-native, invasive plants due to increased human presence and excess water from SunCatcher rinsing. These effects are discussed further below.

Impact analyses typically characterize effects to plant communities as temporary or permanent, with a permanent impact referring to areas that are paved or otherwise precluded from restoration to a pre-project state. In the desert ecosystems the definition of permanent impacts needs to reflect the slow recovery rates of its plant communities. Natural recovery rates from disturbance in these systems depend on the nature and severity of the impact. For example, creosote bushes can re-sprout a full canopy within five years after damage from heavy vehicle traffic (Gibson et al. 2004), but more severe damage involving vegetation removal and soil disturbance can take from 50 to 300 years for partial recovery; complete ecosystem recovery may require over 3,000 years (Lovich and Bainbridge 1999). For example, soil disturbance from military exercises conducted in the Mojave Desert during the Second World War remains visible in many locations to this day.

In this analysis, an impact to vegetation is considered temporary only if there is evidence to indicate that pre-disturbance levels of biomass, cover, density, community structure, and soil characteristics could be achieved within five years. For example, ongoing vegetation mowing of creosote bush scrub on the project area would be considered a permanent impact and may take decades to functionally recover to pre-construction conditions. **Biological Resources Table 3** summarizes the impacts to biological resources resulting from Calico Solar Project construction and operation and provides conditions of certification to mitigate these impacts. Staff's recommended conditions of certification are discussed in more detail later in this analysis.

Biological Resources Table 3
Summary of Impacts/Mitigation

Biological Resource	Impact/Mitigation
Mojave Desert Plant Communities and Wildlife Habitat	**Impact:** Permanent loss and fragmentation of a total of approximately 8,230 acres of native vegetation; potential direct impacts to terrestrial wildlife by heavy equipment and grading; increased risk of road kill; increased disturbance/dust to nearby vegetation and wildlife; spread of non-native invasive weeds. **Mitigation:** Avoidance and minimization measures (**BIO-1** through **BIO-9**); restoration/compensation (**BIO-10**); weed management (**BIO-11**); desert tortoise compensatory mitigation (**BIO-17**).
Special-Status Plants	**Impact:** Potential loss and fragmentation of habitat, potential loss of individuals or populations. **Mitigation:** Avoidance and minimization measures (**BIO-1** through **BIO-9**); restoration/compensation (**BIO-10**); weed management (**BIO-11**); surveys for rare plants prior to ground disturbance and avoidance of rare plants (**BIO-12**); desert tortoise compensatory mitigation (**BIO-17**).
Common Wildlife	**Impact:** Potential mortality or disturbance during construction and operation, loss or fragmentation of habitat, displacement, disruption of movement. **Mitigation:** Avoidance and minimization measures (**BIO-1** through **BIO-9**); desert tortoise compensatory mitigation (**BIO-17**).

Biological Resource	Impact/Mitigation
Horses and Burros	**Impact:** Loss or fragmentation of habitat, displacement, disruption of movement if these species occur in project area. **Mitigation:** Avoidance and minimization measures (**BIO-1** through **BIO-9**).
Waters of the State	**Impact:** Temporary impacts to 356 acres of waters of the State from vegetation mowing; permanent impacts to 258 acres of waters of the State from the installation of permanent project components. **Mitigation:** Avoidance and minimization measures (**BIO-1** through **BIO-9**); acquisition of offsite State jurisdictional waters, the implementation of Best Management Practices to protect drainages, and nonnative vegetation removal (**BIO-27**); removal of engineered diversion channels upon project closure (**BIO-29**).
Special-Status Wildlife	
Mojave Fringe-Toed Lizard	**Impact:** Potential mortality and disturbance, loss of habitat, and habitat fragmentation, disruption of movement corridors. **Mitigation:** Avoidance and minimization measures (**BIO-1** through **BIO-9**); specific Mojave fringe-toed lizard avoidance and minimization measures (**BIO-13**).
Gila Monster	**Impact:** Potential mortality and disturbance, loss of habitat, and habitat fragmentation, if present. **Mitigation:** General avoidance and minimization measures (**BIO-1** through **BIO-9**); specific gila monster avoidance and minimization measures (**BIO-14**).
Desert Tortoise	**Impact:** Habitat loss and fragmentation, disruption of movement corridors, potential take of individuals during operation and construction; increased risk of predation from ravens and other predators; increased road kill hazard from construction and operations traffic. **Mitigation:** Avoidance and minimization measures (**BIO-1** through **BIO-9**); clearance surveys and exclusion fencing (**BIO-15**); Relocation/Translocation Plan (**BIO-16**); off-site habitat acquisition of 23,417 acres (**BIO-17**); Raven Monitoring, Management, And Control Plan (**BIO-18**).
Swainson's Hawk	**Impact:** Potential loss of foraging habitat. **Mitigation:** Desert tortoise compensatory mitigation (**BIO-17**).
Golden Eagle	**Impact:** Loss of foraging habitat; disruption of foraging activities; degradation and alteration of habitat adjacent to the project. **Mitigation:** General avoidance and minimization measures (**BIO-1** through **BIO-9**); preconstruction surveys for golden eagles and establishment of no-disturbance buffer zones around active nests (**BIO-20**); documentation of Eagle Act compliance (**BIO-21**).

Biological Resource	Impact/Mitigation
Burrowing Owl	**Impact:** Potential loss of nest, eggs, or young; loss of breeding and foraging habitat; disturbance of nesting and foraging activities for populations on and near the project site and/or exposure to toxins in the evaporation ponds **Mitigation:** Implement burrowing owl impact avoidance and mitigation measures; pre-construction surveys; detection and avoidance of active burrows and, if necessary, the acquisition of mitigation lands; and the creation of artificial burrows for displaced individuals (**BIO-22**).
Other Migratory/Special-Status Birds • Loggerhead Shrike • Le Conte's Thrasher • Bendire's Thrasher	**Impact:** Disturbance of nesting activities; potential loss of nest, eggs, or young; loss of breeding and foraging habitat; potential mortality due to collisions with solar infrastructure and/or exposure to toxins in the evaporation ponds. **Mitigation:** Off-site habitat acquisition and enhancement (**BIO-17**); conduct pre-construction nesting surveys, implement avoidance measures (**BIO-19**); monitoring bird impacts from solar technology (**BIO-23**); Evaporation Pond Design, Monitoring, and Management Plan (**BIO-28**).
Bird Collisions and Electrocution	**Impact:** Avian species, including special-status species, could be subject to mortality due to collisions and/or electrocution on project transmission lines and collisions with SunCatchers. **Mitigation:** Transmission lines and all electrical components shall be designed, installed, and maintained in accordance with the Avian Power Line Interaction Committee's (APLIC's) *Suggested Practices for Avian Protection on Power Lines* (APLIC 2006) and *Mitigating Bird Collisions with Power Lines* (APLIC 2004) (**BIO-8**); monitoring bird impacts from solar technology (**BIO-23**).
Nelson's Bighorn Sheep	**Impact:** Permanent loss of 458.5 acres of foraging habitat; disturbance from construction activities, noise, and lighting; interference with movement and behavioral modifications due to human presence. **Mitigation:** Avoidance and minimization measures (**BIO-1** through **BIO-9**); construction of artificial water source for bighorn sheep in the Cady Mountains (**BIO-24**)
American Badger and Kit Fox	**Impact:** Potential loss and fragmentation of habitat, loss of foraging grounds, crushing or entombing of animals during construction. **Mitigation:** Conduct pre-construction surveys and implement avoidance measures (**BIO-25**).
Special-Status Bats	**Impact:** Potential loss and fragmentation of habitat, potential mortality and disturbance of animals during construction and operation. Bats may also be subject to collision with SunCatchers and/or exposure to toxins in the evaporation ponds **Mitigation:** Avoidance and minimization measures, including pre-construction surveys, avoidance of maternity colonies, provision of substitute roosting habitat, and exclusion of bats prior to demolition of roosts (**BIO-26**).

Biological Resource	Impact/Mitigation
Wildlife Movement Corridors	**Impact:** Interference with wildlife movement across project site due to permanent exclusion fencing. **Mitigation:** Avoidance and minimization measures (**BIO-1** through **BIO-9**).

Overview of Impacts to Vegetation and Wildlife

Construction of the Calico Solar Project would result in the permanent land use conversion of native vegetation communities and the loss of special-status plant and animal species. Permanent loss involves long-term impacts associated with project features (e.g., SunCatchers, expansion of the Pisgah Substation, new transmission line towers, new access roads, altered drainage features, evaporation ponds, and required maintenance activities that would routinely disturb wildlife and vegetation) that would remain throughout the life of the project.

Vegetation Impacts

Construction of the Calico Solar Project and associated facilities would result in the permanent loss of native vegetation from the construction of access roads, SunCatcher footings, stormwater facilities, and various appurtenant structures to support the project. In addition, the project would result in disturbance to vegetation from mowing. The applicant indicated that prior to SunCatcher installation, the SunCatcher Array area will be mowed to about 3 inches. During SunCatcher operation, if vegetation within the path of SunCatcher movement reaches a height of 8 inches, it will likely be re-mowed to 3 inches. Staff considers this to be a permanent impact to vegetation as mowing will likely result in type conversion from creosote bush scrub to more herbaceous vegetation. Vegetation not within the path of SunCatcher movement or within the access road footprints will be allowed to re-generate.

Direct mortality to vegetation could occur from construction activities that remove vegetation, grade soils, or cause sedimentation or erosion. Clearing and grading may also result in the alteration of soil conditions, including the loss of native seed banks and changes to the topography and drainage of a site such that the capability of the habitat to support native vegetation is impaired. Indirect effects could include soil compaction, disruption of the native seed bank, increased dust, sediment transport, or colonization by invasive non-native species. These actions may result in reduced habitat quality for upland plants. In addition, the removal of vegetation cover and the disruption of soil crusts create possibilities for erosion, dust, and weed invasion that can affect habitat in adjacent areas.

Currently the vegetation present on the Calico Solar project site supports a diversity of common and sensitive wildlife. This includes a large assemblage of birds, reptiles, and small mammals. The loss of existing vegetation and expected level of disturbance from weeds and human disturbance (described below) will alter the functional use of the remaining habitat. Staff considers the direct and indirect construction impacts to vegetation to be significant under CEQA.

Although specific mitigation to reduce impacts of the proposed project to native vegetation has not been proposed by the applicant, this impact would be reduced to less-than-significant levels with implementation of impact avoidance and minimization measures described in staff's proposed Conditions of Certification **BIO-1** through **BIO-9, BIO-10** (Revegetation and Compensation for Impacts to Native Vegetation), and **BIO-11** (Weed Management Plan). These measures include but are not limited to the designation of a Designated Biologist to oversee construction, monitor sensitive resource areas, provide worker training, prepare and implement a Biological Resources Mitigation Implementation and Monitoring Plan, restoration of disturbed areas, and the management of noxious and invasive weeds. To address specific construction-related impacts to native vegetation communities and habitat loss, staff has incorporated existing measures provided by the applicant and proposed supplemental measures into the following Condition of Certification **BIO-17** (Tortoise Habitat Compensation). Implementation of these measures would reduce impacts to native plant communities to less-than-significant levels under CEQA.

Invasive, Non-Native, and Noxious Weeds

Weeds are defined here to include species of non-native, invasive plants included on the weed lists of the California Department of Food and Agriculture (CDFA 2007), the California Invasive Plant Council, or federally listed noxious weeds. The spread of invasive plants is a major threat to biological resources in the Mojave Desert because these invasive non-native plants can displace native plants, increase the threat of wildfire, supplant wildlife foods that are important to herbivorous species, alter the habitat structure and ecological function of wetland, riparian, and desert wash communities, and invade or threaten special-status plant occurrences and habitat (Zouhar et al. 2008; Lovich 1998; Lovich et al. 1997, Lovich et al. 1996).

Invasive plants, noxious weeds, and other invasive species on BLM lands will be prevented, controlled, treated, and restored through an Integrated Pest Management approach per the Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States, and the National Invasive Species Management Plan 2009.

Construction activities and soil disturbance tend to introduce non-native invasive plant species into new areas and to facilitate their proliferation and spread. New introductions occur when seed are inadvertently introduced to a site, most often with mulch, hay bales, or wattles used for erosion control, or when they are transported on construction equipment or their tires from off-site areas. Many invasive non-native species are adapted to and promoted by soil disturbance (Lathrop & Archibald 1980). Once introduced, they can out-compete native species because of minimal water requirements, high germination potential and high seed production (Beatley 1966); can outcompete native annuals where nitrogen deposition (near major highways such as I-40) and precipitation rates are higher, leading to higher risk of wildfire (Allen et al. 2010), and can become locally dominant, representing a serious threat to native desert ecosystems (Abella et al. 2008). Invasive weeds generally spread most readily in disturbed, graded, or cultivated soils, including disturbance by construction equipment. Thus, the proposed Calico Solar project, including the solar generator construction and associated Transmission line and other facilities, would be expected to introduce or facilitate the spread of invasive non-native plants. Without control, staff anticipates that weeds already present in the area would increase their abundance in soils disturbed by project construction throughout the project site and along the linear facilities, especially where nitrogen deposition is an issue, and that construction equipment could accidentally import new invasive species from off-site.

Undisturbed desert habitat has been less vulnerable to invasion by weedy species and only a limited suite of invasive non-native plant species are capable of invading natural desert areas. The hot and arid environment, undependable timing and amount of annual precipitation, and often saline or alkaline soils limit the range of invasive species capable of naturalization in desert areas (Mack 2002). However, certain aspects of the proposed project would change those conditions, creating habitat more suited to a wider variety of invasive plants and to greater abundance of the invasive species already present in the area. Initial mowing and construction disturbance will disrupt soil conditions that favor the colonization by weedy species. Shade beneath the SunCatchers would then alter the micro-environments, favoring weedy ephemerals. Studies conducted in the Sonoran and Mojave Deserts have demonstrated that shading resulted in a cooler, moister microhabitat below and near structures (Smith 1984; Smith et al. 1987). Shading and wind deflection caused by the structures decrease soil temperature extremes and decrease evaporation from soil surfaces. The addition of water due to a regular mirror washing schedule also increases the humidity of the microhabitat around the solar structures. This change from the normal arid desert environment does not favor the native arid-adapted species and allows the weedy ephemerals to colonize (Smith 1984).

Numerous invasive non-native weeds have already become widespread throughout the Mojave Desert and for some invasive species the prevention of further spread is impracticable. Examples of these species include red brome (*Bromus rubens*), cheat grass (*B. tectorum*). Mediterranean grass (*Schismus* spp.), red-stemmed filaree (*Erodium cicutarium*), and Russian thistle (*Salsola tragus*). Other invasive species, particularly Sahara mustard (*Brassica tournefortii*), can substantially alter native habitats if left uncontrolled, but to date, have not become pervasive within or adjacent to the project area. Still others (e.g., saltcedar, *Tamarix ramosissima*) are damaging to specific habitat types but pose little or no threat to widespread upland desert habitat.

Invasive non-native weeds were relatively low in abundance and diversity throughout the Calico Solar Project area. Seven species of invasive weeds were detected during the applicant’s 2007/2008 floristic surveys (SES 2009aa), as described below.

- **Sahara mustard** (*Brassica tournefortii*) occurs throughout the general area; reported as “abundant throughout the site” (SES 2009aa) though staff noted it only occasionally. Sahara mustard is of high concern; Cal-IPC has declared this plant highly invasive (Cal-IPC 2006) and recommends that it should be eradicated whenever encountered.
- **Red brome** (*Bromus madritensis* ssp. *rubens*) is widespread and patchy in the project area, “often at the bases of shrubs” and “too extensive to control” (SES 2009aa). It is an introduced Eurasian grass adapted to microhabitats that, in desert environments, can be found in partial shade (e.g., at the bases of desert shrubs or near structures). It can also form carpet cover in pockets of fine grained soils in rough terrain off the bajada. It is widespread and abundant in the Mojave Desert. Its seeds can disperse readily and across large distances. Cal-IPC has declared this plant highly invasive (Cal-IPC 2006). Because of its widespread distribution, red

brome is not considered feasible for general control. Cheat grass (*Bromus tectorum*) is a closely related species, not reported by the applicant, but undoubtedly common on the project site. It is also highly invasive (Cal-IPC 2006) but also not considered feasible for general control.

- **Mediterranean grass** (*Schismus* spp.) was observed patchily distributed throughout the project site. Cal-IPC has determined that this plant has a limited invasiveness rating in California (Cal-IPC 2006). BLM and other agencies recognize that because of the widespread distribution of Mediterranean grass, this species is not considered feasible to control.
- **Russian thistle, tumbleweed** (*Salsola* spp.) was reported as widespread with a patchy distribution throughout the project area. More so than most other invasive species, Russian thistle tends to be restricted to roadway shoulders and other sites where the soil has been recently disturbed (i.e., within a few years). Cal-IPC has determined that this plant has a limited invasiveness rating in California (Cal-IPC 2006). There is a high potential that Russian thistle could become established in the construction area and it should be eradicated if observed.
- **London rocket** (*Sisymbrium irio*) is widespread throughout the warm deserts of North America. It was reported as widespread with a patchy distribution throughout the project area. Cal-IPC has declared this plant moderately invasive (Cal-IPC 2006). More so than the other invasive herbs, it tends to be in slightly mesic or shaded sites around structures, and monitoring for this species should particularly focus on moist and shaded areas around the solar generators.
- **Mediterranean tamarisk, saltcedar** (*Tamarix ramosissima*) is present in two windrows that parallel the BNSF Railroad. This species was planted on site and evidence of an abandoned irrigation system was observed by staff. This species is primarily associated with mesic and hydric areas and is therefore restricted to habitats where there is perennial soil water availability (though often no surface water). Cal-IPC has declared this plant highly invasive (Cal-IPC 2006).
- **Filaree or storksbill** (*Erodium cicutarium*) is a widespread annual species common in disturbed habitats and often on undisturbed desert uplands. It was reported as “widespread and abundant” and “too extensive to be controlled” on the project site (SES 2009aa). It has a limited overall rating by Cal-IPC, generally because the ecological impacts of the species are minor. Because of its widespread distribution, eradication of filaree is not considered feasible.

To avoid and minimize the spread of existing weeds and the introduction of new ones, an active weed management strategy and control methods must be implemented. The applicant has proposed a Noxious Weed Management Plan (SES 2009aa) to avoid and minimize the spread of weeds. Staff concurs with the recommendations in the applicant’s weed management plan and has incorporated them into staff’s proposed Condition of Certification **BIO-11** (Weed Management Plan).

The applicant’s Noxious Weed Management Plan includes a discussion of weeds targeted for eradication or control and a variety of weed control measures to be implemented during operation, such as establishing weed wash stations for construction vehicles, weed monitoring and management, weed control in areas where irrigation and mirror washing take place, revegetation of disturbed areas with native seed mix, and long-term reporting requirements.

Implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-10** and **BIO-11** (Weed Management Plan) would avoid, minimize and compensate for these indirect impacts to special-status plant species on/near the site and would lessen the impact of weeds to less-than-significant levels under CEQA.

Dust

Disturbance of the soil's surface caused by construction traffic, operations traffic, and other activities such as mirror washing would result in increased wind erosion of the soil. Aeolian transport of dust and sand can result in the degradation of soil and vegetation over a widening area (Okin et al. 2001). Dust can have deleterious physiological effects on plants and may affect their productivity and nutritional qualities (Sharifi et al. 1997; 1999). Aeolian transport of dust and sand can kill plants by burial and abrasion, interrupting natural processes of nutrient accumulation, and allowing the loss of soil resources. The destruction of plants and soil crusts by windblown sand and dust exacerbates the erodibility of the soil and accelerates the loss of nutrients (Okin et al. 2001).

While dust and the aeolian transport of particulate matter remains an integral and natural part of the desert ecosystem, construction can result in excessive levels of dust. To reduce these effects the applicant has proposed the use of soil stabilizers such as Soiltac™ in areas where vehicular traffic is anticipated. Staff has included the recommended measures from the applicant and considers that the impacts of increased dust and other construction impacts can be minimized with implementation of staff's proposed Condition of Certification **BIO-7** (Biological Resource Mitigation Implementation and Monitoring Plan) **BIO-8** (Impact Avoidance and Minimization Measures) and Air Quality Conditions of Certification **AQ-SC3 and AQ-SC-7** and **Soil and Water-1**. Implementation of these measures would reduce impacts of the proposed project from dust to less than significant levels under CEQA.

<u>Impacts to Special-Status Plants</u>

Nine special-status plant species are reported as present on the proposed project site, and 19 additional special-status plant species have a low to high potential for occurrence but were not observed; see **Biological Resources Table 1** (SES 2009aa). For five of the species present onsite, the applicant described numbers of occurrences and potential project impacts, based on occurrences documented by their field surveys. Four others are reported in the Biological Resources Technical Report (SES 2009aa) species list for the project surveys (Appendix D), but no further information was provided. Condition of Certification **BIO-12** is recommended, in part, to expand upon available information of these plants' numbers and areal extent on the project site.

Staff note that the seasonal and irregular nature of most plants' life histories, below-average rainfall during the 2006-07 and 2007-08 seasons, and field survey methodology employed by the applicant during project surveys limit staff's ability to interpret the data as submitted. Numbers and locations of special-status plant occurrences reported in the Biological Resources Technical Report (SES 2009aa) are a minimum estimate of total numbers of occurrences on the site.

Botanical field surveys as conducted for CEQA and NEPA review cannot serve as formal censuses of rare plants. At best, a plant census in any given year can only provide the minimum number of living plants on the survey date. A census can only detect individual plants whose above-ground growth is large or conspicuous enough to be noted by field personnel. An ideally-designed census would be (1) scheduled at the height of the plant's growth season; (2) use a technique to ensure that field personnel walked transect lines close enough to every plant to assure its detection; and (3) field personnel would be well-trained, well-rested, and would have consistently high mental and visual acuity throughout each field day and throughout the field survey period. Even under these ideal conditions, some living plants may not have emerged above ground or may be too small for detection by field crews.

Total rainfall in the 2006-07 season was far below average for the Mojave Desert. The applicant conducted special-status botanical surveys in spring 2007, but recognized that results were of limited value due to the poor spring flowering season. The applicant conducted follow-up surveys in spring 2008, following a rainfall season that was approximately 81% of average. The 2008 field work yielded most of the special-status plant occurrences reported in the Biological Resources Technical Report (SES 2009aa).

Field survey methods did not cover 100% of the proposed project site. Teams of two biologists surveyed approximately 480 acres per field day using a meandering transect method with "special attention being paid to areas where sensitive species were expected to be found." (SES 2009aa). In general, these field survey methods are consistent with recommendations and guidelines of Nelson (1988) and CDFG (2009), though daily coverage of these large acreages allows focused visual searches for plants on only a very small proportion of the assigned survey areas. These limitations are especially important for small or inconspicuous species such as Mojave monkeyflower. Due to limited coverage, survey results do not allow staff to quantify numbers of special-status occurrences, numbers of plants, or areal extent of occupied special-status plant habitat in the proposed project area. Further, the surveys do not allow staff to rule out the possibility that Lane Mountain milk-vetch, a federally listed endangered species, could occur in the project area.

Staff have concluded that construction of the Calico Solar Project would directly impact nine special-status plant species, and that impacts to four of these — crucifixion thorn, white-margined beardtongue, Coves' cassia, and small-flowered sand verbena — would be considered significant under CEQA guidelines. Staff considers project impacts to the other five special-status species — small-flowered androstephium, foxtail cactus, Utah vine milkweed, winged cryptantha, and crowned muilla — to be less than significant. Four of these five species are ranked as "watch list" by CNPS and CDFG's CNDDB and as such are generally considered more regionally common than plants on higher priority lists. The fifth species, small-flowered androstephium, discussed further below, is known from numerous occurrences in the area, including protected occurrences within the adjacent BLM ACEC.

In addition, staff concludes that one listed threatened or endangered plant — Lane Mountain milk-vetch — has low potential to occur on the site and, if it were to occur, would be adversely affected by project development. Further, staff conclude that six additional CNPS List 1B and six additional CNPS List 2 plants have potential to occur and thus to be adversely affected by project development. These species are listed above in **Biological Resources Table 1** (Special-Status Species, Their Status, and Potential Occurrence at the Calico Solar Project Site).

Energy Commission staff's conclusion of CEQA significance was based on an analysis of impacts to these species in light of the following variables:

- Proportion of occurrences that may be lost and/or indirectly affected by the project relative to the documented occurrences and distribution of these species in California;
- Extent of occurrence on-site (i.e., number of documented locations);
- Habitat quality;
- Cumulative effects and indirect threats to remaining occurrences; and
- Peripheral population status.

Proportion of Occurrences Affected and Occurrence Size:

Plants and other sessile organisms are particularly vulnerable to the effects of habitat fragmentation. Small habitat patches ("fragments") can support only small populations which are more vulnerable to extinction. Even minor fluctuations in climate can cause local extinction of a small population. For three CNPS List 2 species occurring on the proposed project site (Emory's crucifixion thorn, Coves' cassia, and small-flowered sand-verbena), the California populations are already geographically marginal relative to their core populations outside the state. For these species, the central Mojave Desert populations represent a substantial portion of their total known distribution within California. Loss of even a few plants could amount to a substantial portion of their regional populations and make them more vulnerable to extirpation within the state.

Numerous new occurrences of small-flowered androstephium (also a CNPS List 2 species) have been found in recent years during surveys conducted for other development projects. In the vicinity of the proposed project site, numerous new occurrences are known to the east and west, including occurrences protected within the Pisgah ACEC. For this reason the project's effects to small-flowered androstephium were not considered significant in a CEQA context.

Habitat Quality

Staff notes that the habitat in the project area is generally undisturbed. Invasive weeds occur in disturbed soils such as roadsides throughout the area, but have not substantially altered native vegetation and habitat as they have elsewhere in the Mojave Desert (especially the western Mojave Desert).

Threats

Threats to special-status plant occurrences outside the project area include grazing, transmission projects, ORV use, and non-native plants (CDFG 2010a). The project site includes several substantial alterations to native habitat, including the BNSF rail line, I-40, and several other linear features (unpaved roads, underground pipelines, fiber optic lines, and transmission lines). Yet most of the project area is distant from these features and relatively undisturbed by the threats listed above. There appears to have been little habitat damage by grazing, cross-country ORVs, or weed invasions.

Status as Peripheral Populations

California occupies an important biogeographic location and zone of ecological transition on the Pacific coast of North America, and so its floristic diversity includes many widespread taxa at the edges of their geographic ranges. The CNPS List 2 designation identifies species which are rare in California but more common elsewhere in their geographic ranges. That is, these are species whose California occurrences are at the geographic limits of their ranges. The CNPS List 2 species occurring in the project area are at the western limits of geographic distributions centered in Arizona, Nevada, or farther east.

Plant populations at the peripheries of their geographic ranges, as the CNPS List 2 species are, may have special conservation and biodiversity values. They tend to be more genetically and ecologically divergent than core populations, and often are ecologically distinctive (Leppig & White 2006). Peripheral populations may serve to increase or maintain genetic variation for the species as a whole, and contribute to long-term species survival and adaptation, especially in changing environments (Channel and Lomolino 2000; Leppig & White 2006). Yet peripheral plant populations are at greater risk of extirpation than core populations because they are smaller in areal extent, smaller in numbers of plants, and often occur in locations where habitat conditions are at the margins of their physiological limits.

CEQA Significance and CNPS Status

Crucifixion thorn, white-margined beardtongue, Coves' cassia, and small-flowered sand verbena are not listed under the California or federal Endangered Species Acts. However, under significance criteria adopted by the Energy Commission in this Staff Assessment (see Section C.2.3), project impacts to these species, if not mitigated, will be considered significant pursuant to CEQA. The Energy Commission and other State agencies such as CDFG and the California Department of Water Resources, have a history of requiring mitigation for impacts to special-status plants such as these.

Under Section 15380 of the CEQA guidelines, a species may be considered endangered, rare or threatened, if it can be shown to meet the criteria for State or federal listing. "CEQA Section 15380 provides that a plant or animal species may be treated as 'rare or endangered' even if not on one of the official lists if, for example, it is likely to become endangered in the foreseeable future."

The California Native Plant Society (CNPS) cooperates under a memorandum of understanding with CDFG to identify which plants may be rare or threatened, evaluate threats to them, share occurrence data, and plan protective measures. In this role, CNPS evaluates plant taxa according to abundance, distribution, and threats, and it ranks rare species on a series of lists. The joint CNPS Rare Plant Program and CDFG's CNDDB Plant Status Review Process for CNPS List and CDFG Special Plants List status is a rigorous review process that evaluates existing literature, reviews herbarium collections, and communicates with experts before making a recommendation for listing. A summary of information on each candidate taxon is reviewed by a network of

California botanists, representing State and federal agencies, environmental consulting firms, academic institutions, CNPS, and other conservation organizations.

All of the CNPS List 1B and 2 plants in the project area are also included in the CDFG Special Plants List (CDFG 2010b) and are tracked by CDFG's CNDDB. The *CNPS Inventory* has been a broadly recognized and accepted source of science-based information on the rarity, endangerment, and distribution of California special-status plants since its first edition in 1974. The Energy Commission's regulations reference CNPS Lists in the definition of "species of special concern" (California Code of Regulations, Title 20, section 1702 (q) and (v)), and the BLM has a policy of designating all CNPS List 1B plants, unless specifically excluded by the BLM State Director, as BLM Sensitive (BLM 2009). By CNPS's standards, the plants on CNPS Lists 1A, 1B and 2 meet the definitions of Sections 2062 and 2067 (CESA) of the California Fish and Game Code, and are eligible for State listing (CNPS 2001). The Energy Commission considers those plants appearing on CNPS List 1B or 2 to meet CEQA's Section 15380 criteria, and adverse effects to these species are generally considered "significant" except where substantial new data may show otherwise, as, in this case, it does for small-flowered androstephium.

Significance Conclusions

Listed threatened or endangered species with potential to occur in project area:

Lane Mountain milk-vetch is the only listed threatened or endangered plant species with potential to occur in the project area. However, staff concludes that Lane Mountain milk-vetch is unlikely to occur on the project site because of its distance from known occurrences and poorly suitable bajada habitat that occurs throughout most of the project site. Staff notes that off-site impacts, such as increased dust deposition (Wijayratne et al. 2009), could also adversely affect Lane Mountain milk-vetch; thus, staff recommends further botanical surveys throughout the proposed project area and a 250-foot buffer area adjacent to the project boundaries.

Energy Commission staff conclude that, absent mitigation, adverse impacts to Lane Mountain milk-vetch, if it were to occur on or adjacent to the site, would be significant under CEQA. Project impacts could include loss of plants and habitat during ground-disturbing activity for project development and operation, or habitat alteration or degradation to nearby occurrences due to potential indirect off-site effects. Staff concludes that these potential impacts can be avoided by implementing surveys and, if needed, impact avoidance as recommended in staff's proposed Condition of Certification **BIO-12**.

CNPS List 1B / BLM Sensitive Taxa

One CNPS List 1B species (white-margined beardtongue) was documented on the project site, and six others could occur there, though their probabilities of occurrence are moderate to low. Due to limitations of the botanical field surveys described above, staff cannot evaluate the total extent of habitat or numbers of white-margined beardtongue or other List 1B plants within the proposed project area. Staff anticipates that more plants will be discovered upon further field surveys, though these would probably be few in number, and white-margined beardtongue occurrences would likely be largely limited to the southeastern portion of the site nearest the Pisgah lava flow. In Condition of Certification **BIO-12** below, staff recommends follow-up spring field surveys to inventory potential project impacts to white-margined beardtongue and other List 1B species, and impact avoidance measures to conserve occurrences on-site to the greatest extent feasible. This measure would provide for the conservation of rare plants in portions of the project site through avoidance and evaluate the potential existence of these species on potential mitigation lands.

Six other plant species that are designated BLM sensitive and CNPS List 1B species have low or moderate potential to occur within the project area:

- Alkali mariposa lily (*Calochortus striatus*) – Low potential
- Desert cymopterus (*Cymopterus deserticola*) – Low potential
- Barstow woolly-sunflower (*Eriophyllum mohavense*) – Moderate potential
- Mojave monkeyflower (*Mimulus mohavensis*) – Moderate potential
- Creamy blazing-star (*Mentzelia tridentate*) – Moderate potential
- Rusby's desert mallow (*Sphaeralcea rusbyi* var. *eremicola*) – Low potential

Project impacts to white-margined beardtongue would consist of loss of plants and their habitat during ground-disturbing activity for project development and operation and additional habitat alteration or degradation to nearby occurrences due to potential indirect off-site effects. In addition, indirect project impacts to this species could result from alterations to the existing wind and hydrological conditions that transport sand to both off-site and on-site populations. Project construction, including the SunCatchers, fences, and drainage structures would likely alter the aeolian transport of sand across the site to downwind habitat within the adjacent Pisgah Crater ACEC, immediately east of the project boundary, though available data are insufficient to quantify this potential impact. Staff concludes that, absent mitigation, adverse impacts to white-margined beardtongue or other CNPS List 1B species would be significant under CEQA. Staff concludes that these impacts can be mitigated below a level of significance by implementing staff's proposed Condition of Certification **BIO-12**.

<u>CNPS List 2 Taxa</u>. Four CNPS List 2 taxa are reported on the project site (SES 2009aa) and an additional six could occur there, with low to high potential. Based on the available survey data, staff cannot evaluate what proportion of the known onsite occurrences would be lost, or what additional, undocumented occurrences may be present. Staff believes that most or all occurrences of CNPS List 2 species onsite, whether documented by prior surveys or not, would be lost or substantially degraded due to grading; soil compaction during construction and facilities operation; and the indirect effects of increased weed abundance, weed control, and alterations to hydrology, soil temperatures, and aeolian sand transport.

Small-flowered androstephium is reported at 52 locations on the project site and 14 additional occurrences within a 1000-foot buffer surrounding the site (SES 2009aa). Staff expects that numerous additional occurrences would be documented during 2010 field surveys, per Condition of Certification **BIO-12**. Staff believes that most or all occurrences on-site and adjacent to the site, whether documented by prior surveys or not, would be lost or adversely impacted as described above. However, staff concludes that adverse impacts to small-flowered androstephium would be less-than-significant per CEQA due to numerous additional occurrences documented elsewhere in California in recent years, including new occurrences documented by the applicant on public lands to the west and east, including many in the Pisgah ACEC.

Emory's crucifixtion thorn is reported from one occurrence near the northern boundary of the proposed project site. Potential habitat occurs more widely on-site, throughout the desert washes and ephemeral channels. Staff anticipates that more plants will be discovered upon further field surveys, though these would probably be few in number, limited to the washes in the upper reaches of the bajada and possibly in the lower portions of the site where numerous channels become confluent before flowing offsite to the west.

Coves's cassia is reported on the project site in the Biological Resources Technical Report (SES 2009aa) Appendix D, but the locations are not mapped and there is no indication of numbers of plants or extent of potential project disturbance. It occurs in desert washes, below approximately 2000 ft. elevation. Staff are unable to evaluate the extent of project impacts to Coves' cassia. If the species can be verified and mapped on the site, staff anticipates any plants discovered would probably be along the washes in the upper reaches of the bajada, and possibly in the lower portions of the site where numerous channels become confluent before flowing offsite to the west.

Small-flowered sand-verbena is reported on the project site in the Biological Resources Technical Report (SES 2009aa) Appendix D, but the locations are not mapped and there is no indication of numbers of plants or extent of potential project disturbance. It generally occurs in dunes or stabilized aeolian sand. Staff are unable to evaluate the extent of potential impacts. If the species can be verified and mapped on the site, staff anticipates any plants discovered would probably be along the washes in the southeastern portion of the site.

Six other CNPS List 2 species have low or moderate potential to occur within the project area:

- King's eyelash grass (*Blepharidachne kingie*) – Low potential.
- Booth's evening primrose (*Camissonia boothii* var. *boothii*) – Moderate potential.
- Viviparous foxtail cactus (*Coryphantha vivipara* var. *rosea*) – Low potential.
- Purple-nerved cympoterus (*Cymopterus multinervatus*): High potential.
- Thorny milkwort (*Polygala acanthoclada*) – Low potential.
- Jackass clover (*Wislizenia refracta* ssp. *refracta*) – Moderate potential.

Project impacts to CNPS List 2 taxa would include loss of plants and their habitat during ground-disturbing activity for project development and operation and additional habitat alteration or degradation to nearby occurrences due to potential indirect off-site effects. Staff concludes that, absent mitigation, adverse impacts to Emory's crucifixion thorn, Coves' cassia, small-flowered sand verbena, or other CNPS List 2 species would be significant under CEQA. Staff concludes that impacts to small-flowered androstephium would not be significant under CEQA. Staff concludes that these impacts can be mitigated below a level of significance by implementing Condition of Certification **BIO-12**.

CNPS List 4 Taxa. CNPS List 4 species are plants of limited distribution or infrequent throughout a broader area of California, and their vulnerability or susceptibility to threat appears low at this time (CNPS 2010). The CNPS List 4 plants found on the project site are foxtail cactus, winged cryptantha, Utah vine milkweed, and crowned muilla. Very few CNPS List 4 plants meet the definition for State or federal listing (CNPS 2001). Nevertheless, they may be locally significant if, for example, they occur at the periphery of their geographic ranges, exhibit unusual morphology, or occur in atypical habitats. Thus, they should be evaluated in a CEQA analysis. Based on these criteria, staff concludes that project impacts to CNPS List 4 species occurring on the proposed project site and discussed above in this SA/DEIS do not reach the level of significance under the Energy Commission's adopted significance criteria.

Impact Evaluation and Mitigation Strategy

Staff concludes that project impacts to four special-status plants documented on the site would reach CEQA standards as significant, and that several other species not documented on the site also could occur there and, if present, could also be subject to adverse project impacts. The extent of these impacts cannot be fully evaluated due to limitations of available field survey data. Staff recommends an impact evaluation and mitigation strategy that would fully evaluate potential project impacts to special-status plants and, for significant impacts, mitigate them.

In Condition of Certification **BIO-12**, staff recommends pre-construction botanical surveys throughout the project area to be completed during the appropriate blooming season in 2010. Staff further recommends that data resulting from these surveys be incorporated into on-site or off-site mitigation of project impacts. Staff evaluated several approaches to mitigating these impacts. These approaches were:

1. Avoiding or minimizing on-site impacts.
2. Acquisition and protection of special-status plant populations on private lands.
3. Protection and enhancement of populations on public lands.
4. Seed collection, translocation or transplantation of special-status plants.

Mitigation Strategies Considered But Rejected

Protection and Enhancement of Populations on Public Lands. Special-status plant occurrences on National Park Service lands are considered to be adequately protected and thus offer no potential for offsetting project losses. In recognition that some of the occurrences on BLM land are subject to the effects of grazing, ORV, transmission projects, mining (CDFG 2010a), and more currently, by future energy projects, staff investigated the possibility of off-setting project losses by placing land use restrictions on or enhancing BLM lands which contained one or more of these special-status plants and which were not currently protected as part of the Mojave Preserve or within a Desert Wildlife Management Area (DWMA). However, BLM cannot make pre-decisional commitments to implement specific actions such as fencing, altering grazing allotments, burro removal, or habitat restoration without conducting NEPA analysis and providing full public disclosure on the effects of those actions. Thus, mitigation measures such as land use changes potentially affecting other uses would necessitate a separate NEPA analysis. Consequently, this mitigation option would not be timely and its outcome would remain unknown until BLM completed a Record of Decision. Pursuant to CEQA, the Energy Commission cannot defer mitigation to a future NEPA document.

Transplantation or Translocation. The general consensus in the scientific community is that transplantation has not been shown to be a viable strategy for special-status plant mitigation (Howald 1996). A study by CDFG (Fiedler 1991) found that, even under optimum conditions, transplantation was not effective in 85% of cases studied. Attempts to transplant or propagate white-margined beard-tongue have been unsuccessful (Scogin 1989). Nonetheless for some species including cacti transplanting is often a statutory requirement. On BLM lands, all cacti with the exception of cholla require relocation from project impacts. It is CNPS's (1998) policy to oppose transplantation as mitigation for loss of rare plants. In a separate policy statement, CNPS (1992) identifies appropriate use of ex-situ conservation techniques and summarizes reasons these techniques have failed as mitigation.

Successful transplantation requires extensive information about microhabitat requirements, reproductive biology, essential pollinators, soil conditions and soil organisms, community relationships, and other critical biological characteristics. This information is lacking for most species, including the special-status species that would be affected by the proposed project. In the absence of known and proven reestablishment techniques for a given species, reestablishment attempts must be considered experimental in nature. These efforts may show early promise but lose viability or decline after the first few years due to one or more of the many factors listed above. Staff concludes that experimental reintroductions could yield important new information that may inform future mitigation efforts, but cannot be expected to succeed and therefore would not constitute mitigation as it is defined under CEQA.

In lieu fee. The overall approach to compensatory mitigation for desert tortoise habitat loss on this and other proposed solar projects has not yet been resolved by land management and resource agencies. Current BLM policy allows for *in lieu* fee payment as an alternative to purchasing and protecting private lands. *In lieu* mitigation fees for this and other proposed projects would be pooled and dedicated to purchasing and managing desert tortoise mitigation lands. Newly developing State policy would likely create similar mitigation fees for compensatory lands.

In lieu fee payment as compensatory mitigation for desert tortoise habitat loss would not feasibly or verifiably mitigate the project's impacts to special-status plants, unless the specific lands to be purchased were identified; the presence on compensation lands of special-status plants listed above verified; and conservation status of the compensation land established in perpetuity through a conservation easement, long-term management plan, and suitable funding to implement conservation management. As presently conceived, the *in lieu* fee strategy would not provide these necessary elements to verifiably function as mitigation for impacts to special-status plants. Staff concludes that *in lieu* fee payment would not constitute mitigation as it is defined under CEQA.

Staff's Recommended Conceptual Mitigation Strategy

To reduce project impacts to special-status plants below a level of significance, staff recommends a mitigation strategy to avoid and protect special-status plant occurrences on the project site, on acquired lands off-site, or a combination of the two. Staff recommends on-site protection or off-site compensation for all occupied habitat of white-margined beardtongue and, at minimum, 75% of all occurrences of Emory's crucifixion thorn, Coves' cassia, and small-flowered sand-verbena known within the project area or within 250 feet of any project activities (SES 2009aa) and any additional CNPS List 1B or List 2 taxa discovered during future pre-construction clearance surveys as recommended in staff's proposed Condition of Certification **BIO-12**. This mitigation strategy is described further in the paragraphs below. Full implementation of this mitigation strategy would reduce the project's direct, indirect, and cumulative impacts below a level of significance.

Acquisition and Protection of Occurrences on Private Lands. Staff's proposed Condition of Certification **BIO-17** specifies compensatory mitigation for desert tortoise habitat loss. The applicant states that "compensatory mitigation for tortoise habitat will also benefit rare plants." (SES 2009aa). Staff agrees, with the caveat that this would only be true if the rare plants are present on the compensatory mitigation lands, and can be managed there to benefit their long-term persistence. Thus, staff concludes that acquisition and protection of rare plant occurrences on private lands may be a viable strategy to mitigate the proposed project's impacts to special-status plants. Implementation of this strategy would necessitate botanical surveys of lands acquired as tortoise habitat compensation and, if rare plants that would be adversely affected by the proposed project are located, follow-up preparation and implementation of a habitat management plan to ensure long-term conservation. Compensatory mitigation lands are discussed more completely in staff's recommended Condition of Certification **BIO-17.** Recommended botanical surveys and long term conservation management on these lands are described in recommended Condition of Certification **BIO-12.**

In lieu fee payment as compensatory mitigation for desert tortoise habitat loss would not feasibly or verifiably mitigate the project's impacts to special-status plants (see above, Mitigation Strategies Considered But Rejected). Therefore, the recommended mitigation strategy would apply only to special-status plant occurrences on private lands acquired by the project applicant and not on lands acquired through an *in lieu* fee program for desert tortoise mitigation.

<u>Avoiding or minimizing on-site impacts</u>. Staff concludes that reconfiguration of the project footprint within and around areas that support white-margined beardtongue, Emory's crucifixion thorn, Coves' cassia, and small-flowered sand-verbena, and subsequent avoidance of indirect project impacts to those sites, could substantially reduce impacts to special-status plant species. Staff makes no recommendations as to the specific reconfiguration that might occur within these areas, pending results of pre-construction surveys as recommended in Condition of Certification **BIO-12**.

Staff's recommended mitigation approach is to protect all of the individual plants and areal extent of each occurrence of white-margined beardtongue, and at least 75% of individual plants and areal extent of each occurrence of Emory's crucifixion thorn, Coves' cassia, and small-flowered sand-verbena known within the project area (SES 2009aa) and any additional CNPS List 1B or List 2 taxa discovered during future pre-construction clearance surveys. Protection would be achieved by avoiding direct and indirect impacts to the plants and a 250-foot buffer are surrounding each protected plant occurrence. Staff concludes that this goal is feasible for white-margined beard-tongue and crucifixion thorn, because only one occurrence is known within the project site for each species (SES 2009aa), though staff would expect a few more occurrences to be discovered during pre-construction surveys. Staff concludes that this measure would reduce impacts to both plants below a level of significance.

Staff is uncertain whether this measure is feasible for Coves' cassia or small-flowered sand verbena. These two species were documented on the project site and reported in the species list (SES 2009aa), but they were not mapped or inventoried and no analysis of potential project impacts to them was provided by the applicant. However, due to the rarity in California and long-disjunct location of these occurrences on the project site, staff believes that feasible project design modifications could likely be made to comply with this measure, and, in combination with plant protection and management on off-site acquisition lands (above), would reduce impacts to both plants below a level of significance.

This level of protection is not recommended for small-flowered androstephium because staff concludes that impacts to this plant would be less-than-significant under CEQA. Staff notes, however, that avoidance measures for the other taxa would likely also benefit small-flowered androstephium due to its scattered distribution in the project area.

Staff's proposed Condition of Certification **BIO-12** (Special-Status Plant Impact Avoidance and Minimization) requires the applicant to minimize disturbance to the extent feasible as described above. This condition also requires preparation of a special-status plant protection and monitoring plan to be implemented for the life of the project and other measures to fully avoid impacts to white-margined beardtongue, and minimize impacts to Emory's crucifixion thorn, Coves' cassia, and small-flowered sand-verbena and any additional CNPS List 1B or List 2 taxa discovered during future pre-construction clearance surveys.

<u>Additional Field Surveys</u>. Protection and management of special-status plant occurrences on off-site BLM-managed lands is not a feasible mitigation measure, as discussed above. Staff's proposed Condition of Certification **BIO-12** requires surveys for special-status plants on all lands that would be acquired by the applicant as part of the desert tortoise compensatory mitigation requirements (Condition of Certification **BIO-17**).

Indirect Effects

The applicant provided information on special-status plant occurrences in the buffer area surrounding the proposed project site comparable to available information on those plants within the site. That is, numerous occurrences have been recorded on surrounding lands (SES 2009aa), though field survey methods were as described earlier and subject to the same limitations. Given the distribution of special-status plants within the project footprint and adjacent habitat characteristics, staff anticipates that the same suite of species are likely to occur within the buffer zone, although the specific locations and numbers of these plants are unknown. The discussion below is therefore a conceptual overview of potential indirect impacts to special-status plants.

Project construction and operation have the potential to cause a variety of indirect effects to special-status plants outside the project boundary. These include effects of erosion or sedimentation that could result from altered hydrology on the site (i.e., plants, their habitat, or their seed banks occurring down slope of disturbed soils could be eroded away or could be covered in sediment); changes in the hydrology from alterations in the drainage patterns of the site (several special-status plant species are associated with desert washes); the introduction of new weeds or spread of weeds already present in the area from the solar fields into the surrounding habitat; greater than normal dust levels; effects of herbicide drift on special-status plants and their pollinators; and an increased risk of fire. Weeds, dust, and hydrology are discussed elsewhere in this SA/DEIS.

Based on an analysis by the Conservation Biology Institute (2000) of indirect impacts to a rare plant species in southern California, staff recommends presuming that the project would likely cause adverse indirect effects to any rare plant occurrences within a 250-foot radius of project activities. Therefore, staff's proposed Condition of Certification **BIO-12** requires pre-construction surveys within the 250-foot buffer beyond the project fence line, and requires avoiding project activities within 250 feet of any protected plant occurrences within project boundaries or adjacent to the site. Plant occurrences that are not protected from project activities by a 250-foot buffer will not be considered "protected" except where specific management and avoidance measures are implements as described in staff's proposed Condition of Certification **BIO-12**. Without those measures, as verified by regular monitoring and reporting, those occurrences will be considered "taken" and additional compensatory mitigation would be required.

Staff anticipates that the use of polymer-based chemicals for fugitive dust control would require product selection and application methods to avoid adverse effects to sensitive plant species within the avoidance areas or impacts to vegetation overall. Staff believes it is impractical to use water for dust control after site grading is completed over such a broad area, considering the rapid evaporation rate in the desert environment and limitations in water supply. Therefore, Air Quality Conditions of Certification **AQ-SC-3** and **AQ-SC-7** and **Soil and Water-1** would require selective application of chemical dust suppressants that would not adversely affect vegetation.

Conclusion

Staff has concluded that implementation of proposed Conditions of Certification **BIO-1** through **BIO-12** and **BIO-17** would reduce impacts to special-status plants to less-than-significant levels under CEQA if the protection goals described above are achieved.

Impacts to Common Wildlife

Construction of the Calico Solar facility would result in large scale direct and indirect impacts to common wildlife. These effects could include mortality from trampling or crushing; increased predation when wildlife is flushed from cover; increased noise levels due to heavy equipment and SunCatcher engine noise; light impacts from construction during low-light periods; increased vehicular and human presence along access roads and desert washes; displacement due to habitat modifications, including vegetation removal, alterations of existing soil conditions; fugitive dust; and a modified hydrologic and sediment regime due to the construction of the storm water management system.

Direct mortality of small mammals; reptiles; eggs and nestlings of bird species with small, well-hidden nests; and other less mobile species could occur during construction. This action would result during habitat clearing and mowing, road construction, earth removal, grading, excavation of the retention basins and storm water management systems, and equipment movement. Bird eggs and nestlings could be directly impacted by construction (specific impacts to nesting birds are discussed below in Migratory/Special-status Birds). More mobile species like birds and larger mammals are expected to disperse into nearby habitat areas during construction. However, the dispersal of wildlife from active construction zones would be hindered by the projects perimeter fencing (i.e., the tortoise exclusion fence).

Another important factor associated with the operational effects of the proposed project to wildlife is noise. Each of the SunCatcher units operates a piston that generates noise that would adversely affect wildlife. Noise levels from each unit would be 84 dBA Leq at approximately 50 feet. This noise level is equivalent to the sound of heavy equipment such as a back hoe or excavator. Noise from construction and operation could discourage wildlife from foraging and nesting adjacent to the proposed project. Noise from daytime operation and nighttime washing and maintenance activities could affect wildlife in adjacent habitats by interfering with breeding or foraging activities and movement patterns, causing animals to avoid areas adjacent to the project. This could disrupt foraging, breeding, sheltering, and other activities. Nocturnal (i.e., active at night) wildlife would be affected less because the maintenance activates would occur in different locations each night.

Noise may affect birds in several ways, including annoyance which causes birds to abandon nests that are otherwise suitable; raise the level of stress hormones, interfering with sleep and other activities; cause permanent injury to the auditory system; and interfere with acoustic communication by masking important sounds or sound components (Dooling 2006). Many bird species rely on vocalizations during the breeding season to attract a mate within their territory, and noise from construction could disturb nesting birds and other wildlife and adversely affect nesting and other activities. Reijnen et al. (1995) demonstrated that for two species of European warbler (Phylloscopus spp.), sound levels between 26 dB(A) and 40 dB(A) reduced breeding density by up to 60% compared to areas without disturbance. These data suggest disturbance from adjacent road noise and urban development may be a contributing factor in the use of habitat adjacent to developed areas. Similar effects may occur in other taxa.

By design, the Calico Solar facility would include perimeter fencing to prevent desert tortoise and bighorn sheep from entering the work area. Prior to construction, tortoises inhabiting the project site would be relocated/translocated to suitable receptor sites (See impacts to desert tortoise below for a detailed discussion of desert tortoise relocation/ translocation). With the exception of birds this barrier would exclude or entrap wildlife at the project site. Therefore, during construction, terrestrial wildlife trapped within the perimeter fence would not be able to disperse from the project area. This would subject any trapped wildlife to repeated disturbance from construction and the use of roads to support maintenance activities. While many species of wildlife can tolerate human disturbance to some degree; implementation of the proposed project would result in an ongoing loss of wildlife from mowing, vehicle traffic, nest failure, and alteration of foraging habitat. The most likely long term affect of the project on wildlife that are trapped within the perimeter fencing is habitat alteration and mortality from road traffic.

The ecological effects of roads have been widely studied (Hoff and Marlow 2002; Trombulak and Frissell 2000; Findlay and Bourdages 2000; Jones et al. 2000; Parendes and Jones 2000; Haskell 2000; and Vistnes and Nellemann 2001). These studies have identified seven general effects from roads that include: mortality from road construction and vehicle collisions; modification of animal behavior; changes to the physical and chemical environment; the spread of invasive species, and increased human access and use (Trombulak and Frissell 2000). The large size of the project (i.e., approximately 8,230 acres) coupled with the activities required to support the operation of the facility such as mowing, monthly washing, and routine SunCatcher maintenance, would result in ongoing disturbance and mortality to wildlife impacts that remain within the project perimeter. Also, there would be substantial use of access roads outside of the fenced project site given the phased implementation of the project. Desert tortoise exclusion fencing would need to be installed along both sides of these access roads, unless otherwise authorized by staff, USFWS, and CDFG.

Construction-related effects to common wildlife are typically not considered significant under the CEQA. However, the large scale of the construction, the fact that many species of wildlife will remain trapped within the perimeter fencing, and the multiyear schedule would result in potential significant effects to common species without implementation of the mitigation measures.

The applicant has recommended general impact avoidance and minimization measures to reduce construction impacts to common wildlife. Staff has incorporated these recommendations into conditions of certification and provided additional language to reduce effects to common wildlife. These Conditions of Certification are designed to educate workers of the presence and sensitivity of wildlife that may occur in the project area; provide limitations on the work that may occur during the breeding season; reducing the effect of fugitive dust on adjacent areas through dust control and reduced vehicle speeds; monitoring construction to reduce direct wildlife mortality; and the control of noxious weeds.

These include the following Conditions of Certification: **BIO-1** (Designated Biologist Selection) which states the minimum qualifications to the satisfaction of the Energy Commission's Compliance Project Manager (CPM) and BLM's Authorized Officer; **BIO-2** (Designated Biologist Duties) which outlines the duties performed during any site mobilization, ground disturbance, grading, construction, operation, closure, and restoration activities; **BIO-3** (Biological Monitor Qualifications); **BIO-4** (Biological Monitor Duties) in which the Biological Monitor assists the Designated Biologist during any site mobilization, ground disturbance, grading, construction, operation, closure, and restoration activities; **BIO-5** (Designated Biologist and Biological Monitor Authority) in which the Designated Biologist and Biological Monitor can call a halt to any activities that would be an adverse impact to biological resources; **BIO-6** (Worker Environmental

Awareness Program) in which workers on the project site or any related facilities are informed about sensitive biological resources; **BIO-7** (Biological Resources Mitigation Implementation and Monitoring Plan) which identifies all biological resources mitigation, monitoring, compliance measures, Conditions of Certification, and permits; **BIO-8** (Impact Avoidance and Minimization Measures) in which all feasible measures which avoid or minimize impacts to the local biological resources are incorporated in any modification or finalization of project design; **BIO-9** (Compliance Verification); and in other proposed conditions of certification. Implementation of these measures would reduce impacts of the proposed project to less-than-significant levels under CEQA.

Horses and Burros

Horses and burros were not observed on the project site but could occur periodically in the project area. The project does not contain or traverse any established BLM HMAs and would not result in any interference with BLM's management of an HMA. While construction of the project would result in barriers to wildlife movement (described below) the project area is not considered an important resource area for wild horses or burros. Should horses or burros occur in the project area, implementation of Conditions of Certification **BIO-1** through **BIO-9** would minimize or avoid impacts to these species. Staff believes that impacts from the proposed project are less-than-significant under CEQA with the implementation of avoidance and minimization measures described above.

Special-Status Wildlife

Habitat in the proposed Calico Solar project area has the potential to support a variety of special-status wildlife including State and federally listed species. Some of the sensitive species observed in the project area include desert tortoise, Mojave fringe-toed lizard, burrowing owl, Le Conte's thrasher, golden eagles, Swainson's hawk, American badger, and Nelson's bighorn sheep. **Biological Resource Table 1** describes the sensitive species that have the potential to occur in the project area. Listed or fully protected species that may be subject to project disturbance include desert tortoise and golden eagle.

Impacts to listed species would occur in the same way as described for non-listed wildlife and could be caused by a variety of direct and indirect factors. Direct impacts to wildlife could include displacement and/or potential mortality of wildlife that are poor dispersers such as tortoise, lizards, and small mammals. Construction may also result in the temporary degradation of the value of adjacent native habitat areas due to disturbance, noise, increased human presence, and increased vehicle traffic during construction. Indirect impacts may include increased human presence and the loss of habitat through the colonization of non-native invasive plants. Mortality or loss of reproductive success may also occur during land clearing, excavation, grading, and construction of the Calico Solar Project. Impacts to these special-status species are detailed below.

Impacts to Special-Status Reptiles

The AFC identified two special-status reptile species that have been reported from the vicinity of the project. These include the desert tortoise and Mojave fringe-toed lizard. Gila monsters, which are known to occur in isolated populations in portions of the

Mohave Desert, have not been recorded in the project area. However, these highly secretive reptiles are seldom observed and may be present within portions of the Cady Mountains north of the project site.

Mojave Fringe-Toed Lizard

Information provided in the AFC indicated that Mojave fringe-toed lizards were documented in a partially stabilized dune complex located between the BNSF Railroad and I 40. Surveys of the project site were conducted by the applicant in portions of the AFC Assessment Area from June 2, 2008 through June 6, 2008 (SES 2009aa). Prior to the surveys the applicant identified areas on site containing windblown sands. Based on the results of the surveys; the applicant considers the 8,230-acre project site to support approximately 16.9 acres of Mojave fringe-toed lizard habitat. However, staff conducted a reconnaissance survey of the Calico Solar Project site in January 2010. Staff inspected the dune complex and believes the applicant has underestimated the amount of habitat that can be utilized by this species. Soft friable sand occurs in many areas adjacent to the identified dune complex, both within the numerous drainages that cross the project site and in small patches of windblown sand. Similarly, soft friable sands with small patches of micro dunes occur within the creosote bush scrub habitat across much of the lower project site. While the applicant accurately characterized the most preferred habitat for this species, and the highest densities of Mojave fringe-toed lizards would be expected to occur in the mapped areas, this species has been documented to occur in a much broader range of sand and dune habitat.

While this species is the only diurnal lizard species in North America that occurs in dunes with no vegetation, Mojave fringe-toed lizard also occur where vegetation is present, including creosote bush (Murphy et al. 2006). Similarly, at Marine Corps Air Ground Combat Center at Twentynine Palms (Twentynine Palms), a study by Cablk and Heaton (2002) documented Mojave fringe-toed lizard populations in a broader area than expected and concluded that more than just the locally suitable habitat must be identified for management. The study further indicated that suitable habitat exists within a matrix of heterogeneous conditions such as hummocks or pockets of soft sand with few annual species interspersed with hard packed sand and less suitable levels of vegetation and vegetation composition (Cablk and Heaton 2002).

From a species management perspective and considering the existing sand patches on the Calico Solar Project site, Mojave fringe-toed lizards may be dispersing between discontinuous patches of good quality habitat. While small patch sizes may not be large enough to support a population of Mojave fringe-toed lizards, the patches provide refugia and foraging habitat, and may play an important role in the linking populations of this species. In fact the idea of labeling hard packed sand as unsuitable habitat may be in error (Cablk and Heaton 2002). Further, this species was found in what was termed medium-pack sand in Lead Mountain during a 2001 survey of Twentynine Palms.

Direct impacts to Mojave fringe-toed lizards include being hit by vehicles on access roads; mechanical crushing during site preparation, grading of access roads, and preparation of staging areas; fugitive dust; and general disturbance due to increased human activity. Because this species is fossorial, direct impacts would include disturbance by noise or vibrations from the heavy equipment. Project implementation would also result in the direct loss of habitat due to the placement of SunCatchers, roads, and drainage channels. Furthermore, the cryptic nature of Mojave fringe-toed lizards increases the likelihood that individuals could be injured or killed during ground-disturbing activities.

Indirect impacts to this species include compaction of soils, the introduction of exotic plant species, alterations to the existing hydrological conditions that transport sand to both off and on-site populations, alterations in the existing solar regime from shading, modification of prey base and altered species composition. Road construction, the placement of SunCatchers, and construction of drainage structures may also alter the aeolian transport of sand within the site and possibly to areas within the adjacent Kelso dunes at the Pisgah Crater ACEC located east of the project boundary, though available data are insufficient to quantify this potential impact. Further, the placement of fencing and the structures of the SunCatchers will also provide roosting opportunities for avian predators that target lizard prey, including shrikes, merlins, burrowing owls, road runners and other avian predators. While not immediately apparent, the large scale land use conversion and disruption of native habitat, including drainages and desert scrub communities, will likely disrupt the ability of this species to effectively disperse from source populations and may result in the extirpation of this population.

Operational impacts include risk of mortality by vehicles and disturbance on access roads due to increased use by the public and maintenance personnel. As described above for common wildlife the use of access roads by construction/maintenance vehicles could result in road-killed wildlife. Other operational impacts include removal and trimming of vegetation during maintenance activities that will alter prey bases and likely result in mortality through mechanical crushing.

The applicant has indicated that to minimize direct effects to this species the 16.9-acre dune complex will be avoided and preserved in perpetuity; therefore, a fringe-toed lizard translocation plan would not be necessary (SES 2008). This area would be excluded from development and demarcated with a with a three-strand barb wire fence to limit access of the area by on-site construction personnel (SES 2009aa). As described above, staff inspected the project site and coordinated with CDFG and USFWS staff regarding the ecology of the species and the presence of habitat within the Calico Solar Project assessment area. Staff considers the proposed avoidance and preservation of the site recommended by the applicant to be inadequate to minimize the potential impacts from the proposed project to Mojave fringe-toed lizards. Based on habitat conditions, staff concludes that this species occupies substantially more habitat than the 16.9 acres identified by the applicant. These cryptic species are difficult to detect and are easily overlooked during surveys. Further, while this species is the only North American lizard known to utilize pure sand sheets as habitat, their range of habitat extends from this extreme to areas with some percentage of perennial cover (Murphy et al. 2006), as well as areas that include stabilized sands (Cablk and Heaton 2002). In addition, even if the 16.9 acre site is preserved in perpetuity, the implementation of the proposed project would isolate the population from occupied areas and result in substantial barriers to dispersal. Subsequently, staff considers that the applicant’s proposal to avoid this area would not result in the preservation of the species on site.

The applicant has proposed general avoidance and minimization measures for Mojave fringe-toed lizards and other sensitive species including pre-construction worker awareness training, monitoring, weed management, and avoidance of the 16.9 acre dune complex. These measures would be adequate to comply with BLM regulations. However, as described above these measures are considered inadequate by staff and CDFG to reduce or minimize adverse effects to this species. Therefore staff has proposed Condition of Certification **BIO-13**. This measure requires the acquisition of suitable dune/sand habitat at a 5:1 ratio. Although the exact acreage of occupied habitat and distribution of the species is not fully known on the Calico Solar Project site, staff and CDFG conclude that the relatively high ratio of 5:1 for the 16.9 acres of dune complex will be adequate to reduce impacts to this species to a less-than-significant level for CEQA. This would require the acquisition and dedication in perpetuity of 84.5 acres of suitable dune/sand sheet habitat. Depending on the location, habitat type, and soil conditions of the proposed desert tortoise mitigation lands (described below) it is possible that portions of the 5:1 ratio mitigation requirements could be achieved through the implementation of tortoise mitigation (i.e., desert washes with suitable friable sands for Mojave fringe-toed lizards that overlap with tortoise habitat). However, as dune formations are generally not considered suitable tortoise habitat, lands that support dune habitat may need to be acquired in other areas.

With the implementation of this measure, the applicant would not be required to avoid the 16.9-acre dune complex and could utilize the area for the placement of SunCatchers. This mitigation strategy was developed in consultation with staff, CDFG, and USFWS personnel. The rationale for this measure is that the long-term viability of this population is not expected to persist post development. Mojave fringe-toed lizards occur only on desert sand dunes and associated mosaics of small sand ramps and the distribution is naturally discontinuous and geographically complex (Murphy et al. 2006). Because of the species behavior and habitat requirements, many populations are vulnerable to local extirpation (Murphy et al. 2006). The patch size and loss of adjacent habitat coupled with indirect effects including invasive plants, predation, loss of potential sand sources, barriers to dispersal, and road kill precludes the long term preservation goals for this site. Staff and the resource agencies believe that preservation of appropriate mitigation lands would provide a more viable approach to mitigating the impacts to this species from the development of the Calico Solar facility. Implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-9** and Condition of Certification **BIO-13** would reduce impacts to Mojave fringe-toed lizards to less than significant levels.

Gila Monsters

Gila monsters were not observed during biological surveys conducted in 2007 and 2008 of the proposed Calico Solar project site. While staff acknowledges that there is a low potential for occurrence of this species in the project area, this species occurs in low densities, is difficult to detect, and may be overlooked during surveys. If present, direct impacts to this species could include mortality during ground-disturbing activities; being hit by vehicles on access roads; mechanical crushing during site preparation, grading of spur roads or drainage features; fugitive dust; and general disturbance due to increased human activity. Indirect impacts to this species include compaction of soils and the introduction of exotic plant species.

Operational impacts include risk of mortality by vehicle strikes and disturbance on access roads due to increased use by the public and maintenance personnel. Other operational impacts include removal and trimming of vegetation during maintenance activities. Staff considers these impacts to be significant under CEQA absent mitigation.

The applicant has not proposed specific mitigation to reduce potential impacts to Gila monsters. Condition of Certification **BIO-14** requires that concurrent with the translocation/ relocation desert tortoise clearance survey, a biologist perform a preconstruction survey for Gila monsters in the project area, and implement appropriate impact avoidance and minimization measures if detected. This would include relocating any individuals of this species outside of the proposed project footprint into suitable habitat.

Construction of the Calico Solar Project would eliminate 8,230 acres of habitat that may provide cover, foraging, and breeding habitat for Gila monsters. However, much of the habitat between the BNSF Railroad and I-40 has been subject to historic disturbance and may provide lower quality habitat compared to the bajadas situated closer to the Cady Mountains. Implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-9, BIO-14,** and **BIO-17,** which include minimization measures for Gila monsters and compensatory land acquisition for desert tortoise (described below) would reduce impacts to Gila monsters and their habitat to less-than-significant levels.

Desert Tortoise

Desert tortoises are present within the proposed Calico Solar Project footprint and within the adjacent desert areas both east and west of the site. Implementation of the proposed project would result in the direct loss of approximately 8,230 acres of occupied desert tortoise habitat. In addition, NAP area A will be surrounded on three sides by the Calico Solar facility fencing.

Information provided by the applicant indicated that most of the desert tortoise occurrences were noted in the area north of the BNSF Railroad. This area is characterized by creosote bush scrub and has less obstructed connectivity to adjacent natural lands. Although habitat for desert tortoise is present in the area between the BNSF Railroad and I-40 staff concurs with the applicant that the area between the BNSF Railroad and I-40 provides lower quality habitat for tortoises. This area is isolated by the highway and railroad, has been subject to disturbance from pipeline development and provides little long-term value to the species. Nonetheless tortoise sign was detected in this area by staff and the applicant. In addition, while the railroad poses a substantial barrier to movement, there remain corridors for dispersal under the many railroad trestles that span the drainages that flow across the site.

Federally designated critical habitat for desert tortoise does not occur within the proposed development footprint and would not be subject to project impacts.

To determine the number of tortoise within the project footprint the applicant implemented a modified survey protocol for desert tortoise that was approved by the USFWS and BLM. These surveys were completed from May 15, 2007 through May 31, 2007 and from April 1, 2008 through May 7, 2008 (Figure 4 – SES 2009aa). This sampling method was requested by the applicant due to the size of the project area and was approved by the BLM and USFWS. Information provided from this sampling method determined that the expected tortoise abundance on the project site ranged from between 60 to 70 tortoises. However, during a data workshop on December 2009 the applicant concluded that up to 100 tortoises may occur in the proposed project footprint and require relocation/translocation. In the workshop, the California Union for Reliable Energy (CURE) raised concerns regarding the use of the modified sampling protocol and the average acreage covered by the survey team each day.

Based on review of the data sheets, number of survey days, and acreage covered, CURE contends that each of the surveyors would have been required to walk up to 20 miles per day. In contrast, in the same meeting the applicant contests that the average mileage was approximately 16 miles per day. While a 100% survey of the project area would have provided a more thorough documentation of biological resources in the project area, staff considers the modified protocol be an adequate tool because the USFWS and BLM have discretionary approval to modify survey methods, particularly for large projects. Regarding the pace of the survey, staff and CDFG conclude the tempo across the project site, which in many areas supports complex, rocky topography, would not have allowed the surveyors adequate time to detect all tortoise sign. Because of this staff, USFWS, and CDFG consider the minimum tortoise population on the project site to consist of 100 animals or more. As of the time of this Draft SA/DEIS the applicant has indicated they plan to conduct 100% surveys of the project area in order to better evaluate the potential number of tortoises that would require relocation/translocation. Because of the large scale land use conversion of the site coupled with the expected level of vehicle traffic and maintenance activities (i.e., mowing, mirror washing, etc.) required at the site, construction of the Calico Solar Project will require the applicant to translocate or relocate all the tortoises that occur within the proposed project footprint.

Direct Impacts

During construction of the Calico Solar project desert tortoises may be harmed during clearing, grading, and trenching activities or may become entrapped within open trenches and pipes. Construction activities could also result in direct mortality, injury, or harassment of individuals as a result of encounters with vehicles or heavy equipment. Other direct effects could include individual tortoises being crushed or entombed in their burrows, collection or vandalism, disruption of tortoise behavior during construction or operation of facilities, disturbance by noise or vibrations from the heavy equipment and the SunCatcher engines, and injury or mortality from encounters with workers’ or visitors' pets. Desert tortoises may also be attracted to the construction area by the application of water to control dust, placing them at higher risk of injury or mortality. Increased human activity and vehicle travel would occur from the construction and improvement of access roads, which could disturb, injure, or kill individual tortoises. Also, tortoises may take shelter under parked vehicles and be killed, injured, or harassed when the vehicle is moved. The applicant has recommended impact avoidance and minimization measures to reduce these direct impacts to desert tortoise, including installation of exclusion fencing to keep desert tortoise out of construction areas, relocating/translocating the resident desert tortoise from the Calico Solar site, reducing construction traffic and speed limits to reduce the incidence of road kills and worker training programs. Staff has incorporated these recommendations into conditions of certification. These include Conditions of Certification **BIO-1** through **BIO-9**, which apply to protection of desert tortoise and other biological resources in and near the Calico Solar Project area, and Conditions of Certification **BIO-15** through **BIO-17**, which are specific to desert tortoise.

Staff's proposed Condition of Certification **BIO-15** would require installation of security and desert tortoise exclusionary fencing around the entire project site and along access roads, and **BIO-16** recommends the development and implementation of a desert tortoise relocation/translocation plan to move the tortoises currently living in the Calico Solar project area to proposed relocation/translocation sites. Currently the locations(s) of the translocation sites remain under development; however, the applicant continues to work with staff, USFWS, and CDFG to identify these areas. Staff will provide additional information about the relocation/translocation plan in the SSA/FEIS.

Staff's proposed **BIO-9** requires verification that all desert tortoise impact avoidance, minimization, and compensation measures have been implemented. Staff's proposed **BIO-8** recommends a variety of additional impact avoidance and minimization measures to reduce the risk of injury and death to desert tortoise as well as other sensitive species.

Implementation of staff's proposed Conditions of Certification **BIO-14** and **BIO-15** have inherent risks and could themselves result in direct effects such as mortality, injury, or harassment of desert tortoises due to equipment operation, fence installation activities, removal of tortoise burrows, and tortoise translocation. These impacts are described in more detail below.

Translocation/Relocation

Capturing, handling, and relocating desert tortoises from the proposed site after the installation of exclusion fencing could result in harassment and possibly death or injury. Impacts of translocation upon desert tortoises may include elevated stress hormone levels, changes in behavior and social structure dynamics, genetic mixing, increased movement (caused by conspecifics, avoidance of predators or anthropogenic influence, homing, or seeking out of preferred habitat), spread of disease, and increased predation. Furthermore, handling, holding, and transport protocols may compound with abiotic factors to affect the outcome for translocated individuals (Bertolero et al. 2007; Field et al. 2007; Rittenhouse et al. 2007; Teixeira et al. 2007), particularly during extreme temperatures, or if they void their bladders. Averill-Murray (2001) determined that tortoises that voided their bladders during handling had significantly lower overall survival rates (0.81-0.88) than those that did not void (0.96). If multiple desert tortoises are handled by biologists without the use of appropriate protective measures, pathogens may be spread among the tortoises, both resident and translocated animals. For those tortoise near but not within the Calico Solar site, removal of habitat within a tortoise's home range or segregating individuals from their home range with a fence would likely result in displacement stress that could result in loss of health, exposure, increased risk of predation, increased intraspecific competition, and death. Tortoises moved outside of their home ranges may attempt to return to the area from which they were moved, therefore making it difficult to isolate them from the potential adverse effects associated with project construction. Mortality for translocated desert tortoise has been estimated at approximately 15% (Sullivan 2008) , though recent evidence from the desert tortoise translocation effort conducted in support of the Fort Irwin Land Expansion Project indicates that mortality rates may be closer to 25% per year (Gowan and Berry 2010).

Success rates of herpetofauna translocations range from 14% to 42%, suggesting that improved efforts are essential for the future recovery of many reptiles and amphibians (Dodd and Seigel 1991; Germano and Bishop 2009). A recent review of 91 herpetofauna translocation projects reported the primary causes of translocation failure were homing response by translocated individuals and poor habitat in translocated areas, followed by human collection, predation, food and nutrient limitation, and disease (Germano and Bishop 2009). The risks and uncertainties of translocation to desert tortoise are well recognized in the desert tortoise scientific community. The Desert Tortoise Recovery Office (DTRO) Science Advisory Committee (SAC) has made the following observation regarding desert tortoise translocations (DTRO 2009, p. 2):

> *As such, consensus (if not unanimity) exists among the SAC and other meeting participants that translocation is fraught with long-term uncertainties, notwithstanding recent research showing short-term successes, and should not be considered lightly as a management option. When considered, translocation should be part of a strategic population augmentation program, targeted toward depleted Populations in areas containing "good" habitat. The SAC recognizes that quantitative measures of habitat quality relative to desert tortoise demographics or population status currently do not exist, and a specific measure of "depleted" (e.g., ratio of dead to live tortoises in surveys of the potential translocation area) was not identified. Augmentations may also be useful to increase less depleted populations if the goal is to obtain a better demographic structure for long-term population persistence. Therefore, any translocations should be accompanied by specific monitoring or research to study the effectiveness or success of the translocation relative to changes in land use, management, or environmental condition.*

To provide guidance for the applicant in addressing these concerns and developing an adequate relocation/translocation plan, on January 27, 2010, the USFWS prepared specific draft guidelines for clearance and translocation of desert tortoises from the project sites. This included the Translocation of Desert Tortoises (Mojave Population) From Project Sites: Plan Development Guidance (USFWS 2010). This document provided guidance including the timing of relocation/translocation, disease testing requirements, and other actions to minimize impacts to desert tortoise.

The applicant submitted their first Administrative Draft Desert Tortoise Relocation/ Translocation Plan identifying potential areas east of the Calico Solar project site as a relocation area and lands east of the project site, as a translocation area. The BLM, USFWS, and CDFG provided preliminary comments on that submittal, requesting considerably more detail on the habitat quality and suitability of the proposed relocation and translocation sites, as well as specific details on the how the translocation would be conducted. To date the applicant has not finalized the Draft Desert Tortoise Relocation/ Translocation Plan. It is expected that based on recent guidance issued from the USFWS the Final Desert Tortoise Relocation/Translocation Plan will be completed by the spring of 2010. As noted above, staff will provide additional information about the relocation/translocation plan in the SSA/FEIS.

Staff's proposed Condition of Certification **BIO-16** requires development of a final Desert Tortoise Relocation/Translocation Plan in consultation with staff, CDFG, and

USFWS to address outstanding concerns that these agencies have regarding the specifics of the plan. Currently, the specific locations proposed for the translocation areas have not yet been finalized; however the current proposal is to relocate tortoises into adjacent lands east of the site. Ongoing negotiations between the applicant, USFWS and BLM have tentatively agreed that disease testing would not be required if tortoise were moved less than 5 kilometers (km) (3 miles). However, the CDFG currently considers that moving tortoises up to 5 km (3 miles) distance without disease testing poses health risks to other populations. As the final distance has not been approved by the CDFG, disease testing may be required for larger numbers of tortoise than previously expected. In addition, the task of relocating up to 100 tortoises poses a substantial effort for the applicant and may hinder the ability of the project to commence construction in some areas. Tortoises moved further than 5 km will require disease testing. Staff concludes that implementation of this condition would minimize harm to desert tortoise during relocation and translocation activities associated with construction of the Calico Solar Project. It should be noted that although staff anticipates that the final Desert Tortoise Relocation/Translocation Plan will mitigate direct and indirect impacts to desert tortoise, a final conclusion cannot be reached until the final plan is developed.

Habitat Loss and Compensatory Mitigation

Construction of the proposed Calico Solar facility would result in the direct and permanent loss of approximately 8,230 acres of occupied desert tortoise habitat (SES 2008). In addition, 1,180 acres of this include donated and acquired lands which were previously used to mitigate for other projects. In order to develop previously dedicated mitigation lands, the applicant will be required to obtain new parcels equal to the existing donated and acquired lands.

Although the project applicant states that it would preserve 75-foot swaths of natural vegetation between the rows of SunCatchers, the facility would be surrounded by perimeter fencing designed to exclude tortoises and other wildlife. The project would also disrupt movement and fragment adjacent tortoise habitat. Compensatory mitigation is required to offset this significant impact and to fully mitigate for impacts to desert tortoise. Compensatory mitigation for desert tortoise typically involves balancing the acreage of habitat loss with acquisition of lands that would be permanently protected and enhanced to support healthy populations of desert tortoise. The compensation comes about by improving the carrying capacity of the acquired property so that more desert tortoise will survive and reproduce on these lands, thus offsetting over time the decrease in numbers of tortoise resulting from the habitat loss.

For the acquisition of mitigation lands to truly compensate for the habitat loss and to make up for the numbers of desert tortoise that would otherwise have been supported by that habitat, the acquisition must be accompanied by: (1) permanent protection and management of the lands for desert tortoise, and (2) enhancement actions. The permanent protection is essential because that allows the lands to be managed in a way that excludes multiple threats and incompatible uses (grazing, off-highway vehicle use, roads and trails, utility corridors, military operations, construction, mining, grazing by livestock and burros, invasive species, fire, and environmental contaminants). Without this protection and management the desert tortoise populations on the acquired lands would be subject to the same threats that led to its population declines and threatened status. While the BLM cannot guarantee the exclusion of these types of activities from acquired lands due to their multiple-use mandate, the Energy Commission concludes that this level of protection would be necessary to meet the requirements for mitigation for loss of desert tortoise habitat under CEQA and CESA. An equally important component is the implementation of enhancement actions to improve desert tortoise survival and reproduction. These actions might include habitat restoration, invasive plant control, road closures or road fencing, reducing livestock and burro grazing, and controlling ravens and other predators. Without permanent protection and enhancement actions on lands acquired for mitigation, the result would be a net loss for desert tortoise populations.

To adequately offset habitat loss CDFG usually requires a mitigation ratio greater than 1:1 for compensation lands (i.e., acquisition of one acre of compensation lands for every acre lost), and typically uses a 3:1 ratio or higher for good quality habitat such as that found in portions (i.e., north of the BNSF Railroad) of the Calico Solar Project site. The higher ratio reflects the limits to increases in carrying capacity that can be achieved on the acquired lands, even with implementation of all possible protection and enhancement measures. Depending on the quality of the habitat that is lost and the habitat conditions of the land that is acquired, it is difficult to sufficiently increase the carrying capacity of the acquisition lands to completely offset habitat loss without relying on additional acreage to boost the numbers of desert tortoise that can be supported on the mitigation lands. The BLM applies a 1:1 compensation ratio because they pursue desert tortoise recovery goals not through parcel by parcel acquisitions and management, but rather through implementation of region-wide management plans and land use planning as described in the WEMO, the California Desert Conservation Act plan, and the Desert Tortoise Recovery Plan (USFWS 1994).

The applicant has proposed a 1:1 ratio to mitigate for permanent impacts to desert tortoise habitat. Staff and CDFG propose that a mixed habitat compensation ratio be implemented for the Calico Solar site. The rationale for the mixed ratio is that tortoise habitat, potential use of the site, and long term habitat value for tortoise varies within the project footprint, primarily as a result of anthropogenic sources, including construction of the BNSF Railroad, I-40, and pipeline and utility construction. The construction of the railroad and interstate has also modified the hydrology of this area by bisecting a series of desert washes that flow from the Cady Mountains (SES 2009l).

Currently, staff, CDFG, and USFWS generally consider the area between the BNSF and I-40 to support lower quality tortoise habitat. The applicant stated in the Biological Technical Report that Desert tortoise habitat exists in the area between the BNSF railroad and I-40, and desert tortoise can access this area through existing culverts and trestles; however, the absence of verifiable desert tortoise sign in this area leads to the expectation that desert tortoise do not prefer this area (SES 2009aa). Staff generally concurs with this assessment, however, while the applicant only detected limited sign; numerous burrows, some of which may have been constructed by desert tortoise, were noted by staff during a site visit conducted in January 2010. Based on the observations of staff in this area, it is likely that some tortoises occur in the area between the BNSF Railroad and I-40. However, because the site is more isolated and remains subject to human disturbance, staff concludes that a 1:1 ratio would be applied for this area. In addition, CDFG and USFWS staff has determined that the application of the 1:1 ratio and mitigation strategy (i.e., payment of fees per the requirements of the West Mojave

Plan) would mitigate the loss of tortoise habitat in this area. As stated in the EIR/EIS for the West Mojave Plan, “Mitigation fees collected on BLM lands would be managed by the BLM and maintained in a special account established for the acquisition of mitigation lands within the HCA, as well as for monitoring, enhancement and management of those lands.” BLM considers impacts to desert tortoise habitat fully mitigated through the payment of these fees (CDFG et al. 2005).

To achieve the required level of mitigation to compensate for impacts to desert tortoise in areas north of the BNSF Railroad Energy Commission staff believes that a 3:1 ratio is required. Habitat in this area is more complex, numerous tortoise sign has been detected by the applicant and staff, and the area is contiguous with other occupied, higher quality desert tortoise habitat. This mitigation ratio is consistent with past Energy Commission mitigation requirements for projects with impacts to desert tortoise (for example, High Desert Power Plant Project and the Victorville 2 Hybrid Power Project), as well as staff’s recommended mitigation as stated in the Final Staff Assessment for the Beacon Solar Energy Project, and with Incidental Take Permits issued by CDFG for other non-Energy Commission jurisdiction projects in the region.

State Desert Tortoise Mitigation Requirements

To satisfy CDFG’s full mitigation standard and to comply with requirements of a State Incidental Take Permit for desert tortoise, the proposed mitigation must meet certain criteria described in Title 14 CCR, Sections 783.4(a) and (b). These criteria include requirements that the proposed mitigation would be capable of successful implementation and that adequate funding is provided to implement the required mitigation measures and to monitor compliance effectiveness of the measures. In order to ensure that the project meets these requirements, the CDFG typically requires and the Energy Commission would require that lands acquired for mitigation purposes for a listed species be managed and protected in perpetuity for the benefit of that species. As described above, the CDFG has recommended the following mitigation strategies that fulfill the state’s full mitigation standard for desert tortoise. CDFG requires a 1:1 ratio for the area between the BNSF Railroad and I-40. This mitigation requirement would be achieved through the application of the standard BLM 1:1 ratio and mitigation strategy (i.e., payment of fees) described below. For all other areas a 3:1 ratio is required. This ratio would include both the 1:1 ratio (fee payment) required by the BLM and the 2:1 ratio required by the CDFG and USFWS.

BLM Desert Tortoise Mitigation Requirements

This desert tortoise mitigation approach for the Calico Solar Project must satisfy BLM’s policies for lands within the Western Mojave Planning Area (BLM et al. 2005). No law, regulation, policy, or plan would permit BLM to require assessing more than a 1:1 compensation ratio for habitat that lies outside of Desert Wildlife Management Areas (DWMA) such as the Calico Solar Project site.

Integrating State and BLM Desert Tortoise Mitigation

The Calico Solar Project must integrate the mitigation requirements for desert tortoise that would satisfy policies and requirements of both the CDFG and BLM. The CDFG and BLM have made substantial progress toward developing a mitigation framework that would work for both State and federal agencies, as described in a July 23, 2009 letter from BLM California Acting State Director James Abbot to CDFG Deputy Director Kevin Hunting (BLM 2009a). This letter indicates that the BLM mitigation ratio of 1:1 would be applied within the mitigation ratio required by CDFG. The following issues must be addressed in developing the final desert tortoise compensatory mitigation package that jointly satisfies both the State and BLM policies and requirements:

Security and Per Acre Mitigation Fee

Staff's proposed Condition of Certification **BIO-17** specifies compensatory mitigation for desert tortoise habitat loss at a 1:1 for the area between the BNSF Railroad and I-40 and 3:1 ratio for all areas north of the BNSF Railroad. BLM has proposed nesting their 1:1 mitigation requirement within this framework. As described above, requirements for the BLM's 1:1 portion of the mitigation ratio would be satisfied through payment of the compensation fee to BLM, which BLM would use for habitat acquisition as well as monitoring, enhancement, and management of those lands for the benefit of desert tortoises (BLM et al. 2005). The Energy Commission staff's portion of the condition of certification requires a security for funding two-thirds of their mitigation requirement. BLM would likely require the project owner to provide a deposit to be held in a BLM-managed contributed funds account based on the area of ground disturbance as determined by the final project footprint. To satisfy section 2081 of the California Endangered Species Act, the applicant must provide financial assurances to guarantee that an adequate level of funding is available to implement all impact avoidance, minimization, and compensation measures described in the desert tortoise conditions of certification. These financial assurances are generally provided in the form of an irrevocable letter of credit, a pledged savings account or another form of security prior to initiating ground-disturbing project activities. For the BLM, a cash payment (proffer) is made prior to initiating ground-disturbing activities.

The Energy Commission staff's conditions of certification typically specify the dollar amount of the security. This security amount is calculated by multiplying the acreage of the impact area by the total per acre costs, a figure which represents the sum of the costs required for: (1) land acquisition, (2) initial habitat improvements, and (3) an endowment to support long-term management of the acquired lands. The latter cost for the long-term management endowment is typically the largest component of the mitigation fee. Interest from the endowment creates a funding source that provides enough income to cover annual stewardship costs on the acquired lands and includes a buffer to offset inflation. The amount for the endowment is established by a Property Analysis Record (PAR), a computerized database methodology developed by the Center for Natural Lands Management (<www.cnlm.org/cms>) which calculates the costs of land management activities for a particular parcel.

These activities include development of a desert tortoise management plan tailored for each parcel of mitigation land to assess habitat status, identify desired conditions, and develop plans to achieve conditions that would best support desert tortoise. Once the management plan is developed and approved by the appropriate resource agencies, implementation of enhancement actions such as fencing, road closure, invasive plant control, habitat restoration, and monitoring can begin. The goal of these activities is to increase the carrying capacity of the acquired lands for desert tortoise and increase their population numbers by enhancing survivorship and reproduction. Funding for the initial habitat improvements supports those actions needed immediately upon acquisition of the property to secure it and remove hazards. These activities might include fencing or debris clean-up, or other urgent remedial action identified prior to when the parcels were acquired. When the management plan is completed for the acquired parcel activities like these are thereafter funded from the interest produced by the long-term management endowment described above.

In contrast to CDFG's mitigation approach, BLM does not require an endowment fee or creation of a management plan to undertake habitat improvements on the acquired mitigation lands. However, guidelines for BLM stewardship and enhancement actions to protect and enhance habitat for desert tortoise are provided by the WEMO and the CDCA Plan. The BLM also takes into consideration all feasible management actions recommended by the Desert Tortoise Recovery Plan (USFWS 1994) on their lands.

Staff's proposed Condition of Certification **BIO-17** specifies acquisition of no less than 14,018 acres and provides an estimate of associated costs. These costs include acquisition fees of $910 per acre, a figure that reflects land sale costs over the past three years for parcels in unincorporated San Bernardino County (CDFG 2009a). In addition, based on guidance from CDFG on past power plant siting projects, initial habitat improvement costs (for example, fencing, debris removal) are estimated at $250 per acre. The long-term management endowment is estimated at $1,350 per acre based on a Property Analysis Records from past Energy Commission projects. The estimated composite mitigation cost to meet Energy Commission staff's recommendation for establishing the security would be $2,510 per acre.

Energy Commission staff has recommended in proposed Condition of Certification **BIO-17** that the applicant's financial responsibility for the actual cost of mitigation shall not increase by more than 25% of the Security Amount. BLM staff proposes compensatory mitigation at a 1:1 ratio, consistent with their guidance from WEMO. For the Calico Solar Project to meet the BLM requirement for desert tortoise mitigation, the applicant will utilize the fee structure identified in the WEMO. The WEMO establishes the mitigation fee as $770 per acre + a 15% acquisition fee ($115.50 per acre) + a 17.1% ($151.42 per acre) indirect cost fee = $1036.92 per acre.

The BLM's first priority for land acquisition would be private lands outside of the Mojave National Preserve that are within a Desert Wildlife Management Area (DWMA) within the Western Mojave Recovery Unit. As a secondary priority, funds would also be spent acquiring private lands within the Mojave National Preserve and on additional management and enhancement projects that would benefit the desert tortoise.

Energy Commission staff have concluded that the combination of the 2:1 compensatory mitigation, as described in staff's proposed Condition of Certification **BIO-17**, and the BLM 1:1 mitigation described conceptually above, would meet CESA's full mitigation standard and would mitigate CEQA impacts to desert tortoise to less-than-significant levels. Staff considers the combination of these two mitigation approaches to be a complementary and complete mitigation package that would achieve 3:1 mitigation and would satisfy State and federal requirements for mitigating impacts to desert tortoise. Staff believes that the implementation of these conditions would reduce impacts to desert tortoise to less-than-significant levels and would also satisfy the California Department of Fish and Game's requirements under Fish and Game Code Section 2081.

“In Perpetuity” Protection for Acquired Mitigation Lands

Historically, the Energy Commission staff and CDFG have not accepted land acquisition as adequate mitigation for impacts to endangered species unless the lands can be maintained and protected in perpetuity for the benefit of those species. For most BLM lands, their multiple use mandates restrict their ability to designate land solely for conservation purposes and to exclude all potentially incompatible development and activities. That in-perpetuity protection requirement for BLM mitigation lands is likely to be satisfied by buying private in-holdings within BLM’s Desert Wildlife Management Areas (DWMAs) or Mojave National Preserve, so that the surrounding protective land management would prevail. For the Energy Commission mitigation lands, CDFG or an appropriate conservation organization would own, protect and manage the lands to ensure permanent protection. If other lands were acquired that were not within such protected areas, BLM would need to provide some sort of assurances for the long-term protection of those lands for desert tortoise if these lands are to be counted as fulfilling part of CESA’s full mitigation standard. However, because the fee paid to the BLM would go into a general fund, assurances as to the long-term protection of those lands may not be possible.

Location of Acquired Mitigation Lands

Currently the location of the proposed mitigation lands has not been identified. CDFG and BLM differ in the regional scope of areas that they could consider for potential acquisition lands. While both agencies agree that the mitigation lands should be as close to the Calico Solar site as possible, the many proposed Solar Applications in the area may limit the ability of the agencies to purchase local parcels. In addition, as described above the Fee based system employed by BLM would not limit the potential location of acquisition lands in the region. Prior to the release of the SSA/FEIS, staff, CDFG, and USFWS will identify the proposed mitigation lands that comply with CDFG and USFWS requirements.

Enhancement Actions Other Than Land Acquisition

The USFWS recovery plans for desert tortoise (USFWS 1994, 2008a) describe actions in addition to land acquisition that could reduce threats to desert tortoise populations. Some of these actions include habitat restoration and invasive plant control, eliminating livestock and burro grazing, fencing to exclude livestock and vehicles or reduce the incidence of roadkill, controlling tortoise predators such as ravens, feral dogs and coyotes, as well as increased law enforcement, signage and education. Staff agrees that fencing, retirement of grazing allotments, removal of burros, and habitat restoration show considerable promise as actions that could increase desert tortoise survivorship and reproduction in portions of the Mojave Desert. The control of ravens shown to be predators on juvenile desert tortoises may also be a particularly effective recovery action. Despite concurrence among staff as to the benefits of these recovery actions, there are formidable challenges to requiring enhancement actions like these in staff’s conditions of certification. BLM cannot make pre-decisional firm commitments to implement specific actions such as fencing, altering grazing allotments, burro removal, or habitat restoration without conducting a NEPA analysis and providing full public disclosure on the effects of those actions. BLM can contribute funds to the Fish and Wildlife Service program of raven control without additional review. However, Energy Commission staff and CDFG cannot meet mitigation requirements for compliance with the California Endangered Species Act by relying on a “yet to be completed” NEPA document. The specifics of the enhancement actions would be consistent with direction from the West Mojave Plan, CDCA plan, and the Desert Tortoise Recovery Plans (USFWS 1994, 2008a). USFWS will collaborate with staff and CDFG in the development of desert tortoise enhancement actions, and these provisions would be incorporated into the Raven Management Plan which would be developed by the applicant (Condition of Certification **BIO-18**).

Mitigation Compliance Monitoring

Mitigation measures in staff’s recommended conditions of certification must be specific and enforceable with a process in place to monitor mitigation compliance and take action to remedy non-compliance. For land acquisitions, BLM, CDFG and the Energy Commission have well developed and transparent procedures to track expenditures and acquisitions. However, a mechanism is needed to verify fulfillment of enhancement actions such as fencing or habitat restoration on BLM lands, and provide a process for compliance monitoring to determine if the actions are being implemented as required by the conditions of certification. For mitigation other than land acquisition, staff will develop a process that allows tracking and verification of enhancement actions for desert tortoise. Staff anticipates resolution of all of these issues in the near future, and will work closely and cooperatively with USFWS, CDFG, and the applicant to finalize a mitigation and enhancement plan (Condition of Certification **BIO-17**) that would offset the significant habitat loss and indirect impacts to desert tortoises associated with construction and operation of the Calico Solar Project.

Indirect Effects

The indirect effects of the Calico Solar Project to desert tortoise include loss of forage, burrowing sites, and cover sites, the spread of non-native invasive plants, loss of dispersal areas and connectivity to other areas, contracted home ranges, and increased risk of predation by predators attracted to the area by increased human activity. Each of these impacts is discussed in more detail below.

Ravens, Coyotes, and Other Predators

Human activities in the Calico Solar Project area potentially provide food or other attractants in the form of trash, litter, or water, which attract and subsidize unnaturally high numbers of tortoise predators such as the common raven, kit fox, and coyote. Common raven populations in some areas of the Mojave Desert have increased 1,500% from 1968 to 1988 in response to expanding human use of the desert (Boarman 2002). Since ravens were scarce in this area prior to 1940, the current level of raven predation on juvenile desert tortoises is considered to be an unnatural occurrence (BLM 1990; USFWS 2008a). In addition to ravens, feral dogs have emerged as major predators of the tortoise. Dogs may range several miles into the desert and have been found digging up and killing desert tortoises (USFWS 1994; Evans 2001). Dogs brought to the project site with visitors may harass, injure, or kill desert tortoises, particularly if allowed off leash to roam freely in occupied desert tortoise habitat. The worker environmental awareness training (Condition of Certification **BIO-6**) and restrictions on pets being brought to the site required of all personnel (Condition of Certification **BIO-11**) would reduce or eliminate the potential for these impacts. Construction and operation of the Calico Solar Project would increase raven and coyote presence in the project area. Ravens depend on human encroachment to expand into areas where they were previously absent or in low abundance.

Ravens habituate to human activities and are subsidized by the food and water, as well as roosting and nesting resources that are introduced or augmented by human encroachment. Ravens were observed during site visits of the Calico Solar Project site and a stick nest with raven feathers was observed along the railroad tracks. Ravens may also use the new transmission line structures as potential nest and perch sites increasing the potential for loss of tortoises from raven predation. Because of the agriculture that occurs west of the project near Daggett and access to water in the region, ravens will continue to occupy this section of the desert. Small mammal, fox, coyote, rabbit, lizard, snake, and tortoise road kill along I-40 also provides an additional attractant and subsidy for opportunistic predators/scavengers such as ravens.

Road kills would mount with increased Calico Solar Project construction and operations traffic, further exacerbating the raven/predator attractions and increasing desert tortoise predation levels. In addition, bird strikes that occur from either collision with facility structures or transmission lines may also attract ravens. The Calico Solar area is already subject to elevated raven predation pressure and any cumulative loss of juvenile tortoise due to the further addition of raven subsidies could have a long-term effect on the tortoise population by reducing the recruitment of juvenile tortoises into the adult life stages (Boarman 2003). The effects of this shortage may not be apparent for years because tortoises do not typically reach sexual maturity until approximately 15 to 20 years of age.

To reduce the impacts of increased raven presence at the Calico Solar Project site, the applicant has prepared a draft Raven Management Plan (SES 2009aa) and has recommended additional avoidance and minimization measures. Staff has incorporated these recommendations with proposed Conditions of Certification **BIO-8** and **BIO-18**, which would minimize the effects of increased predation on desert tortoise in the project area. The USFWS is currently developing a raven management plan that would address some of these potential impacts on a regional basis (Croft 2008) and which would implement recommendations in the USFWS Environmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise (USFWS 2008b). This USFWS regional raven management plan will be integrated with staff's conditions of certification if that plan is completed in time.

Increased Risk from Roads/Traffic

Vehicle traffic would increase as a result of construction and improvement of access roads, increasing the risk of injuring or killing desert tortoise. Construction of the Calico Solar Project would occur over a four-year period and access through Hector Road could result in mortality of desert tortoises by vehicle strikes. The potential for increased traffic-related tortoise mortality is greatest along paved roads where vehicle frequency and speed is greatest though tortoises on dirt roads may also be affected depending on vehicle frequency and speed. Data indicate that desert tortoise numbers decline as vehicle use increases (Bury et al. 1977) and that tortoise sign increases with increased distance from roads (Nicholson 1978; Karl 1989; von Seckendorf and Marlow 1997, 2002). Additional unauthorized impacts that may occur from casual use of the access roads in the project area include unauthorized trail creation. To minimize the risks of increased traffic fatality and other hazards associated with roads at the Calico Solar project site, the applicant has proposed a variety of minimization measures which staff has incorporated into Condition of Certification **BIO-8**. These measures include confining vehicular traffic to and from the project site to existing routes of travel, prohibiting cross country vehicle and equipment use outside designated work areas, and imposing a speed limit of 25 miles per hour on Hector Road and other dirt access routes within desert tortoise habitat.

Tortoise Mitigation Summary

Staff has incorporated these recommendations into proposed conditions of certification. These include staff's proposed Conditions of Certification **BIO-1** through **BIO-9**, which apply to protection of desert tortoise and other biological resources in and near the Calico Solar Project. Staff's proposed Conditions of Certification **BIO-15** through **BIO-17** would involve additional conditions including installation of tortoise exclusion fencing; clearance surveys; monitoring; verification that all desert tortoise impact avoidance, minimization, and compensation measures to replace lost habitat are implemented; relocation/translocation; and acquisition of compensation lands. Staff's proposed Condition of Certification **BIO-18** would require the development and implementation of a Raven Monitoring, Management, and Control Plan which would minimize impacts to desert tortoise resulting from increases in raven populations.

Staff anticipates that implementation of these conditions would reduce impacts to desert tortoise to less-than-significant levels under CEQA and would also satisfy the California Department of Fish and Game's requirements under Fish and Game Code Section 2081. However, a final conclusion cannot be reached until the final Desert Tortoise Translocation/Relocation Plan is developed.

Migratory/Special-Status Bird Species

The variety of topographical features, manmade structures (railroad trestles), vegetation, and adjacent Cady Mountains provide foraging, cover, and/or breeding habitat for a variety of resident and migratory birds. During surveys of the project site the applicant identified approximately 36 avian species in the project area (Appendix G – SES 2009aa). These birds included several species considered as California species of special concern or BLM sensitive. These include loggerhead shrike, Le Conte's thrasher (*Toxostoma lecontei*), Bendire's thrasher, burrowing owl, golden eagle, and Swainson's hawk. Golden eagle is a State fully protected species and Swainson's hawk is State listed. Impacts to burrowing owl, golden eagle, and Swainson's hawks are discussed further below.

Although not observed by the applicant, several other species have a moderate to high potential to occur on site including prairie falcon (*Falco mexicanus*) and black-tailed gnatcatcher (*Polioptila melanura*). Both prairie falcon and golden eagle likely nest within the Cady Mountains and utilize the project site for foraging to some degree.

In review of the applicant's Biological Technical Report (SES 2009aa) staff noted that wintering bird surveys were not conducted. Further, the applicant did not provide any discussion for a variety of bird species staff considers to have a moderate to high potential for occurrence in the project area. Wintering species, such as merlins, sharp-shinned hawks, and ferruginous hawks, may utilize the project site for foraging. Staff also noted during a site visit conducted in January 2010 that windrows of salt cedar that border the BNSF Railroad support potential nesting spots for a variety of birds. However, it is recognized that the heavy rail traffic on this line may limit the use of the windrow by less disturbance tolerant species.

During this reconnaissance a single stick nest was observed in the tamarisk windrow along the BNSF railroad. This nest showed signs of both raven and owl use. While the species of owl was not determined it is possible the nest was used by a great horned owl, a species known to occur in the region. In some areas it is not uncommon for an early nesting species such as a great horned owl to use a nest, hatch and fledge chicks, and then depart the nest in time to allow other later breeding species such as ravens to occupy the site. These windrows also provide suitable habitat for long-eared owl (*Asio otus*). While more typically associated with riparian areas this species has been recorded in more arid regions. Nest sites for common species including mourning dove were noted under the railroad trestles. Initial results from the 2010 helicopter surveys conducted by the applicant indicate that at least 16 raptor nests were identified within a 10-mile radius of the project site, two of which contained incubating golden eagles. Direct impacts to nesting birds or raptors would include the removal or disturbance of vegetation that supports nesting birds, increased noise levels from heavy equipment and the SunCatcher engines, increased human presence, and exposure to fugitive dust. Because of the large size of the project, direct effects would include the loss of foraging habitat. Indirect impacts could include the loss of habitat due to the colonization of invasive plants and a disruption of breeding or foraging activity due to facility maintenance. Weed abatement, mirror washing, and maintenance of the storm water system would likely limit the use of some areas as foraging habitat. Glare from the solar panels and the use of evaporation ponds may also adversely affect bird’s use of the site. In addition, noise and lighting effects have been demonstrated to adversely affect behavior, reproduction, and increase the risk of predation. A detailed discussion of glare, evaporation ponds, noise, and lighting effects are described below for all birds.

Construction of the Calico Solar facility would require large scale land disturbance within the 8,230 acres site. Although the applicant would leave 75-foot swaths of native vegetation relatively undisturbed between the SunCatchers the remaining habitat would require mowing to a minimum height of 3-inches. In addition, construction of the pads, roadways, storm water system, debris basins, and various facilities would result in the removal of potential nesting habitat.

With the exception of a few non-native birds such as European starling, the loss of active bird nests or young is regulated by the federal Migratory Bird Treaty Act (MBTA) and Fish and Game Code Section 3503. The applicant has proposed mitigation measures to avoid and minimize impacts to nesting birds that have been incorporated into staff’s proposed Condition of Certification **BIO-19**. This measure includes removing vegetation outside the breeding season, pre-construction nesting surveys, and the establishment of 500-foot buffers around active nests. Staff concurs with the approach proposed by the applicant but considers it difficult to achieve due to the extended (i.e., four-year) construction schedule, scale of the project (i.e., 8,230 acres), and the numerous common birds expected to nest within the area prior to and during construction. Staff considers it highly unlikely that nesting birds could be completely avoided if clearing and grubbing occur during the nesting season.

As described above, the construction and maintenance activities associated with the project are expected to exclude some species of birds that are less tolerant of anthropogenic disturbance. However, some species of birds will likely nest in the project area both during construction and operation of the facility. Depending on the species, birds may actively nest on the ground close to equipment, within the open metal framework of the SunCatchers, or on idle construction equipment. For example, staff has observed recent nesting activity at several large electrical transmission line projects currently underway in the western Mojave Desert. In these locations birds nested on vehicles, foundations, construction trailers, and other equipment left overnight or during a long weekend. In areas where construction was phased (i.e., footings, or tower structures) birds quickly utilized these features as nest sites. While many of the birds consisted of common ravens, house finches, and doves, these species are protected by the MBTA and relevant Fish and Game codes. Destruction of these nests would require permits from the USFWS and CDFG. Staff considers that the likelihood of encountering nesting birds either within the 500-foot disturbance buffer proposed by the applicant or on vehicles and equipment to be high. Therefore, staff recommends that to avoid impacts to nesting birds, preconstruction surveys of the work area shall be conducted if work is to occur during the breeding season. If active nests are detected during the survey, a 500 foot no-disturbance buffer zone shall be implemented (Condition of Certification **BIO-19**). Implementation of staff's proposed conditions of certification would avoid direct impacts to nests, eggs, or young of migratory birds and would reduce the impacts of construction disturbance to nesting birds to less than significant levels under CEQA.

While staff has proposed Condition of Certification **BIO-19** to reduce or minimize impacts to nesting birds, the scale of the project and the known nesting behaviors of some native birds increases the likelihood that the project would require the removal or relocation of active nests in order to proceed with construction or operate the facility. To comply with the legal requirements under the MBTA and Fish and Game codes, staff has proposed as part of the condition that the applicant coordinate with staff, the CDFG, and USFWS to be certain that this work is conducted properly. Similarly, staff has provided language in proposed Condition of Certification **BIO-19** that would allow certain construction activities to occur closer than 500 feet of active nests with approval of staff, CDFG, and USFWS. The ability to work closer than the proposed 500-foot buffer would depend on the species, stage of development of chicks within the nest, proposed construction activity, and biological response of the animal.

Operational impacts are expected to remain an ongoing source of disturbance to nesting birds. As described above operation of the facility would likely result in disturbance to both ground nesting birds and possible to birds actively nesting on the structures.

Species that utilize the project site for foraging but not nesting, such as golden eagle and prairie falcon, and wintering birds such as merlins, sharp-shinned hawks, and ferruginous hawks would not be directly affected; however, the loss of foraging habitat would be considered significant absent mitigation. Overall the loss of foraging habitat for these special-status bird species would add to the cumulative, significant loss of habitat for these species within the region. Implementation of staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan for desert tortoise, would reduce this habitat loss by the preservation of similar foraging areas.

Swainson's Hawk

Two Swainson's hawks were observed by the applicant overflying the project area on March 30, 2008. Based on the timing of the surveys it is possible these birds were a nesting pair. However, there are no recent observations of this species nesting in the project region and generally the project area does not support nesting habitat for this species. With the exception of the windrow of salt cedar that occurs along the BNSF railroad track and existing transmission towers, nesting trees are not present on the project site. While this species is more commonly associated with large nest trees in the San Joaquin Valley, this species has been documented nesting in Joshua trees in the Antelope Valley.

During a public meeting conducted on December 10, 2009 staff requested information from the applicant regarding potential nesting sites on the or near the proposed Calico Solar Facility. The applicant indicated that these species do not nest in southern California and nesting trees were not present on the site. Information proposed in the Biological Technical Report also indicated that the Swainson's hawk breeding range in California is limited to the northern portion of the state (SES 2009aa). Staff agrees that the project area does not appear to support preferred nesting habitat for this species and the agricultural lands in Daggett do not support extensive nest trees. However, this species is known to nest in the Antelope Valley and historical records (1970s) for this species have been documented as far as the Ivanpah Valley (Bloom 2010). Nonetheless there does not appear to be any known nesting of this species in the project area. As of February 2010 the applicant has been conducting nesting surveys for golden eagles and burrowing owls. No additional observations of Swainson's hawks have been made. Implementation of the proposed project is not expected to result in the loss of Swainson's hawks or their nests, but it would contribute to the ongoing loss of foraging habitat. While this species is more closely associated with agricultural lands that support large microtene (i.e., rodent) populations the CDFG considers suitable foraging habitat to include creosote bush scrub. Implementation of staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan for desert tortoise, would reduce this habitat loss for this species by the preservation of similar foraging areas.

Golden Eagle

Golden eagles were observed by the applicant during the 2007 and 2008 survey season (SES 2009aa). Nest sites or breeding activity was not observed and the project site does not support nesting habitat. Information presented in the applicant's AFC did not consider potential project impacts to this species, nor was mitigation presented for consideration. In response to requests from staff, CDFG, and USFWS, the applicant conducted a literature review and reconnaissance level survey within a 1-mile radius of the project site. After additional coordination with the USFWS the applicant extended the survey area to include a 10-mile radius of the project area. This included a helicopter survey to document nest sites within the Cady Mountains and adjacent areas. Initial data indicated that there are three nest sites within a 5-mile radius and three nests within a 10-mile radius of the proposed Calico Solar project site. Initial results from the 2010 helicopter surveys indicate that at least 16 raptor nests were identified within a 10-mile radius of the project site, two of which contained incubating golden eagles. As further information regarding potential nest sites becomes available, the data will be incorporated into the SSA/FEIS.

Direct impacts to golden eagles could occur through the loss of or disruption of foraging habitat, noise, construction activities and human disturbance or collision with SunCatchers. Because this species commences nest building prior to most other birds disruption of nest building or the abandonment of existing nest sites could occur should eagles nest within 1 mile of the project site. This species is sensitive to human encroachment and if nests are disturbed by humans, nest abandonment will typically occur (Thelander 1974). Staff inspected the foothills of the Cady Mountains and reviewed aerial photography to evaluate potential nest sites for this species. Numerous shallow caves, ledges, and rocky outcrops are present within 1 mile of the northern project boundary where construction activities including the construction of retention basins would occur. Should construction occur when golden eagles are present these activities may result in the disruption of nest building or the abandonment of existing nest sites.

Golden eagles avoid developed areas, and eagle populations in California have declined during the past century due to a decrease in open habitats (Grinnell and Miller 1944). The development of the 8,230 acre project site will result in substantial loss of foraging habitat for this species. While it is possible that this species may forage between the arrays of SunCatchers; staff considers that the large number of structures coupled with the presence of maintenance staff will likely preclude foraging within the Calico Solar project site. Should foraging occur within the SunCatcher arrays this action could also lead to collision or electrocution. Collision and electrocution are discussed further below.

Indirect effects to golden eagles could result from a disruption of normal foraging activity through the use of the facility and the subsequent increase in human activities required to maintain and wash the SunCatchers. Degradation and alteration of habitat adjacent to the project from construction activities could preclude use of the area by golden eagles for up to four years. Similarly, golden eagles are not expected to forage within the project area once the project is complete. These impacts would be considered significant absent mitigation under CEQA.

The applicant has not provided specific mitigation to avoid impacts to golden eagles or to mitigate the loss of foraging habitat. To avoid potential impacts to nesting birds, the applicant has proposed conducting pre-construction surveys on the plant site and along all linear facilities. Staff does not consider this species to have a potential to nest on site but nesting habitat occurs within 1 mile of the project in the adjacent Cady Mountains and along the existing transmission structures.

In order to avoid impacts to golden eagle, staff has developed the proposed Conditions of Certification **BIO-20** and **BIO-21**. Condition of Certification **BIO-20** requires focused nest surveys within 1 mile of project activities and if nests are identified, the project owner would establish a disturbance-free buffer around the nest. No construction activities would be authorized within the 0.5-mile buffer pending the successful fledging of the nest. **BIO-21** requires documentation of compliance with the Bald and Golden Eagle Act (described below). The overall loss of foraging habitat for this species would add to the cumulative, significant loss of habitat that is occurring within the region. Implementation of staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan for desert tortoise, would reduce this habitat loss by the preservation of similar foraging areas.

The USFWS is the primary federal authority charged with the management of golden eagles in the United States. A permit for take of golden eagles, including take from disturbance such as loss of foraging habitat, may be required for this project. USFWS guidance on the applicability of current Eagle Act statutes and mitigation is currently under review. On November 10, 2009 the U.S. Fish and Wildlife Service (USFWS) implemented new rules (74 FR 46835) governing the "take" of golden and bald eagles. The new rules were released under the existing Bald and Golden Eagle Act which has been the primary regulation protection unlisted eagle populations since 1940. All activities that may disturb or incidentally take an eagle or its nest as a result of an otherwise legal activity must be permitted by the USFWS under this act. The definition of disturb (72 FR 31132) includes interfering with normal breeding, feeding, or sheltering behavior to the degree that it causes or is likely to cause decreased productivity or nest abandonment. Because large-scale solar projects would result in the loss of large amounts of golden eagle foraging habitat, there are concerns about the cumulative impacts to golden eagles resulting from loss of foraging habitat. Staff is awaiting guidance from USFWS on this subject as to whether an Eagle Act permit would be required for this and other renewable energy projects. If a permit is required, due to the current uncertainty on the status of golden eagle populations in western United States, it is expected permits would only be issued for safety emergencies or if conservation measures implemented in accordance with a permit would result in a reduction of ongoing take or a net take of zero (USFWS 2009a).

Because golden eagles are known to nest within 5 miles of the project site and have been observed foraging over the project area, the large-scale land use conversion for the Calico Solar project would in essence remove approximately 8,230 acres of foraging habitat for this species. The USFWS may consider this loss to substantially interfere with normal breeding, feeding, or sheltering behavior that would be considered a take. Under the new regulation, the USFWS would require applicants to obtain take for the golden eagles. The take would only be authorized for the incidental loss of birds from contact with facility structures, evaporation ponds or habitat loss. The permit would not be intended to allow the removal or disturbance of active nests.

While staff has proposed Condition of Certification **BIO-21**, this condition will likely require substantial revision or may not be required pending the outcome of ongoing discussions with USFWS staff. Although the federal government may issue a take permit for this species, the direct take of golden eagles would not be authorized by the CDFG. This species is designated as "fully protected" (California Fish & Game Code §§ 3511) and may not be taken or possessed. The USFWS has also raised concerns regarding potential collision threats associated with solar and renewable technologies. To address potential collision concerns (discussed below under operational effects) staff has proposed Conditions of Certification **BIO-23** (Monitoring Bird Impacts from Solar

Technology). This requires a monitoring and reporting program that would document and report potential collision mortality from the proposed solar fields.

In summary, the implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-9, BIO-20, BIO-21,** and **BIO-23** which include worker training, implementation of Best Management Practices, pre-construction surveys, biological monitoring, and potential take authorization would be expected to reduce potential impacts to golden eagles to less-than-significant levels under CEQA, and the project would be compliance with the California Department of Fish and Game's provision for no take of the State Fully Protected Species under Section 3511 of California's Fish and Game Code.

Burrowing Owl

Implementation of the proposed Calico Solar project would result in impacts to at least two burrowing owls. A burrowing owl was identified on the Calico Solar project site and the adjacent ACEC during surveys conducted for desert tortoises in 2008. Active burrows or their sign were not detected during the surveys, nor has the applicant been able to determine the breeding status of the species on the project site. Owls were not detected in 2007 although protocol surveys for the species were not conducted. Surveys for owls were not conducted in 2009.

In a staff workshop conducted on December 10, 2009 staff and CDFG indicated that protocol surveys for burrowing owl would be required in order to evaluate impacts to the species under CEQA. Based on a field inspection of the project area in January 2010 staff considers it likely that burrowing owls could occur throughout the project site. Numerous burrows that could support this species were noted by staff along the existing pipeline right-of-way; however, owl sign was not detected at the burrows inspected by staff. Nonetheless, considering the observation of owls by the applicant, the known range of the species, the presence of foraging habitat, and access to existing burrows, staff believes that owls could occur within the proposed Calico Solar site.

In response to staff's concerns, the applicant commenced focused owl surveys of the Calico Solar site in late January 2010. Inclement weather at the project site further delayed the initiation of surveys by the applicant. Depending on the existing conditions (i.e., recent rainfall, wind, rain, and cold temperatures) the ability to detect active burrows can be reduced. Preliminary data provided by the applicant in an email to staff on February 12, 2010 indicated that two burrowing owls were observed on the project site, as well as eleven active burrows. At the time of the surveys it was not possible to determine if the birds were breeding and eggs were not observed when the applicant completed fiber optic observation of the burrow sites. Therefore it is not possible to determine their breeding status for this SA/DEIS, nor the number of owls that use the site for breeding. Staff is considering the fact that the applicant has not repeatedly detected owls during other surveys whereas incidental tortoise observations were noted during surveys for rare plants. Based on these anecdotal observations and the recent surveys completed by the applicant, burrowing owls are expected to occur on the site in low densities.

Construction of the proposed Calico Solar facility would affect foraging and breeding habitat for this species. The potential effects of the project to burrowing owls depend on many factors including the number of owls present in the project footprint and how the species utilizes the area (i.e., migratory stopover, year round, breeding, or wintering). Impacts from construction would be greater if the owls use the site year round or for breeding. While wintering birds would be adversely affected, displacement of any individuals could likely be mitigated.

Direct impacts to burrowing owls would include the crushing of burrows, removal or disturbance of vegetation, increased noise levels from heavy equipment and the SunCatcher engines, increased human presence, and exposure to fugitive dust. Indirect impacts could include the loss of habitat due to the colonization of noxious weeds, plant community shifts associated with the maintenance, long term human presence associated with the four-year construction schedule, mowing of existing vegetation and the degradation of foraging. Operational impacts include increased human presence from maintenance personnel that would flush or otherwise disturb burrowing owls, invasive plant control activities, exposure to high salinity levels at the evaporation basins, and vehicular use of access roads.

If burrowing owls are present within or adjacent to a construction zone, disturbance could destroy occupied burrows or cause the owls to abandon burrows. Construction during the breeding season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to nest abandonment. The loss of occupied burrowing owl habitat (habitat known to have been occupied by owls during the nesting season within the past three years) or reductions in the number of this rare species, either directly or indirectly through nest abandonment or reproductive suppression, would constitute a significant impact absent mitigation. Furthermore, burrowing owls and their nests are protected under both federal and State laws and regulations, including the Migratory Bird Treaty Act and California Fish and Game Code Section 3503.5.

To avoid potential impacts to burrowing owls that might be nesting or residing within burrows in the project impact area, the applicant has proposed conducting pre-construction surveys on the plant site using established protocols (SES 2009aa). If present the applicant proposes to passively displace the owls and construct replacement burrows in the ACEC located east of the project site. In addition, the applicant has proposed general avoidance measures for nesting birds which require avoidance during the breeding season.

As described above, the strategy for displacing owls depends greatly on how the owls are using the site, their number, and the timing of construction activities. Because project construction would occur for up to four years and result in the land use conversion of approximately 8,000 acres of habitat, passive relocation may result in the repeated harassment of resident owls. While construction of replacement burrows in off-site areas would be considered to have some potential benefits to the species, it is likely that owls would occupy areas close to known territories. Because of the timeframe this could require multiple passive relocation events. Each of these events stresses the bird and exposes the owls to predation, thermal stress, and potential territorial disputes.

There is much debate among State, federal, local, and private entities over the most practicable and successful relocation/translocation methods for burrowing owl. When passive relocation is used solely as an impact avoidance measure, it is generally only effective when burrowing owl nesting territories are directly adjacent to permanently protected lands (i.e., military reservation, airport, wildlife reserve, agricultural reserve with appropriate crop type such as alfalfa) (Bloom 2003). Conversely active translocation of owls involves trapping owls, temporarily holding them in enclosures with supplemental feeding, and releasing at a suitable off-site location with existing or artificial burrows prior to breeding.

While active translocation might be a better solution than passive relocation for removing owls from large sites like the Calico Solar Project site, California Fish and Game Code Section 3503.3 prohibits the active relocation of burrowing owls.

Staff has reviewed the applicant's proposed mitigation and has recommended additional measures to reduce impacts to burrowing owls. Staff has incorporated them into staff's proposed Condition of Certification **BIO-22**. Burrowing owls can tolerate some level of human activity and it may be possible that some owls will remain or colonize areas within the Calico Solar project footprint following construction. However, the expected noise levels associated with the SunCatcher engines may preclude use of the project site. In addition, it is unknown to what extent owls currently use the existing site and whether owls would use the site post construction. Condition **BIO-22** prescribes that the applicant must establish the breeding status of the owls on-site and, depending on how owls use the site, structure the relocation events to accommodate the full life cycle of the species. For example, if owl burrows can be left intact and adequate buffers maintained for wintering birds, staff and CDFG recommend leaving the animals in place. However, staff, CDFG, and USFWS recommend that should it become necessary to destroy an occupied burrow, or if breeding is occurring on the site, the applicant would implement a passive relocation plan, construct artificial burrows, and acquire compensatory lands consistent with the California Burrowing Owl Consortium (CBOC 1993) guidelines to offset the loss of foraging habitat.

Implementation of staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan for desert tortoise, could offset this habitat loss by the preservation of similar plant communities. However, there are many areas in the Mojave Desert where tortoise and burrowing owls do not co-occur. With implementation of these conditions, potential impacts to burrowing owls would remain adverse but would be considered to be mitigated to less-than-significant under CEQA.

Noise

Construction noise may affect birds in several ways, including annoyance which causes birds to abandon nests that are otherwise suitable; raise the level of stress hormones, interfering with sleep and other activities; cause permanent injury to the auditory system; and interfere with acoustic communication by masking important sounds or sound components (Dooling 2006). Many bird species rely on vocalizations during the breeding season to attract a mate within their territory, and noise from construction could disturb nesting birds and other wildlife and adversely affect nesting and other activities. Golden eagles, for example, are highly susceptible to disturbance from noise and may abandon nests if disturbed. Other avian taxa may respond similarly. In general, 60 dBA Leq hourly is considered the threshold for disturbance for many bird species, but some species are less sensitive.

Construction could affect wildlife in adjacent habitats by interfering with breeding or foraging activities and movement patterns, causing animals to temporarily avoid areas adjacent to the construction zone. This could disrupt foraging, breeding, sheltering, and other activities. Nocturnal (i.e., active at night) wildlife would be affected less by construction than diurnal (i.e., active during the day) species since construction would occur primarily during daylight hours. However, construction may also occur during dusk, dawn, or nighttime, and if this occurs, impacts to nocturnal and crepuscular (i.e., active at dawn and dusk) species would be similar to impacts described for diurnal species. More mobile species like birds and larger mammals are expected to disperse into adjacent habitat areas during the land clearing and grading phases associated with tower construction and road construction and widening. For example, noise and human presence are likely to adversely affect bighorn sheep which are expected to avoid the lower foothills during construction of the proposed project.

Noise from construction activities could also temporarily discourage wildlife from foraging and nesting immediately adjacent to the project area. As discussed in the **Noise** section of the AFC (SES 2008), a maximum noise level of 75 dBA Ldn is estimated to occur at a distance of 50 feet from the acoustic center of the construction activity (most often the power block) and attenuate to 40 dBA Ldn or less at project site boundaries. Assuming that construction noise for this project would be relatively constant, the 40 dBA Ldn estimated at the site boundaries for construction noise would be similar to levels of ambient noise.

The loudest noise likely to occur during construction of the Calico Solar Project would be created by the operation of construction equipment. Depending on the type of equipment used, the noise produced can vary from 77 dBA to 90 dBA at 50 feet. Staff concludes that noise impacts to nesting birds and other wildlife would be mitigated through implementation of Conditions of Certification **BIO-1** through **BIO-9** and **BIO-19**. These measures contain language regarding the reduction of noise adjacent to nesting birds. For example, if the noise meets or exceeds the 60 dBA Leq threshold, or if the biologist determines that the construction activities are disturbing nesting activities, the biologist shall have the authority to halt the construction and shall devise methods to reduce the noise and/or disturbance in the vicinity. This may include methods such as, but not limited to, turning off vehicle engines and other equipment whenever possible to reduce noise, installing a protective noise barrier between the nest site and the construction activities, and working in other areas until the young have fledged.

If noise levels still exceed 60 dBA Leq hourly at the edge of nesting territories and/or a no-construction buffer cannot be maintained, construction shall be deferred in that area until the nestlings have fledged. All active nests shall be monitored on a weekly basis until the nestlings fledge. Similarly, should bighorn sheep be present within 1000 feet of the proposed project and noise levels at the project fence line exceed 60 dBA Leq the work will halt until the sheep move out of the project area.

The impact of operational noise on surrounding wildlife is expected to be a constant source of disturbance and would likely preclude use of the adjacent area to some degree. Operation of the SunCatcher units will result in noise levels generally considered to exceed the levels acceptable to most wildlife. As described above for common wildlife, each of the SunCatcher units generates noise levels of 84 dBA Leq at approximately 50 feet. At 850 feet this level remains at 60 dBA. These levels would be expected to limit, and in some cases preclude, the use of habitat adjacent to the project site.

Bird Collisions and Electrocution

Birds are known to collide with communications towers, transmission lines, and other elevated structures. Estimates of the number of bird fatalities specifically attributable to interactions with utility structures vary considerably. Nationwide, it is estimated that hundreds of thousands to as many as 175 million birds are lost annually to fatal collisions with transmission and distribution lines (Erickson et al. 2001). In California, even general estimates are unavailable, although it is plausible that such collisions result in the deaths of hundreds of thousands of birds each year (Hunting 2002).

Solar facilities, including large scale complexes such as the 8,230 acre Calico Solar facility, present a new and relatively un-researched risk for bird collisions and other injuries. The primary threats to collision on the project site include the main SunCatcher assembly building (78 feet) main services complex (44 feet), SunCatcher units (40 feet), and required transmission line facilities (90-110 feet). The SunCatchers at the Calico Solar Project plant site would likely pose some collision risk to birds. Depending on the time of day, use of the site by various species, and glare, it is possible that birds will collide with the structures. Bird fatality studies conducted at the existing Solar One facility near Daggett, west of the Calico Solar project site, indicated that much of the bird mortality consisted predominantly of collisions with mirrors, in large part resulting from increased numbers of birds attracted to the adjacent evaporation ponds and agricultural fields (McCrary et al. 1986). While the proposed Calico Solar facility is not located adjacent to agricultural fields the use of evaporation ponds and the reflection of the SunCatchers may attract various species of birds. The Calico Solar Project would also require the construction of approximately 12 to 15 new 220 kV transmission line structures which are approximately 90 to 110 feet tall (SES 2008).

Avian interactions with transmission lines and structures and the risks those interactions impose vary greatly by location within the proposed project. Bird collisions with power lines generally occur when a power line or other aerial structure transects a daily flight path used by a concentration of birds, or migrants are traveling at reduced altitudes and encounter tall structures in their path (Brown 1993). Collisions are more probable near wetlands, valleys that are bisected by power lines, and within narrow passes where power lines run perpendicular to flight paths. Passerines (e.g., songbirds) and waterfowl (e.g., ducks) are known to collide with wires (APLIC 2006), particularly during nocturnal migrations or poor weather conditions (Avery et al. 1978).

Staff has concluded that the risk of such impacts is probably low, although very little research has been conducted on the risks of bird collisions at solar facilities.

Although staff does not consider it likely that mirrors and other structures within the project disturbance area pose a significant collision risk to resident or migratory birds at the project site, there is insufficient information available to conclude with certainty that the Calico Solar Project would not be an ongoing source of mortality to birds for the life of the project. Given the lack of research-based data on the impacts of glare and collision threats to birds, staff's proposed Condition of Certification **BIO-23**, Monitoring Bird Impacts from Solar Technology, would provide the information needed to implement adaptive management measures to mitigate bird collision impacts. If the SunCatchers are posing a collision risk for birds, the applicant shall implement measures that may include the placement of bird diverters, aerial markers, or other units to minimize potential collision risks for birds.

Power line electrocutions result in the losses of tens to hundreds of thousands of birds annually in the United States (Erickson et al. 2001). In the project area, golden eagles, red-tailed hawks, and other large aerial perching birds are susceptible to electrocution on power lines because of their large size, distribution, and proclivity to perch on tall structures that offer views of potential prey. Electrocution occurs when a perching bird simultaneously contacts two energized phase conductors or an energized conductor and grounded hardware. This happens most frequently when a bird attempts to perch on a transmission tower/pole with insufficient clearance between these elements. Electrocution can occur when horizontal separation is less than the wrist-to-wrist (flesh-to-flesh) distance of a bird's wingspan or where vertical separation is less than a bird's length from head-to-foot. Electrocution can also occur when birds perched side-by-side span the distance between these elements (APLIC 2006).

The proposed transmission line from the energy collection facilities to the Pisgah Substation would be energized at 220-kV, which poses a low risk for most avian electrocutions. The majority of raptor electrocutions are caused by lines that are energized at voltage levels between 1-kV and 69-kV, and "the likelihood of electrocutions occurring at voltages greater than 69-kV is extremely low" (APLIC 2006). In addition, the applicant has proposed constructing the line in accordance with the *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (APLIC 2006). As such, staff's proposed Condition of Certification **BIO-8** requires transmission lines and all electrical components to be designed, installed, and maintained in accordance with the Avian Power Line Interaction Committee's (APLIC's) *Suggested Practices for Avian Protection on Power Lines* (APLIC 2006) and *Mitigating Bird Collisions with Power Lines* (APLIC 2004) to reduce the likelihood of large bird electrocutions and collisions. With the proposed mitigation addressed in staff's proposed Condition of Certification **BIO-8**, staff concludes that the proposed transmission lines would not pose a significant threat to birds.

Glare

Glare from the reflection of sunlight off the SunCatcher units is another factor that may contribute to the risk of avian collision on the project site. To date little is known regarding the avian response to glare from solar technology. However, it is likely that glare will affect birds to some degree. In the same way that large mirrored buildings may be confused by birds as open sky; the mirrors will reflect light and take on the color of the image being reflected. This may result in birds confusing the SunCatchers as either open sky or water and increase the collision risk. The AFC indicated that studies of military overflights did not detect significant glare from existing solar facilities; however the sites are anticipated to be similar to a body of water (SES 2008). Another factor that must be considered is how reflected light may result in damage to a bird's vision from direct exposure to high levels of photon flux density (PFD). Exposure to high intensity light or glare can damage vision and impair foraging in some species. The proposed solar mirrors and heat collection elements are sources of bright light caused from the diffuse reflection of the sun. The SunCatchers are designed so that sun rays from the mirrors would be reflected directly at the receiver and not at surrounding viewers or overhead (SES 2008). However, glint and glare studies of solar trough technology found that pedestrians standing within 20 meters (60 feet) of the perimeter fence when the mirrors rotate from the stowed position to a vertical position may see a light intensity equal to or greater than levels considered safe for the human retina (URS 2008). Staff concludes that any wildlife on the ground at a distance of 20 meters (66 feet) or closer could experience similar hazards from unsafe light intensity.

Bird response to glare from the proposed SunCatcher technology is not well understood. Given the lack of research-based data on these impacts, staff cannot conclude that they are significant. However, due to potential for significant impacts, staff recommends monitoring so that if impacts do occur, they can be addressed (refer to Condition of Certification **BIO-23** [Monitoring Impacts of Solar Technology on Birds]).

Lighting

Lighting may affect essential behavioral activities, physiology, population ecology, and ecosystems of diurnal, crepuscular, and nocturnal wildlife, and ecological light pollution may affect competition and predation for some species (Longcore and Rich 2004). Lighting may also increase the risk of predation of wildlife because they may be more detectable to nocturnal predators (USACE and CDFG 2009). Many insects are drawn to lights, and species that prey on insects, such as bats, may be attracted to lighted construction areas which would increase the potential for disturbance and mortality. However, studies have indicated that many small species, such as rodents, rabbits, snakes, and bats, actually forage at lower rates at high illumination levels (Longcore and Rich 2004), which may be a biological adaptation to high levels of moonlight. Overall, chronic ecological light pollution may favor light-tolerant species over those that are dark-adapted (Longcore and Rich 2004).

For avian species lighting plays a significant role in collision risk with tall towers because lights can attract nocturnal migrant songbirds, and major bird kill events have been reported at lighted communications towers (Manville 2001), with most kills from towers higher than 300 to 500 feet (Kerlinger 2004). Increased lighting during low-light periods can cause some species to leave the area and can disrupt foraging, breeding, or other activities. Lighting may disturb the nighttime rest and sleep periods of diurnal species, including most passerine birds, having similar effects as noise, including annoying individuals and causing them to abandon nests that are otherwise perfectly suitable (USACE and CDFG 2009). Nest site selection by some birds may also be affected by light, with nests being established farther from light sources (Longcore and Rich 2004).

The operation of the Calico Solar Project would require on-site nighttime lighting for safety and security, which could disturb nocturnal wildlife. In addition, the large scale maintenance activities would require vehicle and equipment lighting in order to safely clean and service the SunCatchers. To reduce off-site lighting impacts, lighting at the Calico Solar Project facility would be restricted to areas required for safety, security, and operation. Exterior lights would be hooded, and lights would be directed on site so that light or glare would be minimized. Low-pressure sodium lamps and fixtures of a non-glare type would be specified. Switched lighting would be provided for areas where continuous lighting is not required for normal operation, safety, or security; this would allow these areas to remain un-illuminated (dark) most of the time, thereby minimizing the amount of lighting potentially visible off site. These measures are described in staff's proposed Condition of Certification **VIS-2**. With implementation of this measure lighting impacts to wildlife at the Calico Solar Project would be minimized.

Although facility lighting will be shielded it is expected that the project will be operated with a staff of approximately 180 full-time employees. The project will operate 7 days per week, generating electricity during normal daylight hours when the solar energy is available. Maintenance activities will occur 7 days a week, 24 hours a day to ensure SunCatcher availability when solar energy is available. Light from these activities is expected to result in ongoing disturbance to wildlife both within the perimeter fencing and in adjacent habitat.

Lighting may also be required to facilitate nighttime construction activities, which might disrupt the activities and affect behavior of nocturnal wildlife. As discussed in the Visual Resources section, construction lighting must be consistent with worker safety codes, directed toward the center of the construction site, shielded to prevent light from straying offsite, and task-specific. Staff has proposed Condition of Certification **VIS-2** to formalize temporary lighting measures during construction activity and on the laydown area. See staff's **Visual** analysis for more details about staff's proposed Condition of Certification **VIS-2**. With implementation of this measure, construction lighting at the Calico Solar Project would be reduced to less-than-significant levels under CEQA.

Special-Status Mammals

Nelson's Bighorn Sheep

Nelson's bighorn sheep were not observed during the 2007 or 2008 surveys; however, 62 (12 rams, 38 ewes, and 12 lambs) were observed within 10 miles of the project site during golden eagle helicopter surveys conducted in March 2010 in the Cady Mountains. In addition, the project area overlaps with the known occupied year-round use area for the Cady Mountains population of at least 300 Nelson's bighorn sheep (SES 2009aa; DW 2010).

Direct effects to Nelson's bighorn sheep include the loss of approximately 458.5 acres of foraging habitat from the construction of perimeter fencing. Direct effects would also include disturbance from construction activities, noise, and lighting. Construction of the Calico Solar facility will also pose a potential barrier to movement for this species. While little is known regarding the movement of this species in the project area, Nelson's bighorn sheep are known to move from the Cady Mountains to winter ranges in the Bristol Mountains to the east (SES 2009aa – Figure 9.)

Indirect impacts include the degradation of habitat, noise, dust, and lighting. Indirect effects to habitat include an additional 404.5 acres of habitat that occurs within the 1,000-foot buffer of the proposed project. Additional indirect effects include avoidance of areas near manmade structures, increased traffic on desert roads by the public, and the spread of invasive plants.

Operational impacts include the degradation of habitat in adjacent areas due to increased human presence associated with use of new facility, noise, nighttime maintenance activities and SunCatcher washing. Public interest in the new facility may also result in increased road traffic along desert roads.

Water supplies for operation of the project include obtaining water from the BNSF Cadiz well, located approximately 64 miles southeast of the Calico Solar site. Nelson's bighorn sheep are known to occupy the Marble and Ship mountain ranges surrounding the Cadiz Valley, where the well is located, and a movement corridor for this species connects these areas across the valley. However, as discussed in Section C.7 (Hydrology, Water Use, and Water Quality), estimated average annual water use for the proposed project (20 acre-feet per year) is approximately 2.5% of the groundwater basin's annual recharge volume, and the proposed total use over a 30 year project life would be only .01% of the total basin storage. Therefore, the use of water from the BNSF Cadiz well would not deplete groundwater supplies, or cause water shortages that would impact the bighorn sheep in the area.

Portions of the Calico Solar project site provide seasonal forage for Nelson's bighorn sheep on the lower reaches of the Cady Mountains. Construction of the project would reduce the availability of seasonal forage for Nelson's bighorn sheep and expose sheep to human disturbance. The project could also act as a barrier to movement for sheep using the south side of the Cady Mountains or their foothills to traverse to winter ranges in the Bristol Mountains. CDFG has indicated that there is a paucity of solid data documenting the movement of sheep in this area. Because of concerns raised by staff and CDFG, the applicant has agreed to relocate the perimeter fence south of the proposed retention basins. The applicant has also indicated during a staff workshop on December 11, 2009 that the applicant will plant native shrubs around the northern edge of the site (along the basins) to obscure the site from any bighorn sheep that may come down into the foothills north of the site. This may allow sheep to move down into the basins and gain access to additional forage on the slopes of the bajadas.

Staff concurs with the need to revegetate and limit fencing in this area; however, staff remains concerned that human activities may limit use of the site by bighorn sheep. Although the applicant has provided information suggesting that some populations of sheep acclimate to human presence at limestone quarries in the San Bernardino Mountains; there remains numerous published literature suggesting human disturbance is deleterious to bighorn sheep. For example, there is evidence that in some circumstances, sheep may habituate to predictable human activity (Wehausen et al. 1977; Kovach 1979), including highway traffic (Horesji 1976), hiking (Hicks and Elder 1979; Hamilton et al. 1982; Holl and Bleich 1987), and aircraft (Krausman et al. 1998). However, even in otherwise optimum habitat, sheep are known to abandon an area, either temporarily or permanently, when the limit of their tolerance to disturbance is exceeded (Welles and Welles 1961; Light 1971; Wehausen 1980; Papouchis et al. 2001). Even when bighorn appear to be tolerant of a particular activity, continued and frequent use can cause them to avoid an area, eventually interfering with use of resources, such as water, mineral licks, lambing or feeding areas, or use of traditional movement routes. In addition, disturbance can result in physiological responses such as elevated heart rate, even when no behavioral response is discernible. Ewes with kids are especially sensitive to disturbance, and ewes with lambs were detected in the March 2010 golden eagle surveys.

Staff has concluded that construction and operation of the Calico Solar project could reduce foraging opportunities for bighorn on the bajada, and could also constrict the width of corridors between the Cady and Bristol Mountains. Furthermore, it is likely that project construction and operations could affect sheep lambing areas. These direct and indirect impacts would contribute to the cumulative impacts to bighorn sheep in the Mojave Desert. Throughout their range bighorn sheep have suffered considerable population declines in the past 140 years, and metapopulations have been fragmented by roads and other barriers, with a resulting decline in genetic diversity (Bleich et al. 1996; Epps et al. 2005). Disease, sometimes brought about by contacts with domestic sheep, drought, and predation, combined with interactions with other anthropogenic factors, may also have contributed to declines in bighorn sheep populations (Wehausen 2005). Loss of surface water sources may also diminish the viability of existing populations (Wehausen 2005).

Access to water is of critical importance to bighorn sheep. There is an existing guzzler maintained in the Cady Mountains that is currently accessed through the proposed project site. This access will have to be maintained post development. There are no known seeps or springs in the Cady Mountains and potential impacts of the proposed Calico Solar wells would not affect seeps or springs. For additional detail regarding water resources please see Section C.7 (Hydrology, Water Use, and Water Quality).

In order to minimize effects of the project on bighorn sheep, the applicant has proposed the placement of a new water source within the Cady Mountains to draw sheep away from the project site. The applicant has also proposed general monitoring of sheep that occur within 200 feet of construction activities. Staff has incorporated the applicant's proposal into Condition of Certification **BIO-24** and recommended additional measures. This measure would compensate for the project's contributions to cumulative impacts to bighorn sheep by creation of a new water source in the eastern part of the Cady Mountains. This measure would require construction monitoring and the potential cessation of construction activities should sheep be present within 500 feet of the project area. This artificial water source would attract bighorn sheep and expand foraging opportunities in the lower elevations of the mountains north east of the project site and replace areas of the bajada lost to Calico Solar facilities and the zone of disturbance on the north. This water source would also serve to attract the bighorn during seasonal movements and keep them in the mountainous portion of the wildlife corridor where the project would not be visible due to terrain limitations.

In summary, the implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-9** and **BIO-24,** which include worker training, implementation of Best Management Practices, and biological monitoring, would reduce impacts to bighorn sheep to less-than-significant levels under CEQA.

American Badger and Desert Kit Fox

American badgers are present on the Calico Solar Project site and the area supports suitable foraging and denning habitat for this species. Desert kit fox is expected to occur on site and staff identified several burrows and scat that likely belonged to this species. The desert kit fox (*Vulpes macrotis*), while not a special-status species, is protected under Title 14, California Code of Regulations (sections 670.2 and 670.5), and potential impacts to individuals of this species must be avoided.

Direct impacts to American badger and desert kit fox include mechanical crushing of individuals or burrows by vehicles and construction equipment, noise, dust, and loss of habitat. Construction activities could also result in the disturbance of badger maternity dens during the pup-rearing season (15 February to 1 July). Because of the large size of the project, numerous badgers or kit foxes may be affected. For example, depending on prey densities, home ranges of badgers can vary from 338 to 1,549 acres (Ziener et al. 1990). Their distribution in a landscape coincides with the availability of prey, burrowing sites, and mates, with males ranging wider than females during the breeding and summer months (Minta 1993). While home ranges are expected to be larger and badger densities lower in more arid regions, construction of the Calico Solar facility could result in the loss of as many as 24 home ranges if home ranges are small (8,260 acres divided by 338-acre home ranges) to as few as five home ranges if home ranges are large (8,260 acres divided by 1,549-acre home ranges). While badgers near the perimeter of the project may be able to effectively disperse to other areas, the placement of the tortoise exclusion fence is expected to entrap badgers in the project footprint.

Estimates of kit fox home range size vary widely, and population densities fluctuate drastically depending on the availability of food, predation pressures, rainfall, etc. (Zoellick and Smith 1992; White and Garrott 1999; Arjo et al. 2003). In addition, many kit fox home ranges overlap considerably, often by 20% or more (Zoellick and Smith 1992). Therefore, it is difficult to estimate the actual number of desert kit fox that currently occupy the project site. However, desert kit fox and their sign were observed onsite during surveys conducted for the proposed project, and kit fox could be entrapped within the site by the exclusion fence, as described above for badgers.

Indirect impacts to badgers and kit foxes include alteration of soils, such as compaction that could preclude burrowing, alteration in prey base, and the spread of invasive plants. Operational impacts include risk of mortality by vehicle strikes on access roads by maintenance personnel, the spread of invasive plants, and disturbance due to increased human presence.

The applicant has proposed general measures to minimize impacts to badgers. This includes monitoring active dens and collapsing the dens once the animal leaves the site. However, badgers often retreat to burrows when alarmed and without active monitoring of a den it is difficult to ascertain the status of individual burrows. In addition, because the site would be fenced to avoid impacts to desert tortoise (to minimize the need for multiple relocation events) badgers that abandon existing burrows will remain trapped within the project footprint by the tortoise fence. Animals left within the fence will in effect be subject to ongoing long term impacts that may result in mortality from road kill, loss or alteration of foraging habitat, overlapping territories, and barriers to dispersal. Similar effects would be expected for desert kit fox.

Staff considers that avoidance of badgers and kit fox alone is not expected to mitigate the direct, indirect, and operational effects of the Calico Solar Project. Staff's proposed Condition of Certification **BIO-25** requires that prior to ground disturbance, a qualified biologist perform a preconstruction survey for badger and kit fox dens in the project area, including areas within 250 feet of all project facilities, utility corridors, and access roads. If present, the applicant will flag and avoid occupied badger and kit fox dens during ground-disturbing activities and establish a buffer to avoid loss of maternity dens. Should the applicant need to work in an area with occupied badger dens the applicant will slowly excavate the den in accordance with Condition of Certification **BIO-25**. Implementation of **BIO-25** would reduce impacts to the American badger and desert kit fox. Staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan for desert tortoise habitat, would offset the loss of habitat for this species and reduce the impact from habitat loss to less-than-significant levels under CEQA.

Special-Status Bats

The AFC indicated that there was a low to moderate potential for sensitive bat species to occur in the project area. However, specific discussion regarding bats was not included in the AFC. Several bat species are expected to occur in the Calico Solar project area including pallid bat, Townsend's big-eared bat, western mastiff bat, and Yuma myotis. All these species have the potential to forage within the project area, and some bat species utilize large areas for foraging. For example, the pallid bat is capable of flying more than 18 miles, although most foraging occurs within about 2 miles of the diurnal roost (Hermanson and O'Shea 1983).

The rocky mountainous terrain associated with the Cady Mountains, historic mining operations, and the lava tubes at Pisgah crater all support suitable bat roosts and potential hibernaculum. The West Mojave Plan indicates bats are present at Pisgah Crater and a mine shaft was noted along the proposed Phase 2 transmission line route (required to support the complete build out of the project). In addition, staff has noted bat roosts occurring within railroad trestles and bridges; however, bat sign was not detected by staff at any of the trestles in the project area.

The Calico Solar Project is not expected to result in the loss of maternity, day roosts, or hibernacula for sensitive bats. These features are not known to occur on the project site, and while bats will utilize large trees for day roosts, the habitat on the project site (primarily creosote bush scrub and windrows of sparse salt cedar) is not suited for this behavior. Caves, rock crevices, and old mines are likely present within the adjacent Cady Mountains and it may be possible that some areas of the project that support exposed lava formations may have limited potential to support bats.

Direct impacts to bats could include mortality of individuals during construction activities, loss of foraging habitat due to construction of permanent structures (e.g., SunCatchers) or other construction activities, and temporary disturbance during construction (noise, air turbulence, dust, and ground vibrations from construction equipment). Bats that forage near the ground, such as the pallid bat, would also be subject to crushing or disturbance by vehicles driving at dusk, dawn, or during the night. Indirect effects include the loss of foraging habitat due to type conversion, night time lighting that exposes bats to predation, and alteration in prey bases. Bats may ultimately be attracted to project features such as night lighting, evaporation ponds, and retention basins, as these features may attract prey items such as insects.

In general, bats are highly mobile and it is unlikely that construction activities would result in mortality of bats in the project area. Although bats forage in the project area, most activities will occur during daylight hours when the potential for bat interactions is limited. The applicant has not proposed specific avoidance measures for bats and staff considers the likelihood of roosting bats to be low. However, because potential roost sites occur in the project area (i.e., railroad trestles, and rock outcroppings) and bats are known from the nearby Pisgah Craters, staff has developed pre-construction monitoring and impact avoidance measures for bats to reduce impacts to potential hibernacula or day roosts. Staff's proposed Condition of Certification **BIO-26** requires pre-construction surveys, avoidance of maternity colonies, provision of substitute roosting habitat, and exclusion of bats prior to demolition of roosts. Implementation of this condition would reduce project impacts to less-than-significant levels under CEQA.

Impacts to Wildlife Movement Corridors

Recent studies indicate that habitat fragmentation and isolation of natural areas ultimately results in the loss of native species within those communities (Soulé et al. 1988). In the West Mojave desert large areas of the desert have been subject to habitat fragmentation from residential development, agricultural practices (i.e., near Daggett), military land uses (including Fort Irwin, Marine Corps Logistic Base Yermo, and Twentynine Palms); and off highway vehicle use. The amount and distribution of suitable habitat is an essential element to consider for the management of wildlife. For example, some species require, and are often limited to, unique vegetation or terrain features for breeding or foraging such as bighorn sheep, desert tortoise, and Mojave fringe-toed lizard.

On BLM lands, some of the management strategies regarding wildlife include the preservation of ACECs, Wilderness Areas, Wilderness Study Areas, and DWMAs. Federal lands also play an important regional role in maintaining large blocks of wildlands for a variety of uses including the management of wildlife. This includes maintaining diverse habitats of native plant, fish, and animal species and protecting areas that are the only remaining habitat refugia for species imperiled by the loss or degradation of habitat.

Wildlife corridors provide a variety of functions and can include habitat linkages between natural areas; provide greenbelts and refuge systems; and divert wildlife across permanent physical barriers to dispersal such as highways and dams by roadway underpasses and ramps (Haas 2000, Simberloff et al. 1992). Generally, the accepted definition describes a wildlife corridor as a linear habitat, embedded in a dissimilar matrix that connects two or more larger blocks of habitat (Beier and Noss 1998). Noss (1987) also suggests several potential advantages to corridors, including increased species richness and diversity, decreased probability of extinction, maintenance of genetic variation, a greater mix of habitat and successional stages, and alternative refugia from large disturbances.

The Calico Solar Project is located south of the Cady Mountains in a broad alluvial fan that abuts I-40. While the development of infrastructure (i.e., I-40, Route 66, and utility corridors), and military uses (Marine Corps Logistics Base Yermo, Marine Air Combat Center Twentynine Palms) has resulted in habitat fragmentation to some degree in the region; the project area still supports large areas of open space between I-40 and I-15 that are utilized by a variety of sensitive species.

Construction of the proposed Calico Solar facility would result in the land use conversion of approximately 8,230-acres of open space. This includes approximately 2,400-acres of open space between the BNSF Railroad and I-40 and approximately 5,800-acres between the railroad and the Cady Mountains. While the area between the interstate and railroad is somewhat isolated, this parcel still provides suitable habitat and north-south movement for a variety of local species including Mojave fringe-toed lizards and desert tortoise. In addition, although culverts are present, fencing and road traffic on the interstate reduce or hinder the movement for some species in the planning area. Similarly, the existing BNSF railroad limits unrestricted movement between the Interstate and railroad for species such as desert tortoise and Mojave fringe-toed lizards.

The area with the most potential to serve as an east-west linkage and corridor is the remaining lands north of the railroad. Most of this land consists of creosote bush scrub and the topography varies with distance from the Cady Mountains. Because this is an alluvial fan, the terrain near the foothills is more complex and is characterized by numerous drainages, complex topography, and boulder strewn areas. Conversely, areas further from the foothills support more sand dominated soils with gentle topography.

Based on the vegetation, topography and connectivity to other open areas, staff considers the northern portion of the project to support wildlife movement corridors for the species presented in this document and for common mammal, reptile, and avian species. In addition, the applicant identified general movement patterns, corridors, and culverts for desert tortoise and bighorn sheep in the project assessment area (SES 2009aa – Figures 9, 10, and 11). The most prominent feature identified was sheep movement within the adjacent Cady Mountains. Staff is concerned that while sheep movement is expected to occur in the mountainous portions of the project site, the intermountain movement of sheep is not well understood. This species is known to forage in the bajadas near the foothills of the mountains and may move across the flatlands associated with the Calico Solar project. Wehausen (2005) and others (Schwartz et al. 1986; Bleich et al. 1990, 1996) consider intermountain areas of the desert floor that bighorn traverse between mountain ranges as important to the long term viability of populations as the mountain ranges themselves. Construction of the project may obstruct or hinder some of this movement. For other wide ranging mammals including coyotes, badgers, and desert kit fox the project will also pose a barrier but will not completely prevent passage.

For other less motile species such as desert tortoise construction of the Calico Solar Project will hinder north-south and east-west movement. To reduce potential operational effects to desert tortoise the project will be constructed with fencing that prohibits tortoises and other non-avian wildlife from entering the site. This fencing will result in permanent barriers to east-west and north-south movement for the entire 8,230 acre site. East-west movement will remain available along the northern boundary of the project however this area will likely act as a filter or barrier to tortoise movement to some degree. For example, while many of the desert tortoises observed by the applicant were located in the northern portions of the project area, the topography of this area consists of a complex series of steep walled drainages, rock strewn fields, and small hillocks. While tortoises are known to navigate these terrain features the project will pose barriers and filters to the movement of tortoise in the project area. Tortoise observations in this area may be a function of tortoise moving up the bajadas in a north south pattern to access foraging habitat. In consultation with CDFG, USFWS, and staff, the applicant has proposed several design features to reduce corridor and movement concerns along the northern border of the project. This includes relocating the fence to areas below the retention basins, planting vegetation at the fence line, and constructing the retention basins with side slopes that will not preclude the passage of tortoise. Staff concurs with these measures and has included them into Condition of Certifications **BIO-8** and **BIO-9**. However, even with the implementation of these measures staff considers that the project will pose movement constraints to desert tortoise. In addition, because of the required tortoise fencing these measures would not offset impacts to the north-south corridor in this location.

Staff considers impacts to wildlife movement from the construction and operation of the Calico Solar Project power plant site and transmission line to be significant absent mitigation for CEQA. There is no additional mitigation beyond measures identified in staff’s proposed Conditions of Certification **BIO-8** and **BIO-9** that would reduce impacts to wildlife movement from the implementation of the proposed project.

IMPACTS TO WATERS OF THE STATE

Construction of the Calico Solar Project would result in direct and indirect impacts to numerous ephemeral streams and washes that occur within the floodplain of the Cady Mountains and would alter the hydrological, biogeochemical, vegetation and wildlife functions of these drainages. This would result from the construction of the numerous retention basins, detention and sediment basins, and a series of diversion channels required to direct flow into the primary natural drainages on site. Because these structures would attenuate peak flood discharge rates; construction of the Calico Solar project would impact desert wash communities downstream of the project. Of the 1,099 acres of State waters present on the project site construction activities would result in 356 acres of temporary impacts and 258 acres of permanent impacts respectively. In total this would result in direct impacts to 56% of the State jurisdictional drainages on site. Permanent impacts would primarily occur from the placement of facility structures including SunCatcher footings, roads, detention basins, and other project components. Vegetation mowing would occur on a routine basis around the SunCatchers to keep vegetation no more than 4 inches tall. Therefore, impacts to vegetation from mowing are considered permanent as well. With the exception of vegetation mowing the applicant has considered all impacts to State waters as permanent, but staff concludes that mowing would also be a permanent impact to State waters. **Biological Resources Table 4** summarizes the direct and indirect impacts to waters of the State as a result of the Calico Solar Project.

Biological Resources Table 4
Temporary and Permanent Impacts to State Jurisdictional Waters

Impact Type	Permanent in Acres	Temporary in Acres	Number of Features
SunCatcher Support (2 ft diameter)	1	0	34,000
Debris Basins	41	0	10
Detention Basins	37	0	151
Roads/Cabling	155	0	431

Impact Type	Permanent in Acres	Temporary in Acres	Number of Features
Main Services Complex	4	0	1
Substation	2	0	1
Lay Down Area	2	0	2
Roads	17	0	3
Main Access Rd	1	0	2
Mowing*	356	0	589
Total	**258 acres**	**356 acres**	**35,190**

*Impacts associated with mowing are considered permanent, as vegetation would be maintained at 4 inches tall or less.

Direct impacts to State jurisdictional waters would include the removal of native vegetation including some areas more characterized by microphyll woodland, the discharge of fill, degradation of water quality, and the attenuation of peak flood flows which affect sediment transport. Most of these impacts would occur during access road improvements and the development of the projects detention basin and storm water management system. The attenuation of peak storm flows and the subsequent loss of sediment to the system from the detention basins can adversely affect biological resources dependent on these features. Flooding and regular scour is a form of disturbance to which many plant and animal species appear well adapted and is often required to provide suitable nesting or breeding habitat (Busch and Smith 1995). The imposition of artificial stream flows by the attenuation of storm events may affect seedling recruitment at appropriate stream bank elevations, exaggerate drought stress, and increase mortality of seedlings (Mahoney and Rood 1998). In arid systems, this may be particularly important to ensure seedling survival. In addition, the attenuation of flood events may prevent the essential geomorphic disturbance required to create new nursery sites for seedling recruitment while maintaining other areas relatively clear of vegetation within the scour zone that provides habitat for a number of other plant and animal species (Johnson et al. 1976). Non-natural flow regimes may also change the sediment load carried during regular storm events.

Indirect impacts could include alterations to the existing topographical and hydrological conditions and the introduction of non-native, invasive plant species. As described above construction of the project would result in alterations to the existing hydrology and expected sediment transport across the site. Adverse effects on habitat are created as sediment starved water removes fine particulate material from the stream course resulting in stream narrowing, erosion of the streambed and banks, and development of a coarse, boulder-dominated streambed (Mount 1995). This could alter fine sand transport utilized by several species of rare plants and the Mojave fringe-toed lizard. Conversely, uninhibited storm flows carry a natural mixture of boulder, cobble, gravel, sand, and silt materials that are deposited at different intervals within the floodplain reflective of the strength of the most recent flood event. The diversity and episodic nature of streams and streambed materials creates habitat niches within the floodplain for varying wildlife.

Operational impacts would include routine mowing of vegetation, vehicle access, and repair of damaged culverts and roads following large storm events.

The applicant has provided drainage plans that conceptually discuss how flows would be directed from the 10 large detention and the approximately 151 small debris basins into the primary drainage channels that occur on the site (TS 2010a). In addition, the applicant has provided general information regarding the types of project features that would result in permanent and temporary impacts to waters of the State. Currently the applicant proposes to submit additional information to Energy Commission and CDFG clarifying these effects. However, as discussed in the **Soil & Water** analysis, the drainage report does not provide sufficient information to establish the post-project flooding conditions or to determine the potential impacts to vegetation outside the project area. Further, based on the attenuation of storm flows and loss of sediment to the system coupled with the level of maintenance expected to occur on the site, staff and CDFG consider that all 1,099 acres of the ephemeral washes on the project site and portions of the washes downstream of the project boundaries would be adversely affected by the proposed project.

Staff considers direct and indirect impacts of the project to approximately 1,099 acres of State jurisdictional waters to be significant. The ephemeral drainages in the project area provide beneficial functions and values such as groundwater recharge, flood peak attenuation, floodwater storage, and wildlife corridors and habitat. For the proposed project, these functions would be impaired by construction and operation of the project. Staff and CDFG agree that off-site acquisition and enhancement of off-site State waters would mitigate project impacts to waters. For the Calico Solar Project staff and CDFG have proposed a mitigation ratio of 1:1 for permanent impacts to 258 acres and 0.5:1 for temporary impacts to 356 acres due to temporary loss of habitat functions. Staff is not seeking compensatory mitigation for downstream reaches as flows are already attenuated to some degree by the BNSF Railroad and I-40.

The applicant has not yet proposed specific mitigation to reduce impacts to State waters during construction of the proposed Calico Solar Project. However, it is expected that the applicant will submit a formal application to the CDFG that contains Best Management Practices designed to minimize the potential effects to State waters. Because outstanding data requests remain, staff has proposed Condition of Certification **BIO-27**, and has provided additional recommendations and guidance consistent with CDFG Streambed Alteration Agreement requirements. These include the acquisition of offsite habitat and the implementation of Best Management Practices and the replacement of lost smoke tree and catclaw acacia habitats at a 3:1 ratio. It is possible that the applicant could meet these requirements with the implementation of Condition of Certification **BIO-17,** which requires compensatory mitigation lands for desert tortoise. With implementation of staff's proposed Condition of Certification **BIO-27**, impacts to State jurisdictional waters associated with the desert washes would be mitigated to less-than-significant levels under CEQA. This condition also fulfills requirements of CDFG's Lake and Streambed Alteration Agreement program pursuant to Fish and Game Code Section 1600 et seq. Should the project be terminated or cease operation, staff has identified Condition of Certification **BIO-29** (Channel Decommissioning and Reclamation Plan). This measure would be required in order to replace the lost hydrologic function to the numerous small drainages that would be dewatered from the construction of the detention basins. Because the construction of the Calico Solar Project would involve the construction of numerous basins and a series of small diversion channels that direct flow into the primary natural drainages on site, staff would require the applicant to restore flow to the existing channels upon the project's retirement.

OPERATION IMPACTS AND MITIGATION

The operation of the Calico Solar Project would result in long term persistent impacts to biological resources both within the existing perimeter fence and in adjacent habitats. Operational impacts to biological resources include disturbance to common and sensitive wildlife from vehicle traffic; SunCatcher maintenance and washing (i.e., each SunCatcher would be washed approximately every 30 days [ca. 1000 SunCatchers washed every night]); mowing; night time lighting and maintenance activities (i.e., washing and maintenance would occur at night); noise; and collisions with structures. The use of evaporation ponds would also provide subsidies for ravens which can lead to increased tortoise predation. These impacts are discussed below.

Ravens

Common raven populations in some areas of the Mojave Desert have increased 1,500% from 1968 to 1988 in response to expanding human use of the desert (Boarman 2003). Since ravens were scarce in this area prior to 1940, the current level of raven predation on juvenile desert tortoises is considered to be an unnatural occurrence (BLM 1990). Ravens depend on human encroachment to expand into areas where they were previously absent or in low abundance.

Construction and operation of the Calico Solar Project could provide new sources of food, water, and nesting sites that might draw unnaturally high numbers of tortoise predators such as the common raven. In addition, clearing and grading activities result in the exposure of large numbers of fossorial species such as small rodents and reptiles. Many of these species are killed or injured during these activities and attract ravens and other opportunistic predators.

Roads provide a ready source of raven food in the carcasses of small mammals and reptiles that result from vehicle collisions, and increased nesting opportunities are provided by human structures. Road kills would mount from increased vehicle traffic on both facility access roads and I-40 further exacerbating the raven/predator attractions and increasing desert tortoise predation levels. In addition, water is readily available at pastures, sewage ponds, and wildlife guzzlers in and around Daggett (BLM et al. 2005).

The applicant has proposed general measures to reduce potential project impacts from ravens and have recommended the preparation of a Raven Control Plan (SES 2009aa). Staff considers that the construction and operation of the Calico Solar Project would result in new attractants and potential subsidies that might result in changes in raven population or behavior, which could subsequently affect the desert tortoise population in the region through increased predation. To reduce this effect, staff incorporated the recommendations that the applicant proposed, which includes the development and implementation of a Raven Monitoring, Management, and Control Plan for the Calico Solar Project. These measures are described in more detail in staff's proposed Condition of Certification **BIO-18**.

As described in staff's proposed Condition of Certification **BIO-8**, excess ponded water, food waste and other attractants would be controlled to reduce subsidies to ravens. This potential impact would be minimized by using the minimal amount of water needed for dust abatement, by routine trash collection and appropriate storage, and by use of a Biological Monitor to inspect the construction sites and ensure that potential attractants of the common raven are minimized.

Cumulative/Regional Impacts of Ravens

Construction and operation of the Calico Solar Project and subsequent increases in raven predation could contribute incrementally to cumulative impacts to the western Mojave Desert population of desert tortoise. The Calico Solar Project is located in an area supporting desert tortoise and elevated raven predation pressure and any cumulative loss of juvenile tortoise due to the further addition of raven subsidies could have a long-term effect on the regional tortoise population by reducing the recruitment of juvenile tortoises into the adult life stages (Boarman 2003). In addition, due to the long distances ravens are capable of flying, any raven subsidies in the region would contribute to the decline in tortoise populations throughout the western Mojave Desert and may affect the adjacent ACEC or desert tortoise critical habitat. The overall effects of this predation on populations in the region may not be apparent for years because tortoises do not typically reach sexual maturity until approximately 15 to 20 years of age.

The USFWS is currently developing a comprehensive, regional raven management plan that would implement recommendations in the USFWS *Environmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise* (USFWS 2008a). Staff's proposed Condition of Certification **BIO-18** would require the applicant to contribute to this fund. These fees would contribute to a region-wide management and monitoring program in the California Desert Conservation Area. Staff's proposed Condition of Certification **BIO-18** specifies that the applicant complete a final Raven Monitoring, Management, and Control Plan in consultation with staff, CDFG, and USFWS. The in-lieu fee would offset contributions of the project to cumulative impacts associated with regional increases in raven numbers, and the project-specific raven management efforts proposed by the applicant would reduce impacts to desert tortoise from raven predation to less-than-significant levels under CEQA. The in-lieu fee would be used by the USFWS to manage nuisance ravens and implement minimization measures that include public education regarding raven predation on sensitive wildlife.

Other Predators

In addition to ravens, feral dogs have emerged as significant predators of the tortoise. Dogs may range several miles into the desert and have been found digging up and killing desert tortoises (USFWS 1994; Evans 2001). Dogs brought to the project site with visitors may harass, injure, or kill desert tortoises particularly if allowed off leash to roam freely in occupied habitat. Implementation of staff's proposed Condition of Certification **BIO-6**, the Worker Environmental Awareness Program (WEAP), and restrictions on pets being brought to the site (Condition of Certification **BIO-8**), would reduce the potential for these impacts.

Increased Risk from Roads/Traffic

Vehicle traffic would increase as a result of the construction and operation of the Calico Solar Project increasing the risk of injuring or killing desert tortoise and other wildlife. Information provided by the applicant indicated that 1,462 peak construction traffic trips (peak daily round trips) and 248 daily operations trips would occur (SES 2008). In addition, up to 36 delivery trips will arrive and depart throughout the day. As described above for common wildlife the ecological effects of roads include seven general effects that include: mortality from road construction and vehicle collisions; modification of animal behavior; changes to the physical and chemical environment; the spread of invasive plants, and increased human access and use (Trombulak and Frissell 2000). Construction traffic along access and spur roads, particularly in areas used by nesting birds can adversely affect wildlife by disrupting breeding, foraging, and movement. Wildlife species are most vulnerable to disturbances during their breeding seasons and these disturbances could result in nest, roost, or territory abandonment and subsequent reproductive failure if these disturbances were to occur during the breeding season. The use of access roads by construction and maintenance vehicles would result in accidental road-killed wildlife if these species occurred on roads during construction activities. Diurnal reptiles and small mammals such as desert tortoise, Mojave-fringe toed lizards, chuckwallas, badgers, and desert cottontails are the most likely to be subject to vehicle-caused mortality, although few if any wildlife species are immune to vehicle collisions. Coupled with the large size of the project (i.e., approximately 8,230 acres) and the expected vehicle traffic to support operation and maintenance activities the Calico Solar project could result in adverse effects to wildlife. Mortality to wildlife would be expected to occur both within the perimeter fencing and along the proposed access roads including Hector Road and I-40.

To minimize the risks of increased traffic fatality and other hazards associated with roads at the Calico Solar Project site, the applicant has proposed a variety of general minimization measures which staff has incorporated into staff's proposed Condition of Certification **BIO-8**. These measures include confining vehicular traffic to and from the project site to existing routes of travel, prohibiting cross-country vehicle and equipment use outside designated work areas, and imposing a speed limit of 25 miles per hour within the project area, on maintenance roads for linear facilities, and on access roads to the Calico Solar Project site.

Impacts of Evaporation Ponds

The proposed Calico Solar Project includes two 3,000,000-gallon evaporation ponds that would collect wastewater from the reverse osmosis water treatment system (SES 2008). Evaporation ponds would provide a potential perennial water source in an otherwise arid region and act as a subsidy to ravens. Even if they are fenced off from wildlife, evaporation ponds may still attract predators and other species, including waterfowl. Subsidized predators would increase potential project effects to desert tortoise, Mojave fringe-toed lizard, and other less mobile species. In addition, small mammals, waterfowl, shorebirds, and other resident or migratory birds that drink or forage at the ponds would be exposed to potentially lethal doses of hyper-saline water. Monitoring results from the summer of 2007 at Harper Lake Solar Electric Generating System in the Mojave Desert revealed that numerous waterfowl died at the evaporation ponds due to salt toxicosis (Luz 2007). The Harper Lake ponds are similar to those proposed by the Calico Solar Project. Although Harper Lake is near a wetland area, the evaporation ponds and associated risk to birds are a source of significant concern. Another concern is the location of the evaporation ponds near the proposed transmission towers on the project site where attraction to the ponds by birds would increase the possibility of collision.

The applicant has not proposed any specific measures to reduce or avoid impacts of the ponds to wildlife. Existing measures in the AFC indicate the ponds should be unattractive to wildlife and designed to prevent drowning. In addition, initial water quality and bird use monitoring would be conducted. Staff considers potential impacts to wildlife to be significant absent mitigation under CEQA. To reduce these impacts, staff recommends that the applicant cover the ponds with netting or other suitable materials to minimize bird mortality and develop an Evaporation Pond Design, Monitoring, and Management Plan. This plan would incorporate any revisions to pond size or design discussed in the Soil and Water section of the Staff Assessment/Draft Environmental Impact Statement and would require the review and approval by USFWS, CDFG, and staff. The plan would be developed and implemented per guidance in staff's proposed Condition of Certification **BIO-28**. If appropriately designed, implementation of this plan would reduce evaporation pond impacts to birds to less than significant levels under CEQA. The plan will include language specifying the type of netting and fencing to be used, reporting protocols, and remedial actions required in the event of bird mortality.

C.2.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be a 275-MW solar facility located within the central portion of the proposed 850 MW project. It was developed because it can be constructed without upgrading the existing SCE electrical transmission line between the Pisgah and Lugo Substations. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**. All Figures described in this document are present at the end of the section.

C.2.5.1 SETTING AND EXISTING CONDITIONS

The setting for this alternative would include approximately 2,600 acres or 33% of the lands affected by the proposed project. Lands affected by this alternative would be located generally in the center of the proposed project site, and would all be entirely under the jurisdiction of the BLM. This alternative would include 11,000 SunCatchers, or 31% of the SunCatchers that would be installed under the proposed project, and the net generating capacity would be 275 MW. SCE would be able to complete system upgrades within the existing Pisgah Substation, and would not require the 65-mile upgrade to the existing Pisgah-Lugo transmission line. This Alternative would still require the construction of numerous retention basins, detention and sediment basins, and a series of small diversion channels that direct flow into the primary natural drainages on site. As with the proposed project, these structures would attenuate peak flood discharge rates and would impact desert wash communities both within and downstream of the project. Because the footprint of the Reduced Acreage Alternative is located entirely within the footprint of the proposed project, the environmental setting with regard to biological resources would be the same. Please see the discussion of existing conditions under Section C.2.4.1. However, the reduced acreage of this alternative would reduce some impacts to biological resources identified on site, including desert washes, desert tortoise habitat, and some identified populations of rare plants. The footprint of the Reduced Acreage Alternative would also reduce some of the potential conflicts with Nelson's bighorn sheep by avoiding potential foraging habitat and providing greater distance between bighorn sheep and construction/operation activities. Likewise, while barriers to wildlife movement would still remain under this alternative, by moving the footprint away from the foothills the Alternative would reduce barriers to east-west wildlife movement for desert tortoise, Nelson's bighorn sheep, and other species. However, north-south movement would still be constrained by this Alternative.

C.2.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Vegetation Impacts

As discussed in Section C.2.4.2, the proposed project would result in the loss of native vegetation communities. The types of effects to native vegetation communities resulting from this alternative would be similar to the proposed project but less intense in scale and magnitude. Under the Reduced Acreage Alternative the project would result in an approximately 67% reduction in impacts to native vegetation when compared to the proposed project. The Reduced Acreage Alternative would result in impacts to the same general types of vegetation communities as the proposed project with the following exceptions. Areas mapped as desert saltbrush scrub and un-vegetated habitat would be avoided under this alternative, and most of the native vegetation that would be lost would consist of Mojave creosote bush scrub. In addition, because the project would avoid some of the desert washes present in the foothills of the Cady Mountains, habitat supporting vegetation consistent with microphyll woodlands would be reduced. However, the construction of the proposed stormwater management system would still occur and these structures would attenuate flows to the existing onsite drainages. Vegetation that occurs in these areas would remain subject to long-term effects from the modified flow regime.

Staff's proposed conditions of certification would mitigate for the Reduced Acreage Alternative's direct, indirect, and cumulative impacts to vegetation communities. These conditions are identical to those recommended for the proposed project, and include general minimization and avoidance Conditions of Certification **BIO-1** through **BIO-9**. Specific impacts to vegetation communities would be minimized through the implementation of Conditions of Certification **BIO-10** (Revegetation Plan and Compensation for Impacts to Native Vegetation Communities) and **BIO-11** (Weed Management Plan). To address specific construction-related impacts to native vegetation communities and habitat loss, staff has proposed Condition of Certification **BIO-17** (Desert Tortoise Compensatory Mitigation)**.**

Impacts to Special-Status Plants

Nine special-status plant species were detected on site during surveys conducted for the proposed project; however, some of these species were not mapped in the applicant's Biological Resources Technical Report. Of those that were mapped, the Reduced Acreage Alternative would avoid the mapped occurrences of crucifixion thorn and Utah vine milkweed. However, mapped occurrences of small-flowered androstephium and white-margined beardtongue occur within the boundaries of this alternative. In addition, since some of the special-status plants identified in the plant list provided in the Biological Resources Technical Report were not mapped or considered in the report, staff cannot determine whether these species occur within the boundaries of this alternative. Because special-status plants are not distributed uniformly across the project site, impacts would not be proportionally lower, but the extent of impacts would likely be lower for most species because of the reduced footprint. Some special-status species may be avoided altogether, depending on the actual distribution in the area. Therefore, this alternative would still result in impacts to special-status plants similar to the types of impacts described in **Section C.2.4.2**, but the magnitude of the impacts would be lower due to the reduced acreage of the alternative.

Staff's proposed conditions of certification would mitigate for the Reduced Acreage Alternative's direct, indirect, and cumulative impacts to special-status plants. These conditions are identical to those recommended for the proposed project, and include general minimization and avoidance Conditions of Certification **BIO-1** through **BIO-9**. Specific impacts to vegetation communities would be minimized through the implementation of Conditions of Certification **BIO-10** (Revegetation Plan and Compensation for Impacts to Native Vegetation Communities), **BIO-11** (Weed Management Plan), and **BIO-12** (Special-Status Plant Impact Avoidance and Minimization). To address specific construction-related impacts to special-status plants and habitat loss, staff has proposed Condition of Certification **BIO-17** (Desert Tortoise Compensatory Mitigation).

<u>Impacts to Common Wildlife</u>

Common wildlife range widely over the project area and use the site for breeding, foraging, and to support movement. Impacts to common wildlife resulting from the Reduced Acreage Alternative would be similar to the proposed project, but the magnitude and intensity of these impacts would be proportionately reduced due to the 67% decrease in project size. The reduction in acreage would also provide greater access to movement corridors along the foothills of the Cady Mountains. To reduce and minimize effects to common wildlife, the applicant would implement the exact same Conditions of Certification as the proposed project. These include Conditions of Certification **BIO-1** through **BIO-9**. In addition, while specific mitigation for common non-sensitive taxa is not required, the implementation of desert tortoise compensatory mitigation (**BIO-17**) would also benefit common species that inhabit proposed mitigation lands.

<u>Impacts to Special-Status Wildlife</u>

The Reduced Acreage Alternative would result in reduced impacts to a number of special-status wildlife species on the project site, including desert tortoise, Mojave fringe toed-lizard, and bighorn sheep.

Implementation of this alternative would reduce the amount of desert tortoise habitat affected by the proposed project. This alternative would avoid large areas of tortoise habitat that occur near the foothills of the Cady Mountains and would require fewer tortoises to be relocated/translocated during construction. In addition, the Reduced

Acreage Alternative would no longer isolate a 1,280-acre parcel of land (NAP) that would have been surrounded by the proposed project on three sides. Accordingly, impacts to desert tortoises would be reduced in magnitude and scale. This alternative would also reduce the potential barriers to east-west movement for desert tortoise.

The Reduced Acreage Alternative would also avoid the existing dune habitat identified in the Biological Resources Technical Report. This and other sandy areas of the project site provide habitat for the Mojave fringe-toed lizard. Although this species is expected to range more broadly across the project site due to the presence of sandy washes, friable soils, and micro-dune environments, this alternative would reduce overall impacts to the species and would not result in complete barriers to passage when compared to the proposed project. This alternative may still interfere with aeolian and hydrologic sand transport throughout the region, which could indirectly impact habitat for this species. However, overall impacts to Mojave fringe-toed lizard would be reduced in extent and magnitude under this alternative.

Gila monsters were not identified in the project area; however, this species is difficult to detect and potential habitat does occur on site. The reduced acreage of this alternative would decrease potential impacts to this species. Similarly, impacts to migratory birds and resident birds including golden eagles, burrowing owls, and Le Conte's thrasher would be reduced in proportion to the reduction in size of this alternative. Duration of impacts related to construction, such as disturbance from noise and light, would also be reduced since the alternative would only include 31% of the originally proposed SunCatchers and associated infrastructure. Impacts to birds related to collisions and electrocutions would also be reduced, as SCE's upgrade to 65 miles of transmission line would not be required.

This alternative would minimize impacts to Nelson's bighorn sheep, as the boundaries of the alternative site reduce potential impacts to likely foraging areas for the species. Bighorn sheep would not be constrained from ranging into the southern foothills of the Cady Mountains as they would under the proposed project. Direct effects including disturbance from construction activities, noise, and lighting, would also be minimized as this alternative would place the project farther from areas potentially used by this species. Therefore, impacts to Nelson's bighorn sheep would be reduced in magnitude and extent.

Impacts to other wide-ranging species in the project area, including American badger, desert kit fox, and special-status bats would also be reduced in proportion to the reduction in size of this alternative. Generally speaking, a 67% reduction in habitat loss would occur. Therefore, impacts to these species would be reduced in magnitude and extent.

Staff's proposed conditions of certification would mitigate for the Reduced Acreage Alternative's direct, indirect, and cumulative impacts to special-status wildlife. These conditions are identical to those recommended for the proposed project and include Conditions of Certification **BIO-1** through **BIO-11** and **BIO-13** through **BIO-28**.

Impacts to Wildlife Movement Corridors or Native Wildlife Nursery Sites

The Reduced Acreage Alternative would decrease the project site from the original 8,230 acres to approximately 2,600 acres of land, a 33% reduction compared to the proposed project. As with the proposed project, this alternative would include perimeter fencing designed to exclude desert tortoises from the site and provide for site security. Therefore, the Reduced Acreage Alternative would still present a permanent north-south barrier to wildlife movement in the area. However, because the northern perimeter of the site would be located in some areas more than a mile back from the foothills of the Cady Mountains, the obstacle to movement presented by the topography of this area would be greatly reduced, and animal movement would not be constrained to the degree to which it would be under the proposed project. Therefore, impacts associated with interference with wildlife movement in the region would be more than proportionally reduced under this alternative.

Staff's proposed conditions of certification would mitigate for the Reduced Acreage Alternative's direct, indirect, and cumulative impacts to wildlife movement. These conditions are identical to those recommended for the proposed project and include Conditions of Certification **BIO-1** through **BIO-9**.

Impacts to Waters of the State

The Reduced Acreage Alternative would avoid many of the desert washes that occur within the proposed project site. In addition, because of the topography and associated watershed this alternative would avoid most of the of the high quality wash habitat that supports microphyll woodland. Although wash habitat would be affected near the BNSF Railroad, this alternative would result in substantially lower impacts to State jurisdictional waters. While impacts to jurisdictional waters would still occur, they would be proportionally reduced under the Reduced Acreage Alternative. This Alternative would still require the construction of a storm water management system that would disrupt the hydrologic and sediment transport system within many of the washes that occur on the project site. Because these structures would attenuate peak flood discharge rates; construction of the Calico Solar project would impact desert wash communities downstream of the project to same extent as the proposed project.

Staff's proposed conditions of certification would mitigate for the Reduced Acreage Alternative's direct, indirect, and cumulative impacts to Waters of the State. These conditions are identical to those recommended for the proposed project and include Conditions of Certification **BIO-1** through **BIO-9, BIO-27** (Streambed Impact Minimization and Compensation Measures), and **BIO-29** (Channel Decommissioning and Reclamation Plan).

C.2.5.3 CEQA LEVEL OF SIGNIFICANCE

Vegetation Impacts

As discussed above in **Section C.2.5.2**, and similar to the proposed project, impacts resulting from this alternative on vegetation would be less-than-significant with the implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-11** and **BIO-17**.

Impacts to Special-Status Plants

As discussed above in **Section C.2.5.2**, and similar to the proposed project, impacts resulting from this alternative on special-status plants would be less-than-significant with the implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-12** and **BIO-17**.

Impacts to Common Wildlife

As discussed above in **Section C.2.5.2**, and similar to the proposed project, impacts resulting from this alternative on common wildlife would be less-than-significant with the implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-9** and **BIO-17**.

Impacts to Special-Status Wildlife

As discussed above in **Section C.2.5.2**, and similar to the proposed project, impacts resulting from this alternative on special-status wildlife would be less-than-significant with the implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-11** and **BIO-13** through **BIO-28**.

Impacts to Wildlife Movement Corridors or Native Wildlife Nursery Sites

As discussed above in **Section C.2.5.2**, and similar to the proposed project, impacts resulting from this alternative on wildlife movement corridors would be less-than-significant with the implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-9**. No impacts would occur to native wildlife nursery sites.

Impacts to Waters of the State

As discussed above in **Section C.2.5.2**, and similar to the proposed project, impacts resulting from this alternative on waters of the State would be less-than-significant with the implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-9, BIO-27,** and **BIO-29**.

C.2.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720-MW solar facility located within the boundaries of the proposed 850 MW project. This alternative, the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 2**.

C.2.6.1 SETTING AND EXISTING CONDITIONS

The setting for this alternative would include approximately 7,050 acres or 85% of the lands affected by the proposed project. Lands affected by this alternative would be the same as the proposed project site, with the elimination of the 1,180 acres of donated and acquired lands. In addition, the net generating capacity would be 720 MW, which would require the 65-mile upgrade to the existing Pisgah-Lugo transmission line. Please see the discussion of existing conditions under **Section C.2.4.1**.

C.2.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Vegetation Impacts

As discussed in detail in **Section C.2.4.2**, the proposed project would result in the loss of native vegetation communities. Implementation of the Avoidance of Donated and Acquired Lands Alternative would have the same types of effects as described for the proposed project, but they would be of lower magnitude than the proposed project because of the reduced footprint of 1,180 acres (i.e., a 15% reduction). However, even with this reduction the resulting site boundary includes a large parcel of LWCF lands purchased from Catellus that would be entirely enclosed within the developed solar field (see **Alternatives Figure 2**). Although this parcel would remain undeveloped and direct impacts would not occur, as a result of being surrounded by solar development, this area would be subject to indirect effects and would lose much of its value as wildlife habitat due to fragmentation. Indirect effects to vegetation within this parcel could include altered hydrologic regimes due to the construction of a drainage system and retention basins on the developed solar site, dust, and the spread of non-native and invasive weeds.

Staff's proposed conditions of certification would mitigate for the Avoidance of Donated and Acquired Lands Alternative's direct, indirect, and cumulative impacts to vegetation communities. These conditions are identical to those recommended for the proposed project, except the applicant would not be required to mitigate for the donated and acquired lands, and include general minimization and avoidance Conditions of Certification **BIO-1** through **BIO-9**. Specific impacts to vegetation communities would be minimized through the implementation of Conditions of Certification **BIO-10** (Revegetation Plan and Compensation for Impacts to Native Vegetation Communities) and **BIO-11** (Weed Management Plan). To address specific construction-related impacts to native vegetation communities and habitat loss, staff has proposed Condition of Certification **BIO-17** (Desert Tortoise Compensatory Mitigation).

Impacts to Special-Status Plants

As described above, nine special-status plant species were detected on site during surveys conducted for the proposed project; however, some of these species were not mapped in the applicant's Biological Resources Technical Report. Most of the occurrences that were mapped within the boundaries of the proposed project would also be within the boundaries of this alternative. In addition, since some of the special-status plants identified in the plant list provided in the Biological Resources Technical Report were not mapped or considered in the report, staff cannot determine whether these species occur within the boundaries of this alternative. Because special-status plants are not distributed uniformly across the project site, impacts would not be proportionally lower, but the extent of impacts would likely be lower for some species because of the reduced footprint. Some special-status species may be avoided altogether, depending on the actual distribution in the area. Therefore, this alternative would still result in impacts to special-status plants similar to the types of impacts described in **Section C.2.4.2**, but the magnitude of the impacts would be decreased due to the reduced acreage of the alternative.

Staff's proposed conditions of certification would mitigate for the Avoidance of Donated and Acquired Lands Alternative's direct, indirect, and cumulative impacts to special-status plants. These conditions are identical to those recommended for the proposed project, and include general minimization and avoidance Conditions of Certification **BIO-1** through **BIO-9**. Specific impacts to vegetation communities would be minimized through the implementation of Conditions of Certification **BIO-10** (Revegetation Plan and Compensation for Impacts to Native Vegetation Communities), **BIO-11** (Weed Management Plan), and **BIO-12** (Special-Status Plant Impact Avoidance and Minimization). To address specific construction-related impacts to special-status plants and habitat loss, staff has proposed Condition of Certification **BIO-17** (Desert Tortoise Compensatory Mitigation).

Impacts to Common Wildlife

Impacts to common wildlife resulting from the Avoidance of Donated and Acquired Lands Alternative would be similar to the proposed project, but the magnitude and intensity of these impacts would be slightly reduced due to the 15% decrease in project size. However, the reduction in impacts to common wildlife would not decrease proportionally to the reduction in project size because of the large parcel of LWCF lands purchased from Catellus that would be entirely enclosed within the developed solar field (see **Alternatives Figure 2**). This area would become isolated and while it would be expected to support many common wildlife species with small home ranges, the parcels may be insufficient to support wildlife with large home ranges, such as badgers and foxes. Terrestrial wildlife that could survive within the enclosed area would likely be subject to increased predation and intra- and interspecific competition as well as inbreeding resulting from the lack of genetic exchange. Indirect effects related to noise, changes in vegetation due to altered hydrology and the spread of weeds, and general human disturbance would also occur to wildlife within this parcel. Therefore, overall impacts to common wildlife resulting from the Avoidance of Donated and Acquired Lands Alternative would be only slightly reduced in comparison with the proposed project.

To reduce and minimize effects to common wildlife, the applicant would implement the same Conditions of Certification as the proposed project. These include Conditions of Certification **BIO-1** through **BIO-9**. In addition, while specific mitigation for common non-sensitive taxa is not required, the implementation of desert tortoise compensatory mitigation (**BIO-17**) would also benefit common species that inhabit proposed mitigation lands.

Impacts to Special-Status Wildlife

The Avoidance of Donated and Acquired Lands Alternative was designed to avoid LWCF lands purchased from Catellus and donated lands that occur within the boundary of the proposed project.

Implementation of this alternative would initially result in a reduction in the number of desert tortoises subject to project effects and would also reduce the amount of desert tortoise habitat directly impacted by avoiding the donated and acquired lands. However, the reduction in impacts to individual species or their habitat would not decrease proportionally to the reduction in project size because of the large parcel of donated and acquired lands that would be entirely enclosed within the developed solar field. This area would become isolated and would likely result in the loss of tortoise over time. Because of the exclusion fencing, tortoises trapped within the donated and acquired lands would likely require translocation in order to provide for the preservation of the animals. Indirect effects related to noise, changes in vegetation due to altered hydrology and the spread of invasive plants, and general human disturbance would also occur to within this parcel.

Implementation of the Avoidance of Donated and Acquired Lands Alternative would result in the same general impacts to Mojave fringe-toed lizard habitat as the proposed project. This alternative occurs in the same general areas of soft, friable sands that are known to support this species. In addition, this alternative would also likely interfere with aeolian and hydrologic sand transport throughout the region, which could indirectly impact habitat for this species. Even with the 15% reduction in project size associated with this alternative, overall impacts to Mojave fringe-toed lizard would be largely the same as the proposed project. Generally the soils in the donated and acquired lands do not include the soils favored by this species, and avoidance of these areas would not contribute to the viability of the species on the project site.

Gila monsters were not identified in the project area; however, this species is difficult to detect and potential habitat does occur on site. The reduced acreage of this alternative would slightly decrease potential impacts to this species. Similarly, impacts to migratory birds and resident birds including golden eagles and burrowing owls would be slightly reduced, but because a large portion of the avoided lands in this alternative would be surrounded by the solar development, this fragment may become less suitable for foraging and breeding (for burrowing owls). Therefore, impacts would be reduced, but not in proportion to the reduction in size of this alternative. Duration of impacts related to construction, such as disturbance from noise and lights, would also be slightly reduced since the alternative would only include 85% of the originally proposed SunCatchers and associated infrastructure. Impacts to birds related to collisions and electrocutions would be the same as described for the proposed project, as SCE's upgrade to 65 miles of transmission line would still be required.

This alternative would not minimize impacts to Nelson's bighorn sheep, as the boundaries of the alternative site are the same as the proposed projects within the northern portion that encompasses likely foraging areas for the species. Bighorn sheep would still be constrained from ranging into the southern foothills of the Cady Mountains as they would under the proposed project. Direct effects including disturbance from construction activities, noise, and lighting, would be the same as described for the proposed project.

Impacts to other wide-ranging species in the project area, including American badger, desert kit fox, and special-status bats would also be reduced, but not in proportion to the reduction in size of this alternative because of the large habitat fragment that would occur as a result of the LWCF lands purchased from Catellus that would be entirely enclosed within the developed solar field. Therefore, impacts to these species would be only slightly reduced in magnitude and extent.

Staff's proposed conditions of certification would mitigate for the Avoidance of Donated and Acquired Lands Alternative's direct, indirect, and cumulative impacts to special-status wildlife. These conditions are identical to those recommended for the proposed project and include Conditions of Certification **BIO-1** through **BIO-11** and **BIO-13** through **BIO-28**.

Impacts to Wildlife Movement Corridors or Native Wildlife Nursery Sites

The Avoidance of Donated and Acquired Lands Alternative would decrease the project site by 15% of what was described for the proposed project; however, a large portion of this reduction would include LWCF lands purchased from Catellus. As shown on **Alternatives Figure 2**, a portion of these lands would be entirely enclosed within the boundaries of the project site, and would become unavailable as a wildlife movement corridor in the region. As with the proposed project, this alternative would include perimeter fencing designed to exclude desert tortoises from the site, in addition to providing site security. Therefore, the Avoidance of Donated and Acquired Lands Alternative would still present a substantial barrier to wildlife movement in the area. In addition, because the northern perimeter of the site would occur in the foothills of the Cady Mountains as described for the proposed project, the obstacle to movement presented by the topography of this area would still occur, and animal movement would still be constrained to the same degree to which it would be under the proposed project. Therefore, impacts associated with interference with wildlife movement in the region would be similar to the proposed project under this alternative.

Staff’s proposed conditions of certification would mitigate for the Avoidance of Donated and Acquired Lands Alternative’s direct, indirect, and cumulative impacts to wildlife movement. These conditions are identical to those recommended for the proposed project and include Conditions of Certification **BIO-1** through **BIO-9**.

Impacts to Waters of the State

The Avoidance of Donated and Acquired Lands Alternative would likely impact most of the same desert washes that would be impacted by the proposed project. However, any drainages located on donated or acquired lands would not be directly impacted. Direct impacts to jurisdictional waters would still occur, but would be proportionally reduced under the Avoidance of Donated and Acquired Lands Alternative. However, indirect effects to drainages within the avoided lands, especially those on the LWCF lands purchased from Catellus that would be enclosed within the boundaries of the site, would still occur.

Staff’s proposed conditions of certification would mitigate for the Avoidance of Donated and Acquired Lands Alternative’s direct, indirect, and cumulative impacts to Waters of the State. These conditions are identical to those recommended for the proposed project and include Conditions of Certification **BIO-1** through **BIO-9, BIO-27** (Streambed Impact Minimization and Compensation Measures), and **BIO-29** (Channel Decommissioning and Reclamation Plan).

C.2.6.3 CEQA LEVEL OF SIGNIFICANCE

Vegetation Impacts

As discussed above in **Section C.2.6.2**, and similar to the proposed project, impacts resulting from this alternative on vegetation would be less-than-significant with the implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-11** and **BIO-17**.

Impacts to Special-Status Plants

As discussed above in **Section C.2.6.2**, and similar to the proposed project, impacts resulting from this alternative on special-status plants would be less-than-significant with the implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-12** and **BIO-17**.

Impacts to Common Wildlife

As discussed above in **Section C.2.6.2**, and similar to the proposed project, impacts resulting from this alternative on common wildlife would be less-than-significant with the implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-9** and **BIO-17**.

Impacts to Special-Status Wildlife

As discussed above in **Section C.2.6.2**, and similar to the proposed project, impacts resulting from this alternative on special-status wildlife would be less-than-significant with the implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-11** and **BIO-13** through **BIO-28**.

Impacts to Wildlife Movement Corridors or Native Wildlife Nursery Sites

As discussed above in **Section C.2.6.2**, and similar to the proposed project, impacts resulting from this alternative on wildlife movement corridors would be less-than-significant with the implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-9**. No impacts would occur to native wildlife nursery sites.

Impacts to Waters of the State

As discussed above in **Section C.2.6.2**, and similar to the proposed project, impacts resulting from this alternative on waters of the State would be less-than-significant with the implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-9, BIO-27,** and **BIO-29**.

C.2.7 NO PROJECT / NO ACTION ALTERNATIVE

There are three No Project / No Action Alternatives evaluated as follows:

No Project / No Action Alternative #1: No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another renewable energy project.

If this project is not approved, renewable projects would likely be developed on other sites in the California Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are large solar and wind projects proposed on BLM managed land along the I-40 corridor within a few miles of the Calico Solar site. In addition, there are currently over 70 applications for solar projects covering over 650,000 acres pending with BLM in California.

No Project / No Action Alternative #2: No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. As a result, GHG emissions would result from the construction and operation of the solar technology and would likely be similar to the GHG emissions from the proposed project. Different solar technologies require different amounts of construction and operations maintenance; however, it is expected that all the technologies would provide the more significant benefit, like the proposed project, of displacing fossil fuel fired generation and reducing associated GHG emissions. As such, this No Project/No Action Alternative could result in GHG benefits and impacts similar to those of the proposed project.

No Project / No Action Alternative #3: No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the GHG emissions from the site, including carbon uptake, is not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in the GHG benefits from the proposed project. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.2.8 PROJECT-RELATED FUTURE ACTIONS – BIOLOGICAL RESOURCES

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed. The SCE upgrades would take place in two phases:

- A **275 MW Early Interconnection Phase** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, and new telecommunication facilities would be installed between the Gale and Pisgah substations as well as between the Lugo and Pisgah substations within existing SCE ROWs utilizing existing transmission structures.
- A **850 MW Full Build-Out Phase** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line between the Pisgah and Lugo substations, expansion of the Pisgah Substation either at the existing site at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project. Ten miles of the upgraded Pisgah to Lugo transmission line would be outside of the existing SCE ROW.

The SCE projects will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission (CPUC) after the lead agencies receive complete applications for the proposed projects. Because no complete applications have yet been submitted and the SCE projects are still in the planning stages, the level of impact analysis presented in this document is based on available information provided by the applicant and SCE. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

C.2.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out phases. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out phase.

Vegetation. The applicant conducted a reconnaissance level habitat assessment to characterize the vegetation within the Pisgah Lugo corridor and determine potential habitats for sensitive species in 2007 and 2008 (SES 2008 – Appendix EE). To date, no surveys have been conducted along the Gale to Pisgah telecommunication corridor.

The applicant is proposing to conduct desert tortoise surveys along this corridor in 2010; however, additional data would be required to complete the application for this upgrade. The Pisgah Lugo transmission corridor encompasses a wide range of terrain and elevation with 17 native vegetation types and three non-native or disturbance-related vegetation types observed. The vegetation at the western end of the corridor near the Lugo Substation is characterized by semi-desert scrubs and woodlands within the hilly terrain. The Pisgah Lugo corridor crosses the Mojave River and several ephemeral drainages that are characterized by riparian scrub or forest habitats. As the corridor moves east, the terrain opens into mid-elevation desert basins with creosote bush and other drought tolerant species near the Pisgah Substation. The Pisgah Lugo corridor was surveyed by the applicant by vehicle and on foot. Vegetation communities were identified by one or more indicative species. The project study area included approximately 5,830.4 acres and supports 17 vegetation communities and three altered communities, as are listed in **Biological Resources Table 5** (SES 2008 – Appendix EE).

Biological Resources Table 5
Vegetation Community Types and Acreages within the Survey Area

Vegetation Community	Acreage*
Shrublands	
Mojave creosote scrub	3,301.0 acres
Mojave mixed woody scrub	281.1 acres
Burned Mojave mixed woody scrub	199.6 acres
Mojave wash scrub	21.8 acres
Big sagebrush scrub	97.0 acres
Rabbitbrush scrub	44.3 acres
Disturbed rabbitbrush scrub	79.3 acres
Desert saltbush scrub	174.6 acres
Mulefat scrub	8.8 acres
Chaparral	
Semi-desert chaparral	28.1 acres
Grasslands Mojave mixed steppe	14.4 acres
Native grassland	4.0 acres
Non-native grassland	13.0 acres
Disturbed non-native grassland	23.3 acres
Woodlands and Forests	
Southern cottonwood-willow riparian forest	1.3 acres
Mojave juniper woodland scrub	455.6 acres
Joshua tree woodland	312.8 acres
Disturbed Joshua tree woodland	13.7 acres
Joshua tree woodland/Mojave juniper woodland scrub	267.0 acres
Altered Communities	
Developed	179.7 acres

Vegetation Community	Acreage*
Disturbed	117.1 acres
Orchards and vineyards	24.0 acres
Extensive agriculture	47.4 acres

*Acreages are estimates and vary by up to 5%. Actual acreages would be mapped to support the proposed permit application.
Source: SES 2008.

The western end of the Pisgah to Lugo transmission corridor occurs in the Antelope Valley. Vegetation characteristic of this valley includes various desert scrubs, chaparral, and arid grasslands. As the proposed transmission line moves east, the corridor crosses the Mojave River and the Ord Mountains where Mojave and Joshua tree woodlands are found at the higher elevations. The terrain flattens east of the Ord Mountains into the lower elevations of Apple Valley where Mojave creosote scrub and other drier communities dominate. The proposed transmission line then moves into Lucerne Valley where the vegetation is typically Mojave creosote scrub and desert saltbush scrub. The proposed transmission line would travel along the southern segment of this valley that is characterized by desert saltbush with some areas of agriculture. Continuing east-northeast to the end of the corridor, the vegetation is exclusively Mojave creosote scrub on this rolling terrain (SES 2008 – Appendix EE).

Wildlife. The applicant conducted reconnaissance-level surveys along the Pisgah Lugo corridor for wildlife species in 2007 and 2008. Species were identified by scat, tracks, burrows, vocalizations, or direct observations with the aid of binoculars. The Pisgah Lugo corridor supports a wide range of desert wildlife. Eleven (11) species of reptiles were observed during the biological surveys including desert tortoise, Mojave fringe-toed lizard, side-blotched lizard, western whiptail lizard, zebra-tailed lizard, Mojave black-collared lizard (*Crotaphytus bicinictores*), and desert spiny lizard (*Sceloprous magister*). Sand dunes along the banks of the Mojave River provide habitat for the Mojave fringe-toed lizard (SES 2008 – Appendix EE).

The Pisgah Lugo corridor spans a wide range of vegetation types that support a diversity of mammal species. Mule deer (*Odocoileus hemionus*), coyotes, bobcats, and kit fox range over most of the project area. Smaller mammals present include kangaroo rats (*Dipodomys* spp.), pocket mice (*Perognathus* spp.), black-tailed jackrabbits, and desert cottontails. The applicants biologists observed 13 mammal species while conducting their surveys including the kit fox, coyote, black-tailed jackrabbit, bobcat, American badger, and white-tailed antelope squirrel (*Ammospermophilus leucurus*).

The Pisgah Lugo corridor lies near the Pacific flyway and serves as a stopover for a wide range of migratory birds in the spring and the fall. Other birds spend winter in the area including the white-crowned sparrow, dark-eyed junco (*Junco hyemalis*), sage sparrow, and cedar waxwing (*Bombycilla cedrorum*). Certain birds are residents of the area and can be observed year-round including the greater roadrunner (*Geococcyx californianus*), phainopepla (*Phainopepla nitens*), northern mockingbird, verdin (*Auriparus flaviceps*), cactus wren (*Campylorhynchus brunneicapillus*), and rock wren (*Salpinctes obsoletus*). SES biologists observed 36 bird species in their biological surveys including the golden eagle, cactus wren, red-tailed hawk, and the horned lark (SES 2008 – Appendix EE).

Sensitive Plant and Animal Species. Ten (10) special-status species were detected during the 2007 and 2008 surveys. The desert tortoise is federally listed as threatened. The short-joint beavertail cactus (*Opuntia basilaris* var. *brachyclada*) and white-margined beardtongue are BLM Sensitive Species. The Mojave fringe-toed lizard, western burrowing owl, golden eagle, American badger, horned lark, yellow warbler (*Dendroica petechia*), and loggerhead shrike (*Lanius ludovicianus*) are California Species of Concern with no federal status. The Applicant's Response to CURE Data Requests, Set Four (Data Requests 378-402) (dated December 2009) includes a table that lists the abundance of each special-status species that was detected, and for plants, whether each reported occurrence represented an individual plant or multiple plants (SES 2009w).

Of the BLM sensitive species outlined in the West Mojave Plan, the short-joint beavertail cactus and white-margined beardtongue were the only species observed during surveys. The Mojave monkeyflower (*Mimulus mohavensis*) and gray vireo (*Vireo vicinior*) have potential habitat within the project area, but were not observed during field surveys (SES 2008 – Appendix EE).

Desert Tortoise. Sign of the desert tortoise was detected throughout the project area including inactive burrows, carapace remains, and dried and fresh tortoise scat. URS biologists observed five live desert tortoises and their burrows within the survey corridor during the surveys. The Pisgah Lugo corridor would cross 533 acres of the U.S. Fish and Wildlife Service (FWS) designated desert tortoise critical habitat in the eastern section of the proposed transmission line near the Rodman Mountain Range. Potential desert tortoise habitat was scored on the basis of suitability of soils, vegetation, and presence of tortoise sign. A total of 4,720.2 acres were determined to be suitable for desert tortoise and approximately 2,512.2 acres were classified as either good tortoise habitat or within designated critical habitat for desert tortoise.

Mojave Ground Squirrel. The Mojave ground squirrel (MGS) (*Spermophilus mohavensis*) ranges from Palmdale to Lucerne Valley and from the Coso Range to the Avawatz Mountains. Habitat is typically dominated by creosote bush and burrobush in flat to moderate terrain. Associated species include winterfat (*Krascheninnikovia lanata*) and Joshua tree. This species is a State-listed species with no federal status. The Mojave ground squirrel was not detected during reconnaissance level biological surveys conducted by the applicant in 2007 and 2008. A segment of the transmission corridor analyzed would fall within five miles of a known MGS sighting. Reconnaissance level surveys were performed along that part of the corridor, but did not detect any individuals. Only antelope ground squirrels were detected (SES 2008 – Appendix EE).

West Mojave Management Plan. The transmission corridor would cross through the Ord-Rodman Desert Wildlife Management Area (DWMA), the Pisgah Area of Critical Environmental Concern (ACEC), and the Upper Johnson Valley Yucca Rings ACEC. The West Mojave Plan area, which includes the SCE upgrades, establishes a "one percent" threshold for new ground disturbance within each DWMA and development guidelines are provided in management plans developed for each individual ACEC. The report does not specify the extent of impacts (i.e., acreage and linear distance) to the Ord-Rodman DWMA, and with respect to the Upper Johnson Valley Yucca Rings

ACEC, it states the existing right-of-way corridor “is presumed to be included in the ACEC management plan.” (BLM et al. 2005).

In addition to meeting the cumulative limitation on ground disturbance, projects on lands covered by the Plan would be required to a pay a mitigation fee. Under the Plan, incidental take of white-margined beardtongue is limited to 50 acres of occupied and potential habitat. In addition, take as a result of utility construction is only allowed where avoidance is infeasible. It’s not clear whether the SCE upgrades to the Pisgah to Lugo transmission line would comply with these requirements of the Plan as currently proposed.

It appears that the upgraded Pisgah to Lugo transmission line would go directly through the Upper Johnson Valley Yucca Rings ACEC. The applicant’s report does not discuss the impacts of the upgrades on protected resources within this ACEC, or whether the project would comply with the California Desert Conservation Area Plan Amendment that protects the ACEC (SES 2008 – Appendix EE).

C.2.8.2 ENVIRONMENTAL IMPACTS

Potential impacts to biological resources caused by the upgrading of the Pisgah to Lugo transmission line could occur as a result of construction disturbance at or near the construction work sites that would be established for the project components. These sites include the pull and tensioning sites used to pull the new conductors onto the towers and potential sites for staging or marshalling yards. Temporary equipment and material staging areas would be established for short-term utilization within the existing SCE ROW near the new and retrofitted transmission structure locations, along the telecomm ROWs, and/or at Pisgah Substation during the 275 MW Early Interconnection option. In addition, temporary construction yards would also be established along the 500 kV transmission route for the Full Build-Out Option. Generally these yards would range in size from a few acres to up to approximately 30 acres.

Construction of the expanded Pisgah Substation under the 275 MW Early Interconnection option would occur in a 270-foot by 100-foot area and may require a temporary laydown area located at or near the existing roadway at the site. Upgrades at Lugo Substation would be within the existing substation property. Although the exact location is not yet known, construction of the expanded Pisgah Substation under the 850 MW Full Build-Out option would occur on 40 to 100 acres in the area nearby to the existing 5-acre Pisgah Substation, which would result in permanent loss of habitat. For the proposed 500 kV route, new dulled galvanized 500 kV lattice steel structures would be installed in the existing and new ROWs. Permanent loss of habitat would occur at each of these structure sites as well.

Few new main access roads are expected to be required for the proposed Pisgah to Lugo transmission route except along the 10 miles of new ROW, because it would largely follow an existing transmission corridor; however, spur roads to individual towers would be required. Where overland vehicle travel is not possible, upgrades to main access roads and extensions to existing spur roads would be needed to allow passage of construction vehicles. Such upgrades may require vegetation clearing and grading based on site conditions. During transmission line construction, most of the spur roads built to accommodate new construction are usually left in place to facilitate future access for operations and maintenance purposes. Thus for the purposes of this analysis, the disturbance associated with roads is assumed to be permanent.

Vegetation within the proposed Pisgah to Lugo transmission line ROW may need to be managed to maintain necessary ground to conductor clearances. The majority of the vegetation in the project area is a variety of desert scrub communities that do not grow to heights where trimming would be necessary. Certain areas of the cottonwood-willow riparian forests, Joshua tree woodlands, and Mojave juniper woodlands may require trimming to maintain the necessary ground clearances. Actual removal of vegetation would occur at each structure location (approximately 0.5 acres per structure), where road widening and road construction is necessary, and where vegetation maintenance is required to assure a safe clearance between the vegetation canopy and the conductors and lines. Any project-related surface disturbance could lead to invasion of the newly disturbed area by exotic weed species. Any wetland or riparian habitats would be spanned when possible to avoid impacts. When damage to U.S. Army Corps of Engineers or CDFG jurisdictional wetlands is unavoidable, permits and mitigation would be required to offset the losses. Other special vegetation communities include the sand dunes along the Mojave River, which provide habitat for the Mojave fringe-toed lizard (SES 2008 – Appendix EE).

Construction activities associated with the proposed SCE upgrades would impact general wildlife species through the removal of habitat at each structure location, the expanded Pisgah Substation, and for road widening and road construction. These activities could also increase wildlife mortality in the short-term. The noise and additional vehicle traffic during construction activities could impact wildlife movement and some wildlife may not use areas surrounding the utility corridor during construction activities. Installation of the proposed transmission line and telecomm upgrades is not anticipated to impede resident and migratory wildlife patterns after construction is complete.

Raptors and other large perching birds such as common ravens could be electrocuted by the installation of the proposed transmission line. Design and construction standards such as those outlined by the Avian Power Line Interaction Committee (APLIC 2006) would minimize the risk of bird electrocution. Electrocution of small mammals such as rodents and jackrabbits is a possibility near substations. However, such mortality would be unlikely to affect regional populations of any small mammal species in the area.

Mortality of birds by collision with the wires is also a potential impact. However, none of the proposed lines would pass areas of high bird concentrations such as large wetlands, so the potential for impacts to waterfowl would not likely be significant. The proposed transmission line would cross canyons and woodland areas where the risk of bird collision increases. For the most part, migrating birds in the Pacific flyway fly at a higher elevation than powerlines with the possible exception of some canyon crossings. Design and construction standards outlined by the Avian Power Line Interaction Committee (APLIC 2006) would be expected to be implemented to minimize bird collisions.

During biological surveys in 2007 and 2008 of the Pisgah to Lugo corridor, the applicant’s biologists observed three species that are listed by the FWS or the BLM.

Those species are the desert tortoise, short-joint beavertail cactus, and white-margined beardtongue (SES 2008 – Appendix EE).

- *Desert Tortoise*. The desert tortoise was the only federally listed species found in the project area during biological surveys in 2007 and 2008. Five (5) individuals were observed within the survey corridor and signs of tortoise activity were observed throughout the project area. The project corridor also would cross critical habitat for the desert tortoise on the eastern end of the transmission corridor near the Rodman Mountains. Formal consultation with the USFWS under Section 7 of the Federal Endangered Species Act and the CDFG State Endangered Species Act process would occur before construction activities would begin. The USFWS would review the expected impacts to the desert tortoise and recommend a plan to avoid impacts where feasible and recommend mitigation where impacts would be unavoidable.
- *Short-joint beavertail cactus and white-margined beardtongue.* These two plants are listed as BLM Sensitive Species. The short-joint beavertail cactus was observed in the eastern portion of the project area while the white-margined beardtongue was observed near Pisgah Substation. These populations would likely be avoided wherever possible. Relocation has proven infeasible for white-margined beardtongue (C. Lund, BLM, pers. comm.), but if impacts would be unavoidable, relocation of the short-joint beavertail cactus could occur where feasible, and other appropriate mitigation would be developed if needed. Transplanted individuals should be relocated within the ROW, as close to the original location as possible, while far enough to avoid impacts (Scogin 1989). The BLM would be consulted regarding impacts to these sensitive species before any construction activities would begin.

In summary, impacts that could occur include disturbance of habitat caused by movement of the construction equipment, disturbance of nesting activities caused by construction noise and movement of machinery, and potential take of listed species caused by construction activities at the structure locations. Because the 275 MW Early Interconnection phase would only necessitate the fiber-optic upgrades using existing structures between the Pisgah and Lugo substations and the Pisgah and Gale substations, it would have less construction disturbance than the 850 MW Full Build-Out phase, which requires the replacement of all structures between the Pisgah and Lugo substations, and both temporary and permanent loss of habitat and other biological resources impacts would be reduced. In addition to meeting the cumulative limitation on ground disturbance, activities on lands covered by the West Mojave Plan would be required to a pay a mitigation fee. Therefore, the SCE upgrades, especially with construction of the 850 MW Full Build-Out phase could potentially impact special-status species and sensitive habitats or conflict with the West Mojave Plan. Mitigation measures would be required to avoid, eliminate, and/or reduce impacts to a less-than-significant level or compensate for those impacts.

C.2.8.3 MITIGATION

As discussed above, the CPUC and the BLM would have permitting authority for the SCE transmission and telecommunications upgrades. Once an application is submitted, the CPUC and BLM would prepare an environmental analysis under CEQA and NEPA, respectively. The following measures were recommended in Appendix EE of the Calico Solar AFC to reduce or eliminate effects on biological resources during project construction. It should be noted that measures recommended in the future CEQA/NEPA analysis may differ from the following.

- Clearance surveys for listed and sensitive species should be conducted before each phase of project construction.
- Any listed or sensitive wildlife species observed within the construction area should be relocated to suitable habitat outside the development effect footprint as directed by the Federal Wildlife Biologist (FAO) and in accordance with any required permits or authorizations.
- Where practicable, ground-disturbing activities should occur outside listed and sensitive species breeding times.
- Clearance surveys for nesting birds should be conducted before each phase of project construction if the activity must be conducted during the bird breeding season.
- Off-site mitigation for the permanent loss of suitable habitat for listed and sensitive species habitat should be provided per agreement with the BLM and CPUC.
- After project completion, a seed mix of dominant plant species should be distributed within any extensive temporarily disturbed areas as directed by the FAO.
- Erosion and sedimentation control should be implemented during project construction to retain sediment on-site and to prevent violations of water quality standards.
- Diversion ditches and/or berms should be constructed as necessary to divert runoff from off-site areas around the construction site.

In addition, a team of biologists should inspect each transmission structure site to detect and remove desert tortoises approximately 24 to 48 hours prior to construction equipment being moved on to an individual site. If a tortoise burrow is detected, it should be cleared of tortoises that could be inside and then closed to prevent additional tortoises from entering the burrow. This should be accomplished consistent with USFWS and CDFG incidental take authorizations.

Mitigation should be included such that breeding birds would be avoided by limiting construction periods or by installing noise attenuation on construction equipment. Vehicle use should be limited in areas where sensitive habitats are located. If the aforementioned means of impact avoidance were found to be infeasible at the time of construction, a helicopter could be used to install the structures to minimize ground disturbances. Use of helicopters for installation would eliminate land disturbance associated with crane pads, structure laydown areas, and the trucks and tractors used for steel delivery to structure sites.

Further, construction activities would need to be monitored by qualified personnel. However, no formal construction plan would be developed until SCE submits its application to the CPUC and BLM and they conduct their own environmental review of the project, which could require implementation of mitigation measures for any identified potentially significant impacts. With implementation of measures that would address potential impacts specific to this upgrade project on a tower-by-tower basis for the 500 kV line upgrade and for each individual project component, such as the expanded Pisgah Substation, it is likely that impacts to biological resources would be reduced. However, before mitigation can be proposed, the project and its potential impacts must be clearly defined, including exact identification of work site locations.

As mentioned above, recommended mitigation includes identification of and avoidance of critical habitat and endangered species. Construction activities would be limited during the nesting season in compliance with the Migratory Bird Treaty Act and recommendations to avoid electrocution by maintaining optimal phase separation between new phase conductors or a phase conductor and grounded hardware/conductor would be implemented. An additional biological survey should also be conducted prior to initiation of the project to ensure there are no nesting birds on 220 kV towers, conductors, or OHGW that are being removed. Finally, the following general measures should be implemented during construction to minimize impacts to sensitive biological resources:

- ***Document Environmentally Sensitive Areas.*** Additional direct and indirect impacts to sensitive biological resources throughout the project corridors should be avoided or minimized by designating these features outside of the construction impact area as environmentally sensitive areas (ESAs) on project plans and in project specifications. Information related to the locations of ESAs and their treatment should be shown on contract plans and discussed in the Environmental Awareness Training. ESA provisions should include, but are not limited to, the use of temporary high-visibility orange fencing to delineate the proposed limit of work in areas adjacent to sensitive resources, and to delineate and exclude sensitive resources from potential construction impacts. Contractor encroachment into ESAs should be restricted (including the staging/operation of heavy equipment or casting of excavation materials). ESA provisions should be implemented as a first order of work, and remain in place until all construction activities have been completed.
- ***Biological Monitor*****.** A qualified biologist should monitor all construction activities. Construction activities should not proceed without presence of a biological monitor. The biological monitor should have the authority to stop construction, if necessary, to avoid impacts to special-status species or sensitive habitats.
- ***Environmental Awareness Training.*** All construction personnel working in the project corridor should be required to attend environmental awareness training. At a minimum, the training should include: (1) an overview of the regulatory requirements for the project components, (2) descriptions of the special-status species in the project area and the importance of these species and their habitats, (3) the general measures that are being implemented by SCE to minimize environmental impacts, and (4) the boundaries within which equipment and personnel would be allowed to work during construction. SCE should maintain a record of all workers who have completed the program.
- ***Limit Vegetation Removal*****.** Vegetation removal should be limited to the absolute minimum amount required for construction.
- ***Erosion Control.*** Temporary erosion control devices should be installed on slopes where erosion or sedimentation could degrade sensitive biological resources.
- ***Construction Clean-up*****.** All temporary fill and construction debris should be removed from the project site after completion of construction activities.

- ***Construction Scheduling.*** Construction should be timed to minimize potential impacts to sensitive biological resources.

C.2.8.4 CONCLUSION

Construction of the proposed Pisgah to Lugo transmission line would result in direct effects to a variety of sensitive plant and wildlife species including the desert tortoise. Because it appears some of the construction work would occur in or near sensitive species, habitats, and/or jurisdictional waters, this SA/DEIS concludes that the upgrades could adversely impact sensitive biological resources in and/or adjacent to the transmission line and telecomm corridors and substation sites. Potential impacts include direct mortality, disruption of habitat, construction noise effects on nesting activities, impacts to listed species and/or critical habitat, and physical effects on habitats related to construction activity.

Impact avoidance measures would help reduce potentially significant biological impacts to less-than-significant levels. However, there would also be permanent habitat disturbances at tower locations, at the Pisgah Substation (or new substation location), and with the construction of new access and spur roads. After construction plans are finalized, a complete project description (including results of all sensitive species surveys, and a revised assessment of potential impacts) for the 850 MW Full Build-Out should be developed as part of the CPUC EIR and BLM EIS.

Activities associated with upgrading the Pisgah to Lugo transmission line, substations, and telecommunication facilities would require compliance with applicable federal, State, and local laws, ordinances, and regulations, including: West Mojave Plan, Federal and State Endangered Species Acts, Federal Migratory Bird Treaty Act, and Federal and State Clean Water Acts. Specific agency permits would be required before any work could commence. To determine which permits may be applicable to the upgrades, SCE should consult with applicable local, State, and federal agencies.

Even if the upgrades work complies with all applicable laws, ordinances, regulations, and standards (LORS), absent complete biological survey information, wetland delineation, and temporary and permanent impact acreages, this SA/DEIS concludes that the SCE upgrades may create significant impacts to biological resources due to the permanent loss of habitat and the disturbance to sensitive plant and wildlife species during construction. However, mitigation such as the measures described above is available and feasible, and would likely reduce most impacts to biological resources to less-than-significant levels under CEQA. These impacts will be assessed and addressed, and appropriate mitigation recommended, in separate future environmental evaluations for these associated projects.

C.2.9 CUMULATIVE IMPACT ANALYSIS

C.2.9.1 CEQA AND NEPA DEFINITIONS

A cumulative impact analysis is required under both CEQA and NEPA. “Cumulative impact” is the impact on the environment which results from the incremental impact of the proposed project when considered with other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such other actions (40 CFR §1508.7).

Under CEQA Guidelines, “a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts” (Title 14 Cal Code Regs §15130(a)(1)). Cumulative impacts must be addressed if the incremental effect of a project, combined with the effects of other projects is “cumulatively considerable” (Title 14 Cal Code Regs §15130(a)). Such incremental effects are to be “viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects” (Title 14 Cal Code Regs §15164(b)(1)). Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis.

NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR §1508.7). Under NEPA, both context and intensity are considered. When considering intensity of an effect, we consider “whether the action is related to other actions with individually minor but cumulatively significant impacts. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.” 40 CFR §1508.27(b)(7)

Analysis of Cumulative Effects to Biological Resources

Staff used the following steps to develop the cumulative effects analysis described in this subsection:

- Identified resources to consider in the analysis;
- Defined the geographic study area for each resource;
- Described the current health and historical context for each resource;
- Identified direct and indirect impacts of the proposed project that might contribute to a cumulative impact;
- Identified other reasonably foreseeable actions that affect each resource;
- Assessed potential cumulative impacts;
- Reported the results, and;
- Assessed the need for mitigation.

C.2.9.2 GEOGRAPHIC SCOPE

This cumulative impact analysis makes a broad, regional evaluation of the impacts of existing and reasonably foreseeable future projects that threaten plant and animal communities within the context or geographic scope of the West Mojave Plan (WEMO) (BLM et al. 2005). The WEMO Planning Area is located in the southeastern California Desert Conservation Area (CDCA), and encompasses 9.3 million acres in Inyo, Kern, Los Angeles, and San Bernardino counties. For most resources the analysis focused in particular on renewable projects proposed on BLM, State, and private land in the I-40 corridor west of Barstow to the eastern boundary of the WEMO planning area, in the U.S. 395 Highway corridor from SR 58 north to the northern boundary of the WEMO planning area, and in the SR 14 corridor between California City and Ridgecrest.

C.2.9.3 REGIONAL OVERVIEW

This overview of regional impacts is followed by a more detailed discussion of the effects of past, present, and future projects to biological resources of the project vicinity, with an emphasis on resources found within eastern San Bernardino County.

The California Desert remained an isolated area for the first few decades of the 20th century. Disturbance was more or less restricted to highways, railroad, and utility corridors, scattered mining, and sheep grazing. In the 1940s, several large military reservations were created for military training, testing, and staging areas.

The Calico Solar Project is located south of the Cady Mountains in a broad alluvial fan that abuts I-40. While the development of infrastructure (i.e., I-40, Route 66, and utility corridors), and military uses (Marine Corps Logistics Base Yermo, Marine Air Combat Center Twentynine Palms) has resulted in habitat fragmentation to some degree in the region; the project vicinity still supports large areas of open space between I-40 and I-15 that are utilized by a variety of sensitive species.

Energy providers have recently submitted project applications that would collectively cover more than 1 million acres of the region (BLM 2010), with each project posing a potential incremental contribution to cumulatively significant habitat loss and fragmentation.

The introduction of non-native plant species and increases in predators such as ravens has also contributed to population declines and range contractions for many special-status plant and animal species (Boarman 2002). Combined with the effects of historical grazing and military training, and fragmentation from highway construction, the proposed wind and solar energy projects have the potential to further reduce and degrade native plant and animal populations, in particular sensitive species such as desert tortoise. In the context of this large scale habitat loss, the Calico Solar Project would contribute, at least incrementally, to the cumulative loss and degradation of habitat for desert plants and wildlife, including desert tortoise, bighorn sheep, and white-margined beardtongue, within the Mojave Desert region of southeastern California.

C.2.9.4 MAKING CONCLUSIONS ABOUT THE SEVERITY OR SIGNIFICANCE OF THE EFFECT

Ensuring “no net loss” of biological resources does not necessarily indicate that a project will not contribute to cumulative impacts; the analysis of each resource also describes the indirect and cumulative effects that cannot be quantified through a quantitative analysis of habitat impacts. Similarly, even seemingly minor impacts can be significant if they affect an extremely rare or limited resource; the cumulative impact may be substantial.

For each cumulative effect the following questions were considered in making conclusions about the severity or significance of an effect:

- The health, status, or condition of the resource as a result of past, present and reasonably foreseeable impacts;

- The contribution of the proposed project to the overall cumulative impact to the resource;
- The project's mitigated effect, when added to the effects of these planned future projects, and
- Impact avoidance and minimization: any project design changes that were made, or additional opportunities that could be taken, to avoid and minimize potential impacts in light of cumulative impact concerns.

The standard for a cumulative impacts analysis is defined by the use of the term "collectively significant" in the CEQA Guidelines section 15355; the analysis must assess the collective or combined effect of development. Cumulative impact assessments cannot conclude that contributions to cumulative impacts are not significant because the contributions represent a small percentage of the overall problem. Doing so could improperly omit facts relevant to an analysis of the collective effect that the proposed project and other related projects would have upon biological resources. The result could be approval of projects based on an analysis that avoided evaluating the severity of impacts which, when taken in isolation appear insignificant, but when viewed together appear significant.

C.2.9.5 ANALYTIC TOOLS AND STUDY LIMITATIONS

This cumulative effects analysis employed a combination of quantitative and qualitative analyses: a Geographic Information System (GIS)-based quantitative analysis for assessing the direct cumulative effects to habitat loss, and a qualitative analysis of the cumulatively considerable indirect effects, based on consultations with agency biologists and regional experts, as well as a literature review of the threats to species and their habitats.

GIS-Based Quantitative Analysis of Habitat Loss

The GIS-based analysis of direct habitat loss was used for this cumulative effects analysis to:

- Identify the overlap between existing and future projects and various biological data layers (e.g., landforms, soils, species occurrences, hydrographic data, vegetation mapping, wildlife habitat models, ownership and management layers);
- Compile digital map information about each resource for purposes of display and analysis; and
- Create statistical tables to summarize the direct impacts to these resources from existing and anticipated future projects, and the proposed project's contribution to those effects. Information on the datasets used, the sources of the data, and any limitations of the data, are provided in each biological resource section.

Qualitative Analysis of Indirect Effects

GIS is a widely used and effective tool for analyzing large amounts of spatial data, for documenting and quantifying assumptions about direct habitat loss, and the value of the habitat (where habitat models are available). However, the indirect impacts of projects are not easily captured in GIS and thus were only addressed qualitatively. This is important to note because many of these indirect effects (i.e., effects following construction) have greater significance and greater ecological consequences than the original habitat loss. Of particular concern are the effects of habitat fragmentation and its consequences for population viability and the effects of disrupted wildlife movement and connectivity and its effects on gene flow, subjecting populations of species such as bighorn sheep to isolation and inbreeding depression, and reducing their adaptability to climate change.

Other common themes that arose in this qualitative analysis of indirect cumulative effects include: increased vehicle-related mortality; disturbance from noise, lighting and increased human activity; increase in predators such as ravens; spread of invasive non-native plants; downwind effects of facilities and wind fencing on sand transport corridors; bird collisions and electrocutions; climate change and its accompanying increased risk of drought, fire the and spread of invasive exotic plants; and the downstream effects of channel diversions on fluvial sediment transport and riparian vegetation.

Limitations of the Cumulative Project Data and Datasets

The large renewable projects proposed on BLM and private land that made up the dataset of future projects in the cumulative analysis for Biological Resources (**Biological Resources Table 6 and Figures 6 and 7**) represent only those projects that had applications to the BLM, the Energy Commission, or eastern Riverside County as of February 5, 2010 (the time of the analysis). Porjects for which no GIS-based shape files were available were not included in the quantitative analysis. Further, not all of the projects shown on the table will complete the environmental review, and not all projects will be funded and constructed. Alternatively, it is possible, even likely, that new projects will be proposed in the near future that are not reflected in this analysis.

For the analysis of cumulative effects to special-status species, this analysis does not compare the loss of individuals against the total known metapopulation; population data are incomplete for many or most species or occurrences and for some species can vary widely from year to year in response to drought.

Finally, the GIS-based analysis requires the use of compatible datasets that encompass the entire geographic scope of the analysis; the project-specific survey data could not be compared against data for the region that was derived from different methodologies. For example, the project survey data for habitats is based on field surveys; the WEMO datasets for plant communities are based largely on aerial photo interpretation. The GIS analysis of impacts to plant communities, landforms, and habitats is based on region-wide datasets for those resources (primarily WEMO datasets), and not on project survey data. Therefore, the acreages presented in the analysis below will not match or reflect the project-specific survey results. Where there are such differences, they are noted in a footnote to the table or in the summary of a specific analysis. Notwithstanding the challenges presented by comparing region-wide and project-specific datasets, the GIS-based datasets for vegetation and landforms still provide a powerful and efficient tool for conducting large-scale, region-wide analyses.

C.2.9.6 PROJECTS CONTRIBUTING TO CUMULATIVE EFFECTS TO BIOLOGICAL RESOURCES

This analysis evaluates the impacts of the proposed project in addition to the current baseline of past effects, present (existing) projects, and reasonably foreseeable or probable future projects in the I-40 corridor as well as the greater WEMO Planning Area. **Biological Resources Figure 1** illustrates the numerous proposed renewable projects on BLM, State, and private land in the I-40 corridor in the proposed project vicinity, and **Biological Resources Figure 2** illustrates the numerous proposed renewable projects on BLM, State, and private land in the WEMO Planning Area. **Biological Resources Table 6** lists the existing and foreseeable future projects (proposed) that were included in the quantitative analysis of cumulative effects.

Biological Resources Table 6
Existing and Proposed Future Projects Considered in Cumulative Effects Analysis

Existing Projects with Cumulative Impacts[1]				
Project	**Area (acres)**		**Project**	**Area (acres)**
Urban lands mapped in the WEMO planning area (includes the Cities of Ridgecrest, Lancaster, Palmdale, Barstow, Victorville, Hesperia, Apple Valley, Yucca Valley, and Twentynine Palms)	219,644		Agricultural lands mapped in the WEMO planning area	182,360
Total Existing Projects Acreage: 402,004				
Foreseeable Future Projects[2] [Proposed] (analyzed quantitatively)				
Project	**ROW Area[1] (acres)**		**Project**	**ROW Area[1] (acres)**
Advanced Development Services - Barren Ridge	11,541		Horizon Waterman Hills	724
AES Seawest - Daggett Ridge	1,574		Horizon Wind - Calico Mtns.	27,945
AES SeaWest Daggett	2,593		Horizon Wind - Iron Mountain	10,103
AES Seawest, Inc.	8,598		Horizon Wind - Stoddard/Daggett	24,380
AES Wind Generation - North Daggett	1,642		IDIT, Inc. - Rabbit Dry Lake	477
AES Wind Generation - Sand Ridge	3,898		Little Mountain Wind Power - Bristol Lake	14,786
AES Wind Generation - Sand Ridge	4,176		LSR Pisgah, LLC - Barstow Road	7,440
AES Wind Generation - Sand Ridge 2	801		LSR Pisgah, LLC - Reche Road	17,685
AES Wind Generation, Inc.	211		Oak Creek Energy - Black Butte	36,315
Airtricity / E On	15,485		Oak Creek Energy - Lucchese	7,250
Alta Gas - Ghost Town	7,954		Oak Creek Energy - Ludlow South	23,664
Boulevard Associates - Tehachapi	9,712		Oak Creek Energy - Mojave/ Tehachapi	1,442

BP Orion - Sidewinder Mtn.	2,398		Oak Creek Energy - Rand Mountain	9,215
Brewer Energy - Black Hills	4,503		Oak Creek Energy - Soledad Mtn.	1,229
Caithness LLC - Soda Mountain	7,987		Oak Creek Energy - Tehachapi	160
Calico Solar LLC, Phase 1	5,207		Pacific Crest Power, LLC	21
Calico Solar LLC, Phase 2	3,389		Padoma Wind Power - Flat Top Mountain	12,680
Cameron Ridge, LLC	546		Padoma Wind Power - Pinto Mountains	23,797
Chevron Energy Solutions - Lucerne Valley	518		Power Partners SW - Tylerhorse Canyon	1,531
Competitive Power Ventures, LLC - Saltdale	38,364		Power Partners SW - Tylerhorse Canyon	1,207
Debenham Energy-Haiwee Reservoirs	19,031		Power Partners SW/EnXco - Troy Lake	10,118
Debenham Energy-Searles Hills	7,943		Renewergy, LLC - El Paso Peaks	7,646
DPT Broadwell Lake	8,616		RES North America/Granite Wind	2,085
enXco - Donut	5,033		Ridgecrest/Solar Millennium	3,884
enXco Avalon One	276		Sean Roberts RMC	536
enXco Troy Lake Solar	3,707		Sierra Renewables LLC - Black Lava Butte	4,042
First Solar - Desert Garnet	6,719		Sierra Renewables - Pearsonville	4,121
First Solar - Desert Obsidian	8,943		Sierra Renewables - Rose Valley	13,994
First Solar - Desert Opal	15,803		Solel, Inc. - Johnson Valley	1,798
First Solar - Desert Sapphire	5,327		Solel, Inc. - Stedman	7,443
FPL Energy - West Fry Wind Project	2,908		Verde Resources	3,105
Granite Wind LLC - Granite Mountains	2,085		West Fry Wind LLC - West Fry Mtns.	3,060
GreenWing - Mojave Valley	640		Wind Power Partners - Short Canyon	2,258
Horizon - Daggett Camp Rock	4,741			
Total Foreseeable Future Projects Acreage: 509,013 acres				

1 - According to the WEMO Plant Communities dataset (BLM et al. 2005)
2 - BLM Solar and Wind Renewable Projects - 02/16/2010. Not all of the projects depicted here will complete the environmental review, not all projects will be funded and constructed, and many will not use the entire ROW area

The dataset for existing projects was limited to WEMO vegetation mapping for urban, agricultural, and ruderal areas, and a few solar and wind projects on private land. The data set for reasonably foreseeable future projects was limited to available GIS-based spatial data for proposed energy projects, and does not include any residential or commercial projects planned within the watershed. Therefore, the quantitative analysis could be said to under-represent the number of projects. However, it also over-estimates, to some degree, the actual impacts of the future BLM Renewable projects because the entire right-of-way (ROW) was included in the calculations; not all of the projects depicted in **Biological Resources Figure 2** will complete the environmental review, not all projects will be funded and constructed, and many will not use the entire ROW area.

C.2.9.7 ANALYSIS OF CUMULATIVE EFFECTS TO BIOLOGICAL RESOURCES

Waters of the State

The geographic scope for the analysis of cumulative impacts to waters of the State is the Newberry Springs watershed; the watershed encompassing the Calico Solar Project. The analysis was based on the USGS National Hydrographic Dataset (USGS 2010) within the watershed boundary as defined by the California Interagency Watershed Map of 1999 (Calwater 2.2.1).

Biological Resources Table 7 summarizes the direct loss of desert washes that has resulted from past and present activities and that would result from anticipated future projects within the Newberry Springs watershed. These effects are also illustrated spatially in **Biological Resources Figure 3.** The contribution of the project to cumulative effects from future projects is provided as the sum of all drainages within the project boundaries.

Cumulative effects to these features that cannot be adequately addressed with the GIS analysis include: impacts to water quality and sediment transport from the numerous channel diversions, culverts and road crossings, fragmentation of the habitat and the corresponding loss of habitat function and values.

Biological Resources Table 7
Desert Washes in Newberry Springs Watershed – Cumulative Effects

Total Desert Washes[1] in Newberry Springs Watershed	**Impacts to Habitat from Existing Projects[2]** (percent of total watershed)	**Impacts to Habitat from Foreseeable Future Projects[3]** (percent of total watershed)	**Contribution of Calico Solar Project to Future Cumulative Impacts** (percent of total impacts from future projects)
530.9 miles	0.7 miles (0.1%)	74.8 miles (14.1%)	33.8 miles (45.2%) (based on USGS dataset)

1 - Based on the USGS National Hydrographic Dataset (2010) and California Interagency Watershed Map of 1999 (Calwater 2.2.1)
2 - Based on Agriculture and Urban mapping units from the WEMO Plant Communities dataset (BLM et al. 2005); see **Biological Resources Table 6**
3 - Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in **Biological Resources Table 6**

Staff considers cumulative effects to the Newberry Springs watershed streams from future projects to be significant (approximately 14%). The impacts are attributed largely to the proposed project. The project's contribution to the cumulative effects within the Newberry Springs watershed comprise nearly half (45%) of those impacts, for a total of 33.8 miles. The USGS hydrologic modeling depicts 33.8 miles of desert wash in the project area and over 1,000 acres of State jurisdictional habitat were mapped by the applicant. To mitigate impacts to jurisdictional washes to a level less than significant, staff proposes Condition of Certification **BIO-27** for avoidance and minimization of impacts to State waters and compensation for unavoidable impacts.

Special-Status Wildlife

Desert Tortoise

This analysis addresses cumulative impacts to desert tortoise as defined by the current USGS Desert Tortoise Habitat Model (Nussear et al. 2009). It is a predictive model for mapping the potential distribution of desert tortoise habitat and is a useful tool for evaluating different land-use issues that tortoises face at a landscape scale. **Biological Resources Figure 4** is a spatial representation of the predicted habitat potential index values for desert tortoise, based on the 2009 model. The model is not intended to be used, or viewed, as a substitute for ground-based and site-specific field surveys. Model scores reflect a hypothesized habitat potential given the range of environmental conditions where tortoise occurrence was documented. The report specifically states:

> *As such, there are likely areas of potential habitat for which habitat potential was not predicted to be high, and likewise, areas of low potential for which the model predicted higher potential. Finally, the map of desert tortoise potential habitat that we present does not account either for anthropogenic effects, such as urban development, habitat destruction, or fragmentation, or for natural disturbances, such as fire, which might have rendered potential habitat into habitat with much lower potential in recent years*.

GIS-based files for the boundaries of the Western Mojave Recovery Unit of the 1994 Desert Tortoise Recovery Plan were not available from the USFWS at the time of this analysis and the proposed new boundaries as depicted in the USFWS 2008 Draft Revised Recovery Plan had not been adopted as of the time of this analysis. Consequently, the WEMO boundary was used for this analysis. The WEMO boundary closely approximates the boundaries of the USFWS recovery unit; however, the USFWS boundaries extend further north of the WEMO boundary, past SR 190.

Urbanization/loss of habitat, deteriorating habitat quality from off-highway vehicles, invasion of non-native grasses and weeds, predation by ravens, collection, livestock grazing, and spread of an upper respiratory tract disease have all contributed to the decline of desert tortoise populations. In response to this decline, large expanses of desert tortoise critical habitat and numerous ACEC/DWMA areas have been identified or established within the WEMO planning area. Critical habitat for the desert tortoise and a DWMA occur approximately 1 mile to the south of the Calico Solar site.

Using the GIS-based habitat model and data from USGS, staff analyzed the cumulative impacts to desert tortoise habitat. The project's unmitigated effects to desert tortoise habitat (based on the 2009 USGS habitat model) are quantified below in **Biological Resources Table 8** (and **Biological Resources Figure 4**). The Calico Solar Project supports medium and high quality desert tortoise habitat according to the USGS model. The cumulative effects before mitigation are significant given that nearly 54% of the acreage comprised by future projects is within high quality desert tortoise habitat (rated between 0.8 and 1.0), and another 16% of this acreage is within medium quality desert tortoise habitat.

The proposed project would also significantly impact desert tortoise dispersal and connectivity between local populations. The project's contribution to cumulative effects on desert tortoise habitat and connectivity, considered after mitigation, remain substantial as the proposed project would act as a filter to east west movement in the region. Although movement would not be completely blocked the terrain in the remaining open areas north of the project would inhibit tortoise movement to some degree. Staff's proposed Condition of Certification **BIO-15 and BIO-16** would involve additional conditions including installation of tortoise exclusion fencing, clearance surveys, monitoring; and verification that all desert tortoise impact avoidance, minimization, and compensation measures to replace lost habitat. Staff's proposed Condition of Certification **BIO-17** would require the development and implementation of a Raven Monitoring, Management, and Control Plan which would minimize impacts to desert tortoise resulting from increases in raven populations.

Staff's proposed desert tortoise-specific conditions of certification and general avoidance and minimization measures would reduce the project's direct effects to desert tortoise during construction and operation to a level less than significant. However, staff believes that due to the large-scale habitat conversions that are proposed in the region, impacts to desert tortoise habitat and connectivity remain cumulatively considerable after mitigation. Such effects can only be addressed and implemented through a regional and coordinated effort or a programmatic EIS aimed at preserving and enhancing large tracts of high quality desert tortoise habitat, restoring degraded areas to address the net loss of habitat, and protecting or enhancing probable desert tortoise linkages between DWMAs and other movement corridors. Ongoing collaborative efforts by federal and State agencies to develop a Desert Renewable Energy Conservation Plan and BLM's Solar Energy Development Programmatic EIS provide an appropriate vehicle for such a regional mitigation approach.

Biological Resources Table 8
Cumulative Effects: Desert Tortoise Habitat[1]

Habitat Value[1]	Total Desert Tortoise Habitat[1] in WEMO	Impacts to Habitat from Existing Projects[2]	Impacts to Habitat from Foreseeable Future Projects[3]	Contribution of Calico Solar Project to Future Cumulative Impacts (percent of total impacts from future projects)
0	833,990 acres	12,547 acres 1.5%	36,678 acres 4.4%	0 acres
0.1	480,313 acres	36,482 acres 7.6%	24,471 acres 5.1%	0 acres
0.2	405,839 acres	43,260 acres 10.7%	26,038 acres 6.4%	0 acres
0.3	406,093 acres	23,107 acres 5.7%	20,339 acres 5.0%	0 acres
0.4–0.5	895,828 acres	68,394 acres 7.6%	38,161 acres 4.3%	0 acres
0.6–0.7	1,359,657 acres	70,201 acres 5.2%	92,292 acres 6.8%	445 acres 0.5%
0.8–0.9	4,881,903 acres	138,505 acres 2.8%	2,495,543 acres 51.1%	7,817 acres 0.3%
1.0	84,001 acres	0 acres	2,227 acres 2.7%	0 acres

1 - Based on the USGS Desert Tortoise Habitat Model (Nussear et al. 2009)
2 - Based on Agriculture and Urban mapping units from the WEMO Plant Communities dataset (BLM et al. 2005); see **Biological Resources Table 6**
3 - Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in **Biological Resources Table 6**

Mohave Ground Squirrel

The geographic scope of the analysis of cumulative effects on Mohave ground squirrel habitat was based on the WEMO Planning Area and used the WEMO range map for the Mohave ground squirrel as well as landform mapping from the Mojave Desert Ecosystem Project (MDEP) to map and quantify cumulative effects on squirrel habitat. WEMO plant communities that intersect with suitable landforms in the Mohave ground squirrel's range are quantified in **Biological Resources Table 9. Biological Resources Figure 5** depicts the locations of Mohave ground squirrel conservation areas and the overall range of this species, pursuant to WEMO.

The Mohave ground squirrel is threatened by loss of habitat and degradation of habitat due to urban, suburban and rural development, agriculture, military activities, energy development, livestock grazing, and OHV use. In spite of its protected status, little is known of its habitat extent and needs. In many areas within its historic range, there are no recent records. In addition, as a State-listed species with no federal status, there is limited regulatory protection for the Mohave ground squirrel compared to the desert tortoise. For example, although tortoise management programs at Edwards AFB and China Lake minimize habitat loss and degradation of Mohave ground squirrel habitat, the Air Force and Navy are not obligated to manage the installations to preserve State-listed species. The CDFG has no habitat designation that is analogous to federally designated critical habitat (BLM et al. 2005).

Based on the BLM WEMO interpretation of Mohave ground squirrel range, the project occurs outside its range and thus does not contribute, even incrementally, to overall impacts to Mohave ground squirrel habitat or connectivity, as it is located well outside the known range of this species.

Biological Resources Table 9
Cumulative Effects: Mohave Ground Squirrel Habitat[1]

Habitat	Total Mohave Ground Squirrel Habitat[1] in WEMO	Impacts to Habitat from Existing Projects[2]	Impacts to Habitat from Foreseeable Future Projects[3]	Contribution of Calico Solar Project to Future Cumulative Impacts (percent of total impacts from future projects)
Mojave Creosote Scrub	1,528,590 acres	1,462 acres (0.1%)	54,845 acres (3.6%)	0 acres
Saltbush Scrub	529,384 acres	1,057 acres (0.2%)	13,660 acres (2.6%)	0 acres
Mixed Desert Scrubs	168,228 acres	0 acres	17,380 acres (10%)	0 acres
Urban	134,692 acres	132,761 acres (99%)	0 acres	0 acres
Agriculture	75,307 acres	75,307 acres (100%)	0 acres	0 acres
Desert Wash Scrub	18,354 acres	0 acres	54 acres (0.3%)	0 acres

Habitat	Total Mohave Ground Squirrel Habitat[1] in WEMO	Impacts to Habitat from Existing Projects[2]	Impacts to Habitat from Foreseeable Future Projects[3]	Contribution of Calico Solar Project to Future Cumulative Impacts (percent of total impacts from future projects)
Desert Sink Scrub	9,416 acres	0 acres	63 acres (0.7%)	0 acres
Sand Dunes	8,505 acres	0 acres	0 acres	0 acres
Oak/Juniper/Pine/ Joshua Tree Woodland	6,917 acres	0 acres	0 acres	0 acres
Playa/Dry Lake	6,017 acres	0 acres	8.1 acres (0.1%)	0 acres
Riparian Scrub/Forest	845 acres	0 acres	0 acres	0 acres
Chaparral	646 acres	0 acres	0 acres	0 acres
Mesquite Bosque	488 acres	0 acres	0 acres	0 acres
Native Grassland	189 acres	0 acres	0 acres	0 acres
Non-native Grassland	88 acres	0 acres	0 acres	0 acres
Seeps	59 acres	0 acres	0 acres	0 acres

1 - Based on plant communities occurring on the following MDEP landforms within the range of the Mohave ground squirrel pursuant to WEMO Figure 3-15: fluvial floodplain, fluvial terrace, older alluvial deposits, bajada, active alluvial plain, older alluvial plain, alluvial fan, undifferentiated dune field, and disturbed.
2 - Based on Agriculture and Urban mapping units from the WEMO Plant Communities dataset (BLM et al. 2005); see **Biological Resources Table 6**
3 - Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in **Biological Resources Table 6**

Golden Eagle

The geographic scope of the analysis of cumulative effects on golden eagle foraging habitat was completed for the entire WEMO planning area, as well as on foraging habitat within 10 miles of nests occurring within 10 miles of the proposed project, and used the WEMO plant communities dataset to map and quantify cumulative effects on foraging habitat (**Biological Resources Tables 10 and 11** and **Biological Resources Figures 6 and 7**). The WEMO plant communities dataset is based on the 1996 California Gap Analysis Project conducted by the Biogeography Lab at the University of California, Santa Barbara and coordinated through the USGS Biological Resources Division.

Biological Resources Figure 7 also depicts the locations of other known and documented golden eagle nest locations. The source of this information includes the "nest card" database--helicopter surveys conducted in 1978 and 1979 desert-wide--and on locations depicted in a 1984 BLM California Desert Conservation Area (CDCA) map of “Sensitive, Rare, Threatened and Endangered Fish and Wildlife”. An Environmental Assessment (EA) and Implementation Guidance for take permits were issued under the Bald Eagle and Golden Eagle Protection Act (USFWS 2009d). The EA specifies that in implementing the resource recovery permit for take of inactive golden eagle nests (50 CFR 22.25), data within a 10-mile radius of the nest provides adequate information to evaluate potential effects.

The project contribution to impacts to foraging habitat within 10 miles of the nearest known nests is cumulatively considerable; 15% of the anticipated impacts to Mojave creosote scrub and 22.9% of the impacts to saltbush scrub. However, the analysis of direct habitat loss does not reflect the indirect effects of the proposed new transmission lines and associated collisions and raptor electrocutions, which also significantly contribute to cumulative impacts to golden eagle populations. The USFWS (2010b) estimates there are currently approximately 30,000 golden eagles in the western U.S., down from an estimated 100,000 in the late 1970s. Survey data from 2003, 2006-2008 indicate a decline of 26% since 2003.

Climate change is expected to impact golden eagle by increasing drought severity; CO_2 concentrations are expected to exacerbate the spread of invasive weeds, which displace native species and habitats, fuel wild fires and alter fire regimes. The project contribution to these effects would be minimized to a CEQA level less than significant through Conditions of Certification **BIO-20** and **BIO-21**. Condition of Certification **BIO-20** requires focused nest surveys within 1 mile of project activities and if nests are identified, the project owner would establish a disturbance-free buffer around the nest. No construction activities would be authorized within the 0.5-mile buffer pending the successful fledging of the nest. **BIO-21** requires documentation of compliance with the Bald and Golden Eagle Act (described below). The overall the loss of foraging habitat for this species would add to the cumulative, significant loss of habitat that is occurring within the region. Implementation of staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan for desert tortoise, would offset this habitat loss by the preservation of similar plant communities. While acquisition does not address the net loss of foraging habitat in the immediate future, it is expected to prevent future losses of habitat by placing a permanent conservation easement and deed restrictions on private lands that could otherwise be converted for urban or agricultural uses or energy development.

Biological Resources Table 10
Cumulative Effects: Golden Eagle Foraging Habitat
for Nests within 10 Miles of Project

Foraging Habitat[1] (by plant community)	**Total Plant Communities**[1] **in 10-mile radii**	**Impacts to Foraging Habitat from Existing Projects**[2] (percent of all community type in 10-mile radii)	**Impacts to Foraging Habitat from Foreseeable Future Projects**[3] (percent of all community type in 10-mile radii)	**Contribution of Calico Solar Project to Future Cumulative Impacts** (percent of total impacts from future projects)
Mojave Creosote Scrub	260,451 acres	0 acres	53,533 acres (20.6%)	8,020 acres (15%)
Mixed Desert Scrubs	22.1 acres	0 acres	0 acres	0 acres
Saltbush Scrub	13,038 acres	0 acres	997 acres (7.7%)	228 acres (22.9%)
Playa/Dry Lake	1,691 acres	0 acres	10 acres (0.6%)	0 acres
Desert Wash Scrub[4]	2608.5 acres	0 acres	376 acres (14.4%)	0 acres[4]
Sand Dunes[4]	0 acres	0 acres	0 acres	0 acres[4]
Desert Sink Scrub	66.5 acres	0 acres	699 acres (32.8%)	0 acres

Foraging Habitat[1] (by plant community)	Total Plant Communities[1] in 10-mile radii	Impacts to Foraging Habitat from Existing Projects[2] (percent of all community type in 10-mile radii)	Impacts to Foraging Habitat from Foreseeable Future Projects[3] (percent of all community type in 10-mile radii)	Contribution of Calico Solar Project to Future Cumulative Impacts (percent of total impacts from future projects)
Riparian Scrub/Forest	139 acres	0 acres	0 acres	0 acres
Lava	8,798 acres	0 acres	15 acres (0.2%)	10 acres (66.7%)

1 - Based on the WEMO Plant Communities dataset (BLM et al. 2005)
2 - Based on Agriculture and Urban mapping units from the WEMO Plant Communities dataset (BLM et al. 2005); see **Biological Resources Table 6**
3 - Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in **Biological Resources Table 6**
4 - Acreages based on the WEMO Plant Communities dataset (BLM et al. 2005) vegetation mapping and does not reflect the ground-based delineation of habitat.

Biological Resources Table 11
Cumulative Effects: Golden Eagle Foraging Habitat in WEMO Planning Area

Foraging Habitat[1] (by plant community)	Total Plant Communities[1] in WEMO	Impacts to Foraging Habitat from Existing Projects[2]	Impacts to Foraging Habitat from Foreseeable Future Projects[3]	Contribution of Calico Solar Project to Future Cumulative Impacts (percent of total impacts from future projects)
Mojave Creosote Scrub	5,685,847 acres	2,272 acres (0.04%)	362,587 acres (6.4%)	8,024 acres (2.2%)
Mixed Desert Scrubs	1,462,366 acres	32 acres (0.002%)	73,128 acres (5.0%)	0 acres
Saltbush Scrub	845,157 acres	1,569 acres (0.2%)	21,247 acres (2.5%)	228 acres (1.1%)
Oak/Juniper/Pine/ Joshua Tree Woodland	320,031 acres	0 acres	14,812 acres (4.6%)	0 acres
Urban	219,644 acres	211,399 acres (96%)	46 acres (0.02%)	0 acres
Chaparral	194,551 acres	0 acres	11,546 acres (5.9%)	0 acres
Agriculture	182,360 acres	182,360 acres (100%)	0 acres	0 acres
Playa/Dry Lake	153,593 acres	0 acres	3,329 acres (2.2%)	0 acres
Desert Wash Scrub	81,683 acres	0 acres	1,387 acres (1.7%)	0 acres
Non-native Grassland	69,563 acres	0 acres	344 acres (0.5%)	0 acres
Sand Dunes	41,416 acres	0 acres	8 acres (<0.1%)	0 acres
Desert Sink Scrub	30,586 acres	0 acres	853 acres (2.8%)	0 acres
Riparian Scrub/Forest	26,671 acres	0 acres	378 acres (1.4%)	0 acres
Lava	23,789 acres	0 acres	17 acres (0.1%)	10 acres (58.8%)

Foraging Habitat[1] (by plant community)	Total Plant Communities[1] in WEMO	Impacts to Foraging Habitat from Existing Projects[2]	Impacts to Foraging Habitat from Foreseeable Future Projects[3]	Contribution of Calico Solar Project to Future Cumulative Impacts (percent of total impacts from future projects)
Mesquite Bosque	7,576 acres	0 acres	0 acres	0 acres
Native Grassland	3,375 acres	0 acres	24 acres (0.7%)	0 acres
Montane Meadow	974 acres	0 acres	2 acres (0.2%)	0 acres
Sand Fields	547 acres	0 acres	0 acres	0 acres
Seeps	447 acres	0 acres	0 acres	0 acres
Palm Oasis	33 acres	0 acres	0 acres	0 acres

1 - Based on the WEMO Plant Communities dataset (BLM et al. 2005)
2 - Based on Agriculture and Urban mapping units from the WEMO Plant Communities dataset (BLM et al. 2005); see **Biological Resources Table 6**
3 - Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in **Biological Resources Table 6**

Burrowing Owl

The western burrowing owl is widely distributed throughout western North America in areas containing short vegetation and/or bare ground in desert, grassland, and low-lying shrub habitats. They are closely associated with burrowing mammals, whose burrows are used by the owls for nesting and roosting. This species is listed as a California Species of Special Concern by CDFG and is a BLM Sensitive Species. Additionally this species is provided federal protection under the Migratory Bird Treaty Act and is listed as a Bird of Conservation Concern by the USFWS. Threats to this species include habitat loss or damage and/or a reduction in prey base due to urbanization, mining, trash disposal, pesticide use, grazing activities, off-highway vehicle use, invasion of non-native plants, and brush control activities (BLM et al. 2005). Current and foreseeable renewable energy developments in the Mojave Desert contribute to the loss and damage of habitat through development, a potential reduction in prey base and the disruption of natural areas. Cumulatively, impacts to the burrowing owl populations in the Mojave Desert area would be severe, and the project's contribution to cumulative effects is significant given the threats to this species from future developments. These cumulative effects would be minimized to a level less than significant by measures requiring avoidance, passive relocation, and compensation, in staff's proposed Condition of Certification **BIO-22**. In addition, implementation of staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan for desert tortoise, would reduce this habitat loss by the preservation of similar plant communities.

Le Conte's Thrasher

Le Conte's thrasher is patchily distributed within the deserts of the American Southwest and northwestern Mexico (Sheppard 1996). This species is listed as a California Species of Special Concern by CDFG and is a BLM Sensitive Species. Additionally this species is provided federal protection under the Migratory Bird Treaty Act and is listed as a Bird of Conservation Concern by the USFWS. Threats to Le Conte's thrasher primarily include habitat loss or degradation due to development, grazing, invasion of nonnative weeds, wildfires, and off-highway vehicle use. Current and foreseeable renewable energy developments in the Mojave Desert contribute to the loss and damage of habitat through development and the disruption of natural areas.

Cumulatively, impacts to the Le Conte's thrasher in the Mojave Desert would be severe, and the project's contribution to cumulative effects is significant given the threats to this species from future developments. These cumulative effects would be minimized to a level less than significant by measures requiring pre-construction breeding bird surveys and avoidance of active nests, in staff's proposed Condition of Certification **BIO-19**. In addition, implementation of staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan for desert tortoise, would reduce the impacts of habitat loss by the preservation of similar plant communities.

Migratory Birds

Migratory birds, depending on the time of year, range over the entire Mojave Desert and surrounding areas. Most, if not all, of the migratory birds whose ranges may extend to the Mojave Desert are protected under the Migratory Bird Treaty Act. Threats to migratory birds include habitat loss or damage due to urbanization and agriculture, hunting, pesticide applications, and power line electrocution. Current and foreseeable renewable energy developments in the Mojave Desert contribute to the loss and damage of habitat through development, a reduction in prey base, and the disruption of natural areas. Cumulatively, impacts to migratory bird populations in the Mojave Desert area would be severe, and the project's contribution to cumulative effects is significant given the threats to these species from future developments. The project's contribution to these cumulative effects would be minimized to a level less than significant by measures requiring pre-construction breeding bird surveys and avoidance of active nests, in staff's proposed Condition of Certification **BIO-19**. In addition, implementation of staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan for desert tortoise, and Condition of Certification **BIO-27**, avoidance, minimization, and compensation for impacts to desert washes would reduce the impacts to migratory birds from habitat loss by the preservation of similar plant communities.

Mojave Fringe-Toed Lizard

The Mojave fringe-toed lizard is endemic to southern California and a small area of western Arizona. This species is an obligate sand-dweller, found in dunes, sand fields, sand hummocks, and other sand deposits throughout the Mojave Desert in California. Its survival requires conservation of the blowsand ecosystem processes, including the sand source, fluvial sand transport areas, aeolian sand transport areas, wind corridors, and the occupied habitat. Mojave fringe-toed lizards occur at several disjunct localities in the WEMO planning area, including the Saddleback Buttes region of Los Angeles County, Edwards Air Force Base, El Mirage, Mojave River near Barstow, Mojave Valley, Alvord Mountain, Pisgah, Cronese Lakes, Dale Lake, Twentynine Palms, and Harper Dry Lake. Threats to the lizard include population fragmentation from both urban and rural development along the Mojave River and at Twentynine Palms, as well as agricultural development in the Mojave Valley. Other major threats are flood control structures which prevent the waterborne flow of sand towards the occupied habitat, windbreaks and construction that impedes the aeolian transport of sand to the occupied habitat, and vehicle use within the occupied habitat (BLM et al. 2005).

The geographic scope for the cumulative effects analyses for Mojave fringe-toed lizard is the entire WEMO Planning Area and used landform mapping from the MDEP to map and quantify cumulative effects on fringe-toed lizard habitat. Using the MDEP landforms dataset, this analysis created a simple habitat model by selecting the following landforms: sand sheet, barchanoid dune field, linear dune field, parabolic dune field, climbing-falling dune field, coppice dune field, and undifferentiated dune field. WEMO plant communities that intersect with these landforms are quantified in **Biological Resources Table 12. Biological Resources Figure 8** depicts the locations of Mojave fringe-toed lizard conservation areas and the extent of suitable habitat pursuant to the landforms dataset.

Anticipated cumulative effects to Mojave fringe-toed lizard that are not reflected in this quantitative analysis of habitat conversion include: downwind indirect impacts to dune habitats from interruption of the fluvial and aeolian sand transport systems; premature stabilization of dunes by the spread of noxious weeds, which also fuel wildfires; the effects of past and future grazing and off-road vehicles; fragmentation of the remaining habitat and reduced gene flow; an increase in predation by ravens and other predators from an increase in perching structures; and an increase in the potential for fire from transmission lines and increased vehicle use.

Biological Resources Table 12 and **Biological Resources Figure 8** illustrates the potentially significant cumulative effects of habitat loss from existing and foreseeable future projects to Mojave fringe-toed lizards in the WEMO Planning Area. The landforms dataset did not identify suitable habitat for the Mojave fringe-toed lizard within the Calico Solar Project site, which can illustrate the limits of large-scale mapping efforts for project mapping; this species was documented in the project area and the applicant identified a dune complex in the project site (approximately 16.9 acres). Staff considers the species to be more widespread on the project site due to the presence of windblown sand and has proposed mitigation to off-set the expected habitat fragmentation that would occur from the development of the Calico Solar Project. This includes Condition of Certification **BIO-13** which requires the acquisition of suitable dune/sand habitat at a 5:1 ratio. Current and foreseeable renewable energy developments in the range of the Mojave fringe-toed lizard contribute to the loss and damage of habitat through development, fragmentation, and disruption of aeolian sand movement. Cumulatively, impacts to the Mojave fringe-toed lizard would be severe and would contribute to the decline of this species.

Biological Resources Table 12
Cumulative Effects: Mojave Fringe-toed Lizard Habitat

Habitat	Total Mojave Fringe-toed Lizard Habitat in WEMO[1]	Impacts to Habitat from Existing Projects[2]	Impacts to Habitat from Foreseeable Future Projects[3]	Contribution of Calico Solar Project to Future Cumulative Impacts (percent of total impacts from future projects)
Mojave Creosote Scrub	159,559 acres	0 acres	4,773 acres (3.0%)	0 acres
Saltbush Scrub	165,423 acres	0 acres	1,268 acres (0.8%)	0 acres
Mixed Desert Scrubs	862 acres	0 acres	0 acres	0 acres
Urban	2,525 acres	2,128 acres (84.3%)	0 acres	0 acres
Agriculture	12,223 acres	12,223 acres (100%)	0 acres	0 acres

Habitat	Total Mojave Fringe-toed Lizard Habitat in WEMO[1]	Impacts to Habitat from Existing Projects[2]	Impacts to Habitat from Foreseeable Future Projects[3]	**Contribution of Calico Solar Project to Future Cumulative Impacts** (percent of total impacts from future projects)
Desert Wash Scrub	6,574 acres	0 acres	0 acres	0 acres
Desert Sink Scrub	9,207 acres	0 acres	35 acres (0.4%)	0 acres
Sand Dunes	24,370 acres	0 acres	8 acres (0.03%)	0 acres[4]
Oak/Juniper/Pine/ Joshua Tree Woodland	768 acres	0 acres	0 acres	0 acres
Playa/Dry Lake	4,380 acres	0 acres	0 acres	0 acres
Riparian Scrub/Forest	1,286 acres	0 acres	0 acres	0 acres
Lava	897 acres	0 acres	0 acres	0 acres
Chaparral	116 acres	0 acres	0 acres	0 acres
Mesquite Bosque	4,086acres	0 acres	0 acres	0 acres
Native Grassland	0 acres	0 acres	0 acres	0 acres
Non-native Grassland	251 acres	0 acres	0 acres	0 acres
Seeps	0 acres	0 acres	0 acres	0 acres
TOTAL HABITAT	**392,528 acres**	**14,352 acres (3.7%)**	**6,084 acres (1.5%)**	**0 acres**

1 - Based on plant communities occurring on the following MDEP landforms dataset: sand sheet, barchanoid dune field, linear dune field, parabolic dune field, climbing-falling dune field, coppice dune field, and undifferentiated dune field.
2 - Based on Agriculture and Urban mapping units from the WEMO Plant Communities dataset (BLM et al. 2005); see **Biological Resources Table 6**
3 - Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in **Biological Resources Table 6**
4 - Acreages based on the MDEP landforms mapping of the Mojave Desert region and does not reflect the ground-based delineation of habitat. The applicant mapped 16.9 acres of dunes (habitat for Mojave fringe-toed lizard) within the project area (SES 2009a)

Nelson's Bighorn Sheep

Within the WEMO planning area, 16 bighorn sheep populations are known to have existed as defined by mountain range complexes. Five of these 16 areas no longer contain populations, three have been reintroduced, and two have been augmented with sheep from another population (BLM et al. 2005). For the past decade, bighorn sheep populations in California have been viewed in a metapopulation context. Within the WEMO planning area there are three metapopulations whose geographic boundaries are now formed by major fenced highways (I-15 and I-40) — the south, central, and north Mojave Desert metapopulations (Torres et al. 1994, 1996). Preferred habitat of bighorn is primarily on or near mountainous terrain above the desert floor. Access to surface water is another element of desert bighorn habitat important to population health.

The distribution and extent of bighorn sheep occupied and unoccupied range (WHMAs), connectivity corridors, and spring forage habitat (1 mile from outer edges of range), overlaid with past and foreseeable future projects within the WEMO planning area are quantified in **Biological Resources Tables 13** and **14** and illustrated in **Biological Resources Figure 9**.

The GIS analysis of the WEMO bighorn sheep range and connectivity corridors indicates that occupied and unoccupied ranges are relatively unaffected by past and future projects (from habitat conversion), due largely to their position in wilderness areas and at higher elevations. Cumulatively, however, large-scale renewable energy development could significantly impact gene flow between sheep populations, decreasing the viability of the metapopulation of bighorn sheep. The Calico Solar Project would contribute to the loss of bighorn sheep habitat, as occupied habitat for Nelson's bighorn sheep within the Cady Mountains overlaps the northern portion of the project site; these impacts would be considered significant.

The Society for Conservation of Bighorn Sheep has recommended a 1-mile buffer from the upper edge of any solar development to the base of the mountains. Using the metric of a 1-mile buffer from the base of occupied ranges (or potentially restored populations), the project, when combined with other existing and future projects, would result in the loss of a substantial portion of spring foraging habitat on the upper bajadas of the Cady Mountains. The bighorn can survive without going down on the bajadas to forage in the spring, as they do now in the Santa Rosa Mountains, providing foraging habitat is opened up elsewhere. Staff considers cumulative effects to spring foraging habitat for bighorn sheep from future projects to be significant, comprising 6.1% of existing spring foraging habitat. The proposed project's effects comprise 5.8% of this total, and also are significant. This loss of foraging habitat and an adequate buffer from disturbance and edge effects are significant, but could be minimized by the placement of water sources in strategic locations to open up the foraging habitat in other areas. Staff's proposed Condition of Certification **BIO-24** specifies such mitigation to offset this potential impact. Cumulatively, the project would contribute to the loss of foraging habitat region wide and impacts to Nelson's bighorn sheep populations in the Mojave Desert area would be severe.

Biological Resources Table 13
Cumulative Effects: Bighorn Sheep Range and Connectivity Corridors

Bighorn Sheep Range (WHMAs) & Connectivity Corridors[1]	Total Range or Connectivity Corridor[1] in WEMO	Impacts to Range & Connectivity Corridors from Existing Projects[2] (percent of all WHMAs or corridors in WEMO)	Impacts to Range & Connectivity Corridors from Foreseeable Future Projects[3] (percent of all WHMAs or corridors in WEMO)	Contribution of Calico Solar Project to Future Cumulative Impacts (percent of total impacts from future projects)
Total in WEMO	5,319,405 acres	7,169 acres (0.1% of total WEMO)	300,524 acres (5.6% of total WEMO)	430 acres (0.01% of total WEMO)
Occupied Range	1,020,111 acres	548 acres (0.05% of total occupied range)	35,488 acres (3.5% of total occupied range)	430 acres (1.2% of total impacts from Future Projects)
Unoccupied Range	601,955 acres	0 acres	12,421 acres (2.1% of total unoccupied range)	0 acres
Connectivity Corridors	3,695,747 acres	6,621 acres (0.2% of total connectivity corridor)	252,615 acres (6.8% of total connectivity corridor)	0 acres

Bighorn Sheep Range (WHMAs) & Connectivity Corridors[1]	Total Range or Connectivity Corridor[1] in WEMO	Impacts to Range & Connectivity Corridors from Existing Projects[2] (percent of all WHMAs or corridors in WEMO)	Impacts to Range & Connectivity Corridors from Foreseeable Future Projects[3] (percent of all WHMAs or corridors in WEMO)	Contribution of Calico Solar Project to Future Cumulative Impacts (percent of total impacts from future projects)
Concentration Area	1,592 acres	0 acres	0 acres	0 acres

1 - Based on the BLM WEMO Bighorn Sheep WHMAs dataset
2 - Based on Agriculture and Urban mapping units from the WEMO Plant Communities dataset (BLM et al. 2005); see **Biological Resources Table 6**
3 - Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in **Biological Resources Table 6**

Biological Resources Table 14
Cumulative Effects: Bighorn Sheep Spring Forage

Habitat	Total Spring Forage[1] in WEMO	Impacts to Spring Forage from Existing Projects[2] (percent of all spring forage in WEMO)	Impacts to Spring Forage from Foreseeable Future Projects[3] (percent of all spring forage in WEMO)	Contribution of CalicoSolar Project to Future Cumulative Impacts (percent of total impacts from future projects)
Total in WEMO	**634,560 acres**	**1,055 acres (0.2%)**	**38,592 acres (6.1%)**	**2,247 acres (5.8%)**
Mojave Creosote Scrub	484,232 acres	0 acres	31,931 acres (6.6%)	2,247 acres (7.0%)
Mixed Desert Scrubs	77,935 acres	0 acres	4,187 acres (5.4%)	0 acres
Saltbush Scrub	17,224 acres	0 acres	2,169 acres (12.6%)	0 acres
Oak/Juniper/Pine/Joshua Tree Woodland	9,765 acres	0 acres	0 acres	0 acres
Urban	3,418 acres	1,052 acres (30.1%)	0 acres	0 acres
Chaparral	2,878 acres	0 acres	0 acres	0 acres
Agriculture	3 acres	3 acres (100%)	0 acres	0 acres
Playa/Dry Lake	9,877 acres	0 acres	0 acres	0 acres
Desert Wash Scrub	18,577 acres	0 acres	204 acres (1.1%)	0 acres
Non-native Grassland	0 acres	0 acres	0 acres	0 acres
Sand Dunes	4,656 acres	0 acres	8 acres (0.2%)	0 acres
Desert Sink Scrub	3,930 acres	0 acres	94 acres (2.4%)	0 acres
Riparian Scrub/Forest	150 acres	0 acres	0 acres	0 acres
Lava	0 acres	0 acres	0 acres	0 acres
Mesquite Bosque	1,905 acres	0 acres	0 acres	0 acres
Native Grassland	0 acres	0 acres	0 acres	0 acres

Habitat	Total Spring Forage[1] in WEMO	Impacts to Spring Forage from Existing Projects[2] (percent of all spring forage in WEMO)	Impacts to Spring Forage from Foreseeable Future Projects[3] (percent of all spring forage in WEMO)	Contribution of CalicoSolar Project to Future Cumulative Impacts (percent of total impacts from future projects)
Montane Meadow	0 acres	0 acres	0 acres	0 acres
Sand Fields	0 acres	0 acres	0 acres	0 acres
Seeps	0 acres	0 acres	0 acres	0 acres
Palm Oasis	9.5 acres	0 acres	0 acres	0 acres

1 - Within 1 mile of range boundaries.
2 - Based on Agriculture and Urban mapping units from the WEMO Plant Communities dataset (BLM et al. 2005); see **Biological Resources Table 6**
3 - Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in **Biological Resources Table 6**

American Badger and Desert Kit Fox

The range of the American badger extends throughout the state of California in areas where suitable vegetative structure exists for cover and friable soils are present for burrowing. The American badger is a CDFG Species of Special Concern. The desert kit fox distribution ranges from the southwestern United States into areas of northern Mexico, and can be found in many of the same habitats that support the badger. The desert kit fox currently retains no special status; however, it is protected under Title 14, California Code of Regulations (sections 460). Threats to both of these species include habitat loss or damage due to development, agriculture, pesticide use, off-highway vehicle use, mining, and trash disposal. Current and foreseeable renewable energy developments in the Mojave Desert contribute to the loss and damage of habitat through development, fragmentation, and the disruption of natural areas. Cumulatively, impacts to American badger and desert kit fox populations in the Mojave Desert area would be severe, and the project's contribution to cumulative effects is significant given the threats to these species from future developments. These cumulative effects would be minimized to a level less than significant by avoidance and minimization measures in staff's proposed Condition of Certification **BIO-25**. In addition, implementation of staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan for desert tortoise, would reduce the impacts of habitat loss by the preservation of similar plant communities.

Bats

A variety of bat species are known to occur in the Mojave Desert. The pallid bat, Yuma myotis, and Townsend's big-eared bat range throughout most of California while the western mastiff bat is generally found south of the San Joaquin Valley (inland range) and Monterey County (coast range). All four species are BLM Sensitive Species while the pallid bat, Townsend's big-eared bat and western mastiff bat are also CDFG Species of Special Concern. Threats to bat species include habitat loss or damage and/or a reduction in prey base due to urbanization, mining, trash disposal, pesticide use, and noise from off-road vehicles. Current and foreseeable renewable energy developments in the Mojave Desert contribute to the loss and damage of habitat through development, a potential reduction in prey base and the disruption of natural areas. Cumulatively, impacts to bat populations in the Mojave Desert area would be severe, and the project's contribution to cumulative effects is significant given the threats to these species from future developments. These cumulative effects would be minimized to a level less than significant by avoidance and minimization measures in staff's proposed Condition of Certification **BIO-26**. In addition, implementation of staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan for desert tortoise, would reduce the impacts of habitat loss by the preservation of similar plant communities.

Wildlife Movement and Connectivity

Wildlife movement corridors currently present on the project site help facilitate movement over a range that includes the entire Mojave Desert. Wildlife corridors provide a variety of functions and can include habitat linkages between natural areas, provide greenbelts and refuge systems, and divert wildlife across permanent physical barriers to dispersal such as highways and dams by roadway underpasses and ramps (Haas 2000; Simberloff et al. 1992). Threats to wildlife movement corridors include large-scale development, including agriculture, infrastructure, commercial and residential development, and military uses. Current and foreseeable renewable energy developments in the Mojave Desert contribute to the loss and damage of wildlife movement corridors. Cumulatively, impacts to corridors in the Mojave Desert area would be severe. The proposed project would contribute incrementally to these impacts, but the cumulative contribution would be minimized through the implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-9**. However, even with the implementation of these measures staff considers that the impacts of the project, combined with the effects of other foreseeable future projects, will be cumulatively considerable and that because of the required tortoise fencing these measures would not entirely offset the project's impacts to movement in the north-south corridor.

Plant Communities

Thirty-two distinct plant communities are found within the western Mojave Desert (BLM et al. 2005), some of which have been consolidated into more general categories in **Biological Resources Table 15**. Creosote bush scrub and saltbush scrub are the most common, occupying 75% of the undeveloped lands. Mojave mixed woody scrub accounts for 13% of the native vegetation. The remaining 29 plant communities are found in isolated areas with unique conditions, such as freshwater or alkali wetlands, or occur along the south and west edges of the WEMO planning area, in the desert-mountain transition (BLM et al. 2005).

The geographic scope of the analysis of cumulative effects on plant communities and general wildlife habitat encompasses the WEMO Planning Area and uses the WEMO plant communities dataset to map and quantify cumulative effects on plant communities (**Biological Resources Table 15** and **Biological Resources Figure 10**). The WEMO plant communities dataset is based on the 1996 California Gap Analysis Project conducted by the Biogeography Lab at the University of California, Santa Barbara and coordinated through the USGS Biological Resources Division. A new vegetation mapping dataset recently became available for the Mojave Desert Region (Thomas et al. 2002); however, the dataset does not cover the entire WEMO area and therefore was not used in this analysis.

Biological Resources Table 15 quantifies the cumulative effects to plant communities, stratified by community type. Mojave creosote scrub refers to the creosote bush-dominant desert scrubs that occur within the Mojave Desert region of the California Desert geographic subdivision (Hickman 1993).

Significant cumulative effects to plant communities from future projects are seen in many community types, particularly Mojave creosote scrub, mixed desert scrubs, woodland habitats, playa and desert sink scrub, desert wash scrub, and riparian scrub. The project contributes at least incrementally to the cumulative impacts of future projects to Mojave creosote scrub and saltbush scrub. Mojave creosote scrub is a common and widespread community in the southeastern deserts of California; however, this broad designation does not reflect the many uncommon and even rare plant assemblages within creosote scrub that have been documented and are monitored by the CNDDB. These are communities ranked as State rare (S3 or below) because the associations are rare due to a restricted range, relatively few occurrences, recent and widespread declines, or other factors. Examples include associations of creosote scrub and galleta grass, which occur on the project site but were not delineated separately from creosote scrub.

The analysis of impacts to foraging habitat based on the WEMO plant communities dataset concludes that the project would impact 2.2% of all the Mojave creosote bush scrub affected by future projects, as well as 1.1% of all the saltbush scrub affected by future projects. The project's contribution to these effects would be minimized through the compensatory mitigation of desert tortoise habitat, bighorn sheep habitat, and golden eagle foraging habitat; implementation of Best Management Practices for minimizing construction impacts; and specifications for restoring temporarily disturbed habitat. While acquisition does not address the net loss of habitat in the immediate future (a temporal net loss of habitat), it is expected to prevent future losses of habitat by placing a permanent conservation easement and deed restrictions on private lands that could otherwise be converted for urban, agricultural or energy development.

The project also would have minor impacts to lava flows, a noteworthy landform in the WEMO planning area. These impacts are not significant given that the total contribution to effects on lava flows resulting from future projects is only 0.1%.

The project does not contribute to cumulative effects to any other plant community type other than Mojave creosote scrub and saltbush scrub, to which it has only minor cumulative effects.

Biological Resources Table 15
Cumulative Effects: Plant Communities

Plant Community[1]	**Total Plant Communities**[1] **in WEMO**	**Impacts to Habitat from Existing Projects**[2] (percent of all community type in WEMO)	**Impacts to Habitat from Foreseeable Future Projects**[3] (percent of all community type in WEMO**)**	**Contribution of Calico Solar Project to Future Cumulative Impacts** (percent of total impacts from future projects)
Mojave Creosote Scrub	5,685,847 acres	2,272 acres (0.04%)	362,587 acres (6.4%)	8,024 acres (2.2%)
Mixed Desert Scrubs	1,462,366 acres	32 acres (0.002%)	73,128 acres (5.0%)	0 acres

Saltbush Scrub	845,157 acres	1,569 acres (0.2%)	21,247 acres (2.5%)	228 acres (1.1%)
Oak/Juniper/Pine/Joshua Tree Woodland	320,031 acres	0 acres	14,812 acres (4.6%)	0 acres
Urban	219,644 acres	211,399 acres (96%)	46 acres (0.02%)	0 acres
Chaparral	194,551 acres	0 acres	11,546 acres (5.9%)	0 acres
Agriculture	182,360 acres	182,360 acres (100%)	0 acres	0 acres
Playa/Dry Lake	153,593 acres	0 acres	3,329 acres (2.2%)	0 acres
Desert Wash Scrub	81,683 acres	0 acres	1,387 acres (1.7%)	0 acres
Non-native Grassland	69,563 acres	0 acres	344 acres (0.5%)	0 acres
Sand Dunes	41,416 acres	0 acres	8 acres (<0.1%)	0 acres
Desert Sink Scrub	30,586 acres	0 acres	853 acres (2.8%)	0 acres
Riparian Scrub/Forest	26,671 acres	0 acres	378 acres (1.4%)	0 acres
Lava	23,789 acres	0 acres	17 acres (0.1%)	10 acres (58.8%)
Mesquite Bosque	7,576 acres	0 acres	0 acres	0 acres
Native Grassland	3,375 acres	0 acres	24 acres (0.7%)	0 acres
Montane Meadow	974 acres	0 acres	2 acres (0.2%)	0 acres
Sand Fields	547 acres	0 acres	0 acres	0 acres
Seeps	447 acres	0 acres	0 acres	0 acres
Palm Oasis	33 acres	0 acres	0 acres	0 acres

1 - Based on the BLM WEMO Plant Communities dataset
2 - Based on Agriculture and Urban mapping units from the WEMO Plant Communities dataset (BLM et al. 2005); see **Biological Resources Table 6**
3 - Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in **Biological Resources Table 5**

<u>Special-Status Plants</u>

White-margined beardtongue

White-margined beardtongue is a locally endemic species in three widely disjunct locations in California, Nevada, and Arizona. It is a rare plant throughout its known range in all three states and its occurrences in Nevada are threatened (Christina Lund, BLM, pers. comm.). Its range and habitat are discussed in more detail under "Special-Status Species" (Section C.2.4.1: Setting and Existing Conditions). In California, most known occurrences are within the BLM Pisgah ACEC southeast of the project site. The California occurrences are far distant and genetically isolated from the other occurrences. Leppig and White (2006) present a rationale for conservation of peripheral populations such as CNPS List 2 taxa (rare in California but more common elsewhere in their ranges). Given that white-margined beardtongue is a CNPS List 1B species, occurs in only a few long-disjunct populations, and is rare everywhere in its known range, the same reasoning argues strongly for local conservation. Given the long distances between the three known occurrences and their locations in three different states, cumulative impacts to California beardtongue are evaluated here in terms of the project's potential impacts to the regional population. Significant adverse cumulative impacts to the regional population would also be significant in the broader context of all three known populations.

There is no quantitative data available on population sizes or areal extent of occupied habitat. White-margined beardtongue habitat is characterized as aeolian sand. In the Pisgah ACEC area, these sandy habitats generally are associated with lava flows, but habitat descriptions in Nevada and Arizona do not mention lava in those areas. Further, there are many extensive dune systems in the California deserts where white-margined beardtongue has never been documented, implying that the species requires additional, unknown, habitat conditions. In the absence of quantitative data on populations and habitat area, the project's cumulative impacts to white-margined beardtongue are evaluated here in qualitative terms.

In addition to direct impacts to white-margined beardtongue and its occupied habitat, construction and/or wind-fencing within the active dune habitat may indirectly affect white-margined beardtongue populations off-site to the southeast, within the BLM Pisgah ACEC, by interrupting aeolian sand transport systems. Quantitative sand transport data are not available to quantify or the significance of these potential off-site project impacts. Other cumulative indirect effects not reflected in the quantitative analysis include: the effects of past and future grazing and off-road vehicles; altered drainage patterns, and the potential spread of invasive non-native plants.

Biological Resources Table 16 summarizes the results of an analysis of the plant communities that occur within the range of white-margined beardtongue in California, using the WEMO plant communities dataset. The species' range boundaries were based on a delineation of the outermost known/documented occurrences (CNDDB 2010; BLM 2006) with a buffer of 1 mile created around the outermost occurrences. **Biological Resources Table 16** also summarizes the various landforms that have been documented within its range, using the MDEP landforms dataset. The landforms data are illustrated spatially in **Biological Resources Figure 11**. This presentation makes no attempt to rank the habitat quality or suitability. The species has been documented on dune habitat in Nevada but in California it appears to be restricted to blow sand on lava flows associated with the Pisgah Crater. The mapping of habitat types known to support white-margined beardtongue should not be misconstrued as potentially occupied; rare plants have very specific microhabitat requirements that are often poorly understood. Much of the area known to contain 'suitable habitat' for a given rare plant is unoccupied or confined to small or scattered and infrequent occurrences.

As quantified in **Biological Resources Table 16** and illustrated in **Biological Resources Figure 11**; foreseeable future projects, including the proposed project, have the potential to convert a substantial portion of the range of this rare species in California, and threats to the southern Nevada populations have also been reported (Christina Lund, BLM, pers. comm.). The project's contribution to cumulative effects to white-margined beardtongue is also cumulatively considerable, particularly in light of the highly restricted range of this species in California. These significant cumulative effects could only be minimized to a level less than significant through the recommended avoidance measures and adjacent 250-foot buffer in staff's proposed Condition of Certification **BIO-12.**

Biological Resources Table 16
Cumulative Effects: White-margined Beardtongue – Range in California
WEMO Plant Communities/MDEP Landforms

Plant Communities[1]	Total Plant Communities Within Range of Species in California	Impacts to Plant Communities from Existing Projects[2] (percent of total habitat)	Impacts to Plant Communities from Foreseeable Future Projects[3] (percent of total habitat)	Contribution of Calico Solar Project to Future Cumulative Impacts (percent of total future impacts)
Mojave Creosote Scrub	91,589 acres	0 acres	30,066 acres (32.8%)	6,072 acres (20.2%)
Mixed Desert Scrubs	85 acres	0 acres	14 acres (16.5%)	0 acres
Saltbush Scrub	9,362 acres	0 acres	228 acres	228 acres (100%)
Lava	8,340 acres	0 acres	15 acres (0.2%)	10 acres (66.6%)
Playa/Dry Lake	1,500 acres	0 acres	0 acres	0 acres[4]
Desert Wash Scrub	1,220 acres	0 acres	391 acres (32.1%)	0 acres[4]

Landforms[1]	Total Landforms within Range of Species in California	Impacts to Landforms from Existing Projects (percent of total habitat)	Impacts to Landforms from Foreseeable Future Projects (percent of total habitat)	Contribution of Calico Solar Project to Future Cumulative Impacts (percent of total future impacts)
Bajada	38,583 acres	0 acres	11,540 acres (29.9%)	4,148 (35.9%)
Canyon Bottomland	206 acres	0 acres	154 acres (74.8%)	0 acres
Dune Fields	464 acres	0 acres	464 acres (100%)	0 acres[4]
Erosional Highland	27,037 acres	0 acres	10,865 acres (40.2%)	0 acres
Floodplain	795 acres	0 acres	227 acres (28.6%)	0 acres
Inselberg	3,445 acres	0 acres	328 acres (9.5%)	28 acres (8.5%)
Intermountain Alluvial Plain	208 acres	0 acres	0 acres	0 acres
Lava Field	13,110 acres	0 acres	191 acres (1.5%)	62 acres (32.5%)
Older Alluvial Deposit	24,768 acres	0 acres	6,442 acres (26%)	2,006 acres (31.1%)
Playa	2,838 acres	0 acres	0 acres	0 acres

Landforms[1]	Total Landforms within Range of Species in California	Impacts to Landforms from Existing Projects (percent of total habitat)	Impacts to Landforms from Foreseeable Future Projects (percent of total habitat)	Contribution of Calico Solar Project to Future Cumulative Impacts (percent of total future impacts)
Volcano	180 acres	0 acres	0 acres	0 acres
Desert Wash	1,108 acres	0 acres	275 acres (24.8%)	72 acres[4] (26.2%)

1 - Plant communities based on WEMO plant communities dataset; Landforms based on MDEP landforms dataset:
2 - Based on Agriculture and Urban mapping units from the WEMO Plant Communities dataset (BLM et al. 2005); see **Biological Resources Table 6**
3 - Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in **Biological Resources Table 6**
4 - Acreages based on large-scale mapping efforts from interpretation of aerial photos (WEMO plant communities dataset and MDEP landforms dataset) and does not reflect the ground-based delineation of habitat. The applicant mapped 16.9 acres of dunes (habitat for Mojave fringe-toed lizard) within the project area (SES 2009a)

Biological Resources Table 17
Cumulative Effects: White-margined Beardtongue – CNDDB Records

CNDDB Polygons/ Point (Centroid) Data	Total CNDDB Records in WEMO	Impacts to CNDDB Records from Existing Projects[1] (percent of total habitat)	Impacts to CNDDB Records from Foreseeable Future Projects[2] (percent of total habitat)	Contribution of Calico Solar Project to Future Cumulative Impacts (percent of total future impacts)
CNDDB Point Data	18	0	8 (44%)	2 (25%)

1 - Based on Agriculture and Urban mapping units from the WEMO Plant Communities dataset (BLM et al., 2005); see Biological Resources Table 6
2 - Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in Biological Resources Table 6

Although portions of some populations of white-margined beardtongue would be avoided by future projects, many of the known occurrences are in areas proposed for future energy development projects (**Biological Resources Figure 11** and **Biological Resources Table 16**). As such, the project's contribution to cumulative effects is significant given the highly restricted range of this species in California, and threats to its population from future developments. These cumulative effects would be minimized by measures requiring partial avoidance and measures for avoiding indirect impacts to remaining plants following construction, in staff's proposed Condition of Certification **BIO-12**.

Other Special-Status Plants

A variety of special-status plant species have ranges that extend through the Mojave Desert, and several are endemic. Nine special-status plants occur on the Calico Solar Project site, including CNPS List 1, 2 and 4 plants as well as BLM Sensitive Species. Threats to special-status plants in the Mojave Desert include habitat loss and fragmentation due to development, off-highway vehicle activity, cattle and sheep grazing, overdrawn groundwater, and the spread of invasive plant species (CDFG 2005). Current and foreseeable renewable energy developments in the Mojave Desert contribute to impacts to special-status plants through loss and fragmentation of habitat to development, contributing to depletion of groundwater supplies, and contributing to the spread of nonnative and invasive weeds. Cumulatively, impacts to special-status plants would be severe, and the project's contribution to cumulative effects is significant given the threats to these species from future developments. These cumulative effects would be minimized to a level less than significant by measures requiring partial avoidance and measures for avoiding indirect impacts to remaining plants following construction, in staff's proposed Condition of Certification **BIO-12**.

C.2.9.8 CONCLUSION

Construction and operation of the proposed project will have effects on a number of biological resources that are individually limited but cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. However, cumulative impact assessments cannot conclude that contributions to cumulative impacts are not significant because the contributions represent a small percentage of the overall problem.

The cumulative effects analysis employed a quantitative, GIS-based analysis of direct impacts to habitat, and a qualitative analysis of indirect effects (e.g., increases in predators, invasive weeds, etc.). In many cases, the anticipated indirect effects are more significant, or adverse, than the direct loss of habitat, but are more difficult to quantify. The qualitative assessment of indirect cumulative effects relied on consultations with regional experts and agency biologists and a literature review of the threats to species and their habitats.

Staff considers the cumulative effects to the Newberry Springs watershed streams from all proposed future projects (14.1% of all stream reaches) to be significant. The proposed project's contribution to these significant cumulative impacts could be reduced to a level below significance at the project level with implementation of staff's proposed Condition of Certification **BIO-27**.

Staff considers the cumulative project impacts to desert tortoise and Mohave fringe-toed lizard to be significant even with the application of mitigation. This includes Condition of Certification **BIO-13** which requires the acquisition of suitable dune/sand habitat at a 5:1 ratio for Mojave fringe-toed lizard habitat and Conditions of Certification **BIO-15, BIO-16,** and **BIO-17** for desert tortoise.

Even with the implementation of the avoidance, minimization, and compensation measures, staff considers that the impacts of the proposed project on wildlife movement and connectivity, combined with the similar effects of other foreseeable future projects will be cumulatively considerable, and would not entirely offset the proposed project's impacts to movement in the north-south corridor.

Staff considers the cumulative project impacts to bighorn sheep occupied range, connectivity, and spring forage habitat to be significant, and only partially mitigated by habitat acquisition specified in Condition of Certification **BIO-24**.

Staff considers the cumulative impacts to white-margined beardtongue to be significant, and only partially mitigated by avoidance and preservation of portions of the habitat, as specified in Condition of Certification **BIO-12**. Although the project's contribution to cumulative effects to white-margined beardtongue, after mitigation, is individually small, the project contributes incrementally to overall impacts to habitat and connectivity for this species. The cumulative effects of all projects are likely to remain significant even after project-specific mitigation for habitat loss is considered.

The project-specific effects to other special-status species and habitats have been mitigated to less-than-significant levels with general and species-specific measures for avoidance, minimization, and compensation, detailed monitoring, reporting requirements, and funding mechanisms to ensure implementation and accountability.

Although the implementation of staff's proposed conditions of certification would reduce the proposed project's contribution to most cumulative effects to a level that is not cumulatively considerable, there may be cumulative effects remaining even after mitigation is implemented by all projects. These residual cumulative effects from all future projects could be addressed through a regional and coordinated planning effort aimed at preserving and enhancing large, intact expanses of wildlife habitat and linkages, including maintaining connections between wildlife management areas and other movement corridors. Ongoing collaborative efforts by federal and State agencies to develop a Desert Renewable Energy Conservation Plan and BLM's Solar Energy Development Programmatic EIS offer an appropriate forum for such planning. Staff supports these programmatic efforts and believes they represent an excellent means of integrating the State's and BLM's renewable resources goals and environmental protection goals.

C.2.10 COMPLIANCE WITH LORS

The proposed project must comply with State and federal laws, ordinances, regulations, and standards (LORS) that address State and federally listed species, as well as other sensitive species and habitats, and must secure the appropriate permits to satisfy these LORS. The Energy Commission has a one-stop permitting process for all thermal power plants rated 50 MW or more under the Warren-Alquist Act (Pub. Resources Code § 25500). Under the act, the Energy Commission’s certificate is “in lieu of” other State, local, and regional permits (*ibid*.) The Energy Commission’s streamlined permitting process accomplishes a primary objective of the Renewable Energy Action Team, as identified in the Governor’s Executive Order S-14-08 — to create a “one-stop” process for permitting renewable energy generation facilities under California law. Accordingly, Energy Commission staff has coordinated joint environmental review with the California Department of Fish and Game and the Lahontan Regional Water Quality Control Board, as well as the U.S. Fish and Wildlife Service. Staff has incorporated all required terms and conditions that might otherwise be included in State permits into the Energy Commission’s certification process. The conditions of certification described below satisfy the following State LORS and take the place of terms and conditions that, but for the Commission’s exclusive authority, would have been included in the following State permits.

In addition, the applicant has submitted an application to the BLM requesting a ROW to construct the proposed project and its related facilities. Pursuant to the

California Desert Conservation Area (CDCA) Plan (1980, as amended), sites associated with power generation or transmission not identified in the CDCA Plan are considered through the Plan Amendment process. Under Federal law, BLM is responsible for processing requests for ROWs to authorize such proposed projects and associated transmission lines and other appurtenant facilities on land it manages. The CDCA Plan, while recognizing the potential compatibility of solar generation facilities on public lands, requires that all sites associated with power generation or transmission not identified in the Plan be considered through the Plan Amendment process. BLM would use the following Planning Criteria during the Plan Amendment process:

- The plan amendment process would be completed in compliance with the Federal Land Policy and Management Act (FLPMA), NEPA, and all other relevant Federal law, Executive orders, and management policies of the BLM;
- The plan amendment process would include an EIS (i.e., this joint Energy Commission Staff Assessment/BLM EIS) to comply with NEPA standards;
- Where existing planning decisions are still valid, those decisions may remain unchanged and be incorporated into the new plan amendment;
- The plan amendment would recognize valid existing rights;
- Native American Tribal consultations would be conducted in accordance with policy, and Tribal concerns would be given due consideration. The plan amendment process would include the consideration of any impacts on Indian trust assets (please see the **Cultural Resources** section);
- Consultation with the State Office of Historic Preservation (SHPO) would be conducted throughout the plan amendment process (please see the **Cultural Resources** section); and
- Consultation with the US Fish and Wildlife Service (USFWS) would be conducted throughout the plan amendment process.

If the ROW and proposed land use plan amendment are approved by BLM, the proposed solar thermal power plant facility on public lands would be authorized in accordance with Title V of the FLPMA of 1976 and the Federal Regulations at 43 CFR part 2800. This Environmental Impact Statement (EIS) acts as the mechanism for meeting NEPA requirements, and also provides the analysis required to support a Plan Amendment identifying the facility within the Plan.

Biological Resources Table 18 provides a summary of the proposed project's compliance with federal, State, and local LORS.

Biological Resources Table 18
Summary of Compliance with LORS

Applicable Law	Description	Rationale for Compliance
FEDERAL		
Federal Endangered Species Act (Title 16, United States Code, section 1531 et seq., and Title 50, Code of Federal Regulations, part 17.1 et seq.)	Designates and provides for protection of threatened and endangered plant and animal species and their critical habitat. "Take" of a federally-listed species is prohibited without an incidental take permit, which may be obtained through Section 7 consultation (between federal agencies) or a Section 10 Habitat Conservation Plan.	The applicant is currently undergoing consultation with the USFWS for project impacts to desert tortoise and a Biological Opinion will be issued for the proposed project. In addition, staff's proposed Conditions of Certification BIO-1 through BIO-9 and BIO-15 through BIO-18 include measures to minimize and compensate for impacts to the federally listed desert tortoise.
Migratory Bird Treaty (Title 16, United States Code, sections 703 through 711)	Makes it unlawful to take or possess any migratory nongame bird (or any part of such migratory nongame bird) as designated in the Migratory Bird Treaty Act unless permitted by regulation (e.g., duck hunting).	Staff's proposed Condition of Certification BIO-19 includes preconstruction nest surveys, no-disturbance buffers around active nests, and monitoring of nests to minimize impacts to nesting birds covered under the Migratory Bird Treaty Act.
Clean Water Act (Title 33, United States Code, sections 1251 through 1376, and Code of Federal Regulations, part 30, section 330.5(a)(26))	Requires the permitting and monitoring of all discharges to surface water bodies. Section 404 requires a permit from the U.S. Army Corps of Engineers (USACE) for a discharge from dredged or fill materials into waters of the U.S., including wetlands. Section 401 requires a permit from a regional water quality control board (RWQCB) for the discharge of pollutants. By federal law, every applicant for a federal permit or license for an activity that may result in a discharge into a California water body, including wetlands, must request State certification that the proposed activity will not violate State and federal water quality standards.	Waters of the U.S. do not occur within the project area.
Bald and Golden Eagle Protection Act (Title 16, United States Code section 668)	Provides for the protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the take, possession, and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the act or regulations issued pursuant thereto and strengthened other enforcement measures. Rewards are provided for information leading to arrest and conviction for violation of the act.	A recently issued Final Rule (September 2009) provides for a regulatory mechanism under the BGPA to permit take of bald or golden eagles comparable to incidental take permits under the ESA. This rule adds a new section at 50 CFR 22.26 to authorize the issuance of permits to take bald eagles and golden eagles on a limited basis. The BGPA defines the ''take'' of an eagle to include a broad range of actions, including disturbance. ''Disturb'' is defined in regulations at 50 CFR 22.3 as: ''to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.''

Applicable Law	Description	Rationale for Compliance
		The proposed project may result in "take" of the golden eagle from disturbance to nesting pairs as well as loss of foraging habitat, which may result loss of productivity for this species. Golden eagles are known to nest within a 10-mile radius of the project and at least three pairs occur within 5-miles. Results of golden eagle nesting surveys and foraging habitat assessment are required to determine whether construction of the proposed project would result in take of the species and therefore require a permit. The USFWS Migratory Bird Division is in the process of developing guidance regarding implementation of this final rule, including establishing take thresholds within each Bird Conservation Region that must not be exceeded. If it is ultimately determined that take of golden eagle would occur as a result of the proposed project, an individual (non-programmatic) permit would be required. Permit issuance will be conditioned on various criteria, the most important of which is that the permitted take is compatible with the preservation of the bald eagle and the golden eagle (i.e., consistent with the goal of stable or increasing breeding populations). Staff encourages the applicant to coordinate closely with USFWS as guidance becomes available regarding implementation of the revised BGPA. At this time, staff is unable to determine whether the proposed project would be in compliance with the BGPA. Staff's proposed Condition of Certification BIO-20 includes preconstruction nest surveys, no-disturbance buffers around active nests, and monitoring of nests to minimize impacts to nesting golden eagles. Staff's proposed Condition of Certification BIO-21 requires documentation of compliance with the Bald and Golden Eagle Protection Act.
California Desert Conservation Area Plan 1980, as amended (reprinted in 1999)	Administered by the BLM, the CDCA Plan requires that proposed development projects are compatible with policies that provide for the protection, enhancement, and sustainability of fish and wildlife species, wildlife corridors, riparian and wetland habitats, and native vegetation resources.	Staff's proposed Conditions of Certification BIO-1 through BIO-30 minimize, avoid, and compensate for impacts to various biological resources covered by the CDCA Plan.

Applicable Law	Description	Rationale for Compliance
California Desert Protection Act of 1994	An Act of Congress which established 69 wilderness areas, the Mojave National Preserve, expanded Joshua Tree and Death Valley National Monuments and redefined them as National Parks. Lands transferred to the National Park Service were formerly administered by the BLM and included significant portions of grazing allotments, wild horse and burro Herd Management Areas, and Herd Areas.	Staff's proposed Conditions of Certification BIO-1 through BIO-30 minimize, avoid, and compensate for impacts to various biological resources covered by the California Desert Protection Act of 1994.
West Mojave Plan	As an amendment to the CDCA Plan, the BLM produced the West Mojave Plan (WEMO) (BLM 2006). The WEMO is a federal land use plan amendment that (1) presents a comprehensive strategy to conserve and protect the desert tortoise, the Mohave ground squirrel (MGS) and nearly 100 other plants and animals and the natural communities of which they are part, and (2) provides a streamlined program for complying with the requirements of the California and federal Endangered Species Acts (BLM et al. 2005).	Staff's proposed Conditions of Certification BIO-1 through BIO-30 minimize, avoid, and compensate for impacts to various biological resources covered by the West Mojave Plan.
STATE		
California Endangered Species Act of 1984 (Fish and Game Code, sections 2050 through 2098)	Protects California's rare, threatened, and endangered species. "Take" of a State-listed species is prohibited without an Incidental Take Permit.	Staff's proposed Conditions of Certification BIO-1 through BIO-9 and BIO-15 through BIO-19 would ensure that the project is not likely to jeopardize the continued existence of desert tortoise or Swainson's hawk or result in the degradation of occupied habitat for any State-listed species.
California Code of Regulations (Title 14, sections 670.2 and 670.5)	Lists the plants and animals of California that are declared rare, threatened, or endangered.	Analysis of potential project impacts to rare, threatened, or endangered species is provided above, and Conditions of Certification are proposed that would minimize impacts to these species.
Fully Protected Species (Fish and Game Code, sections 3511, 4700, 5050, and 5515)	Designates certain species as fully protected and prohibits the take of such species or their habitat unless for scientific purposes (see also California Code of Regulations, Title 14, section 670.7).	Golden eagle is designated as fully protected and has been observed in the project area. However, Staff's proposed Condition of Certification BIO-20 includes preconstruction nest surveys, no-disturbance buffers around active nests, and monitoring of nests to minimize impacts to golden eagles. Staff's proposed Condition of Certification BIO-21 requires documentation of compliance with the Bald and Golden Eagle Protection Act.
Nest or Eggs (Fish and Game Code section 3503 and 3503.5)	Protects California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird.	Staff's proposed Condition of Certification BIO-19 includes preconstruction nest surveys, no-disturbance buffers around active nests, and monitoring of nests to minimize impacts to nesting birds. Staff's proposed Condition of Certification BIO-6 includes a Worker Environmental Awareness Program to educate workers about compliance with environmental regulations, including Fish and Game Code section 3503.

Applicable Law	Description	Rationale for Compliance
Migratory Birds (Fish and Game Code section 3513)	Protects California's migratory birds by making it unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame birds.	Staff's proposed Condition of Certification BIO-19 includes preconstruction nest surveys, no-disturbance buffers around active nests, and monitoring of nests to minimize impacts to nesting birds. Staff's proposed Condition of Certification BIO-6 includes a Worker Environmental Awareness Program to educate workers about compliance with environmental regulations, including Fish and Game Code section 3513.
Significant Natural Areas (Fish and Game Code section 1930 et seq.)	Designates certain areas such as refuges, natural sloughs, riparian areas, and vernal pools as significant wildlife habitat.	Refuges, natural sloughs, riparian areas, and vernal pools do not occur on the project site.
California Environmental Quality Act (CEQA), CEQA Guidelines section 15380	CEQA defines rare species more broadly than the definitions for species listed under the State and federal Endangered Species Acts. Under section 15830, species not protected through State or federal listing but nonetheless demonstrable as "endangered" or "rare" under CEQA should also receive consideration in environmental analyses. Included in this category are many plants considered rare by the California Native Plant Society (CNPS) and some animals on the CDFG's Special Animals List.	Implementation of Staff's proposed Conditions of Certification BIO-1 through BIO-30 would ensure that the project remains in compliance with CEQA.
Streambed Alteration Agreement (Fish and Game Code sections 1600 et seq.)	Regulates activities that may divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake in California designated by CDFG in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit. Impacts to vegetation and wildlife resulting from disturbances to waterways are also reviewed and regulated during the permitting process.	Staff's proposed Condition of Certification BIO-27 includes measures to minimize and avoid impacts to jurisdictional waters of the State.
California Native Plant Protection Act of 1977 (Fish and Game Code section 1900 et seq.)	Designates State rare, threatened, and endangered plants.	Staff's proposed Conditions of Certification BIO-10 through BIO-12 include restoration and compensation for impacts to native plant communities, a Weed Management Plan, special-status plant surveys, and minimization and avoidance measures to minimize impacts to special-status plants.
California Desert Native Plants Act of 1981 (Food and Agricultural Code section 80001 et seq. and California Fish and Game Code sections 1925-1926)	Protects non-listed California desert native plants from unlawful harvesting on both public and private lands in Imperial, Inyo, Kern, Los Angeles, Mono, Riverside, San Bernardino, and San Diego counties. Unless issued a valid permit, wood receipt, tag, and seal by the commissioner or sheriff, harvesting, transporting, selling, or possessing specific desert plants is prohibited.	Staff's proposed Condition of Certification BIO-12 includes a Protected Plant Salvage Plan, which would minimize impacts to specific native desert plants.

Applicable Law	Description	Rationale for Compliance
LOCAL		
San Bernardino County General Plan: Conservation/Open Space Element of the County General Plan (County of San Bernardino 2007)	Includes objectives to preserve water quality and open space to benefit biological resources, and specific policies and goals for protecting areas of sensitive plant, soils and wildlife habitat and for assuring compatibility between natural areas and development. Although the Calico Solar Project is not located on lands under county jurisdiction, the general plan provides objectives which are consistent with some of the LORS listed above.	Implementation of Staff's proposed Conditions of Certification BIO-1 through BIO-30 would ensure that the project remains in compliance with the San Bernardino County General Plan.

C.2.11 NOTEWORTHY PUBLIC BENEFITS

The Calico Solar Project and the proposed alternatives would result in significant impacts to sensitive biological resources, and would permanently diminish the extent and value of native plant and animal communities in the region. Staff has therefore concluded that the Calico Solar Project would not provide any noteworthy public benefits related to biological resources, despite the contributions the project would make to meeting federal and State mandates for development of renewable energy resources.

C.2.12 FACILITY CLOSURE

In the future, Calico Solar Project would experience either a planned closure or be unexpectedly (either temporarily or permanently) closed. When facility closure occurs, it must be done so that it protects the environment and public health and safety. A closure plan would be prepared by the project owner prior to any planned closure. To address unanticipated facility closure, an "on-site contingency plan" would be developed by the project owner and approved by the Energy Commission Compliance Project Manager (CPM). Facility closure requirements are discussed in more detail in the **General Conditions** section of this SA/DEIS. Facility closure mitigation measures would also be included in the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) prepared by the project owner and described in staff's proposed Condition of Certification **BIO-7.**

The facility closure plan should address habitat restoration measures to be implemented in the event of a planned or an unexpected permanent closure and must also include a funding mechanism to ensure sufficient funds are available for decommissioning and habitat restoration. Planned or unexpected permanent facility closure should address the removal of the transmission conductors and poles since birds are known to collide with transmission line ground wires and poles may serve as predatory perches and nesting sites.

Staff's proposed Conditions of Certification **BIO-29** and **BIO-30** contain measures to ensure that impacts to biological resources are addressed prior to the planned permanent or unexpected permanent closure of the project.

C.2.13 STAFF'S PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

With implementation of staff's proposed conditions of certification, construction and operation of the Calico Solar Project would comply with all federal, State, and local laws, ordinances, regulations, and standards relating to biological resources. Staff recommends adoption of the following conditions of certification to mitigate potential impacts to sensitive biological resources to less-than-significant levels under CEQA. The accelerated timing requirements described in these proposed conditions of certification reflect the need for the Calico Solar Project to commence construction before the end of 2010 in order to receive American Recovery and Reinvestment Act of 2009 (ARRA) funding.

DESIGNATED BIOLOGIST SELECTION[1]

BIO-1 The project owner shall assign at least one Designated Biologist to the project. The project owner shall submit the resume of the proposed Designated Biologist, with at least three references and contact information, to the Energy Commission Compliance Project Manager (CPM) and the Bureau of Land Management's (BLM's) Wildlife Biologist for approval in consultation with the California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS).

The Designated Biologist must meet the following minimum qualifications: Bachelor's degree in biological sciences, zoology, botany, ecology, or a closely related field;

1. Three years of experience in field biology or current certification of a nationally recognized biological society, such as The Ecological Society of America or The Wildlife Society;
2. Have at least one year of field experience with biological resources found in or near the project area;
3. Meet the current USFWS Authorized Biologist qualifications criteria (www.fws.gov/ventura/speciesinfo/protocols_guidelines), demonstrate familiarity with protocols and guidelines for the desert tortoise, and be approved by the USFWS; and
4. Possess a California ESA Memorandum of Understanding pursuant to Section 2081(a) for desert tortoise.

[1] USFWS <www.fws.gov/ventura/speciesinfo/protocols_guidelines/docs/dt> designates biologists who are approved to handle tortoises as "Authorized Biologists." Such biologists have demonstrated to USFWS that they possess sufficient desert tortoise knowledge and experience to handle and move tortoises appropriately, and have received USFWS approval. Authorized Biologists are permitted to then approve specific monitors to handle tortoises, at their discretion. The California Department of Fish and Game (CDFG) must also approve such biologists, potentially including individual approvals for monitors approved by the Authorized Biologist. Designated Biologists are the equivalent of Authorized Biologists. Only Designated Biologists and certain Biological Monitors who have been approved by the Designated Biologist would be allowed to handle desert tortoises.

In lieu of the above requirements, the resume shall demonstrate to the satisfaction of BLM's Wildlife Biologist and the CPM, in consultation with CDFG and USFWS, that the proposed Designated Biologist or alternate has the appropriate training and background to effectively implement the conditions of certification.

Verification: No fewer than 30 days prior to construction-related ground disturbance, the Designated Biologist(s) shall complete a USFWS Desert Tortoise Authorized Biologist Request Form (www.fws.gov/ventura/speciesinfo/protocols_guidelines) and submit it to the USFWS, BLM's Authorized Officer, and the CPM for review and final approval.

The project owner shall submit the resume of the Designated Biologist to the CPM and BLM within 7 days of receiving the Energy Commission Decision. No construction-related ground disturbance, grading, boring, or trenching shall commence until an approved Designated Biologist is available to be on site.

If a Designated Biologist needs to be replaced, the specified information of the proposed replacement must be submitted to BLM's Wildlife Biologist and the CPM at least 10 working days prior to the termination or release of the preceding Designated Biologist. In an emergency, the project owner shall immediately notify the BLM's Wildlife Biologist and the CPM to discuss the qualifications and approval of a short-term replacement while a permanent Designated Biologist is proposed to BLM's Wildlife Biologist and the CPM and for consideration.

DESIGNATED BIOLOGIST DUTIES

BIO-2 The project owner shall ensure that the Designated Biologist performs the activities described below during any site mobilization activities, construction-related ground disturbance, grading, boring, or trenching activities. The Designated Biologist may be assisted by the approved Biological Monitor(s) but remains the contact for the project owner, BLM's Authorized Officer, and the CPM. The Designated Biologist Duties shall include the following:

1. Advise the project owner's Construction and Operation Managers on the implementation of the biological resources conditions of certification;
2. Consult on the preparation of the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) to be submitted by the project owner;
3. Be available to supervise, conduct, and coordinate mitigation, monitoring, and other biological resources compliance efforts, particularly in areas requiring avoidance or containing sensitive biological resources, such as special-status species or their habitat;
4. Clearly mark sensitive biological resource areas and inspect these areas at appropriate intervals for compliance with regulatory terms and conditions;
5. Inspect active construction areas where animals may have become trapped prior to construction commencing each day. At the end of the day, inspect for the installation of structures that prevent entrapment or allow

escape during periods of construction inactivity. Periodically inspect areas with high vehicle activity (e.g., parking lots) for animals in harm's way;

6. Notify the project owner, the BLM's Wildlife Biologist and the CPM of any non-compliance with any biological resources condition of certification;
7. Respond directly to inquiries of BLM's Wildlife Biologist and the CPM regarding biological resource issues;
8. Maintain written records of the tasks specified above and those included in the BRMIMP. Summaries of these records shall be submitted in the Monthly Compliance Report and the Annual Compliance Report to both the CPM and BLM Wildlife Biologist;
9. Train the Biological Monitors as appropriate, and ensure their familiarity with the BRMIMP, Worker Environmental Awareness Program (WEAP) training, and USFWS guidelines on desert tortoise surveys and handling procedures <www.fws.gov/ventura/speciesinfo/protocols_guidelines>; and
10. Maintain the ability to be in regular, direct communication with representatives of CDFG, USFWS, BLM's Authorized Officer, and the CPM, including notifying these agencies of dead or injured listed species and reporting special-status species observations to the California Natural Diversity Data Base.

Verification: The Designated Biologist shall provide copies of all written reports and summaries that document biological resources compliance activities in the Monthly Compliance Reports submitted to BLM's Wildlife Biologist and the CPM. If actions may affect biological resources during operation a Designated Biologist shall be available for monitoring and reporting. During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless his or her duties cease, as approved by BLM's Wildlife Biologist and the CPM.

BIOLOGICAL MONITOR QUALIFICATIONS

BIO-3 The Designated Biologist shall submit the resume, at least three references, and contact information of each of the proposed Biological Monitors to BLM's Wildlife Biologist and the CPM. The resume shall demonstrate, to the satisfaction of the BLM's Wildlife Biologist and the CPM, the appropriate education and experience to accomplish the assigned biological resource tasks. The Biological Monitor is the equivalent of the USFWS designated Desert Tortoise Monitor (USFWS 2008c).

Biological Monitor(s) training by the Designated Biologist shall include familiarity with the conditions of certification, BRMIMP, WEAP, and USFWS guidelines on desert tortoise surveys and handling procedures <www.fws.gov/ventura/speciesinfo/protocols_guidelines>.

Verification: The project owner shall submit the specified information to the BLM's Wildlife Biologist and the CPM for approval at least 30 days prior to the start of any site mobilization or construction-related ground disturbance, grading, boring, and trenching. The Designated Biologist shall submit a written statement to BLM's Wildlife Biologist and the CPM confirming that individual Biological Monitor(s) has been trained including the date when training was completed. If additional biological monitors are needed during construction, the specified information shall be submitted to BLM's Wildlife Biologist and the CPM for approval at least 10 days prior to their first day of monitoring activities.

BIOLOGICAL MONITOR DUTIES

BIO-4 The Biological Monitors shall assist the Designated Biologist in conducting surveys and in monitoring of site mobilization activities, construction-related ground disturbance, grading, boring, or trenching. The Designated Biologist shall remain the contact for the project owner, BLM's Authorized Officer, and the CPM.

Verification: The Designated Biologist shall submit in the Monthly Compliance Report to BLM's Wildlife Biologist and the CPM and copies of all written reports and summaries that document biological resources compliance activities, including those conducted by Biological Monitors. If actions may affect biological resources during operation a Biological Monitor, under the supervision of the Designated Biologist, shall be available for monitoring and reporting. During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless their duties cease, as approved by BLM's Wildlife Biologist and the CPM.

DESIGNATED BIOLOGIST AND BIOLOGICAL MONITOR AUTHORITY

BIO-5 The project owner's construction/operation manager shall act on the advice of the Designated Biologist and Biological Monitor(s) to ensure conformance with the biological resources conditions of certification. The Designated Biologist shall have the authority to immediately stop any activity that is not in compliance with these conditions and/or order any reasonable measure to avoid take of an individual of a listed species. If required by the Designated Biologist and Biological Monitor(s), the project owner's construction/operation manager shall halt all site mobilization, ground disturbance, grading, boring, trenching, and operation activities in areas specified by the Designated Biologist. The Designated Biologist shall:

1. Require a halt to all activities in any area when determined that there would be an unauthorized adverse impact to biological resources if the activities continued;
2. Inform the project owner and the construction/operation manager when to resume activities; and
3. Notify BLM's Wildlife Biologist and the CPM if there is a halt of any activities and advise them of any corrective actions that have been taken or would be instituted as a result of the work stoppage.
4. If the Designated Biologist is unavailable for direct consultation, the Biological Monitor shall act on behalf of the Designated Biologist.

Verification: The project owner shall ensure that the Designated Biologist or Biological Monitor notifies BLM's Wildlife Biologist and the CPM immediately (and no later than the morning following the incident, or Monday morning in the case of a weekend) of any non-compliance or a halt of any site mobilization, ground disturbance, grading, construction, and operation activities. The project owner shall notify BLM's

Wildlife Biologist and the CPM of the circumstances and actions being taken to resolve the problem.

Whenever corrective action is taken by the project owner, a determination of success or failure would be made by BLM's Wildlife Biologist and the CPM within five working days after receipt of notice that corrective action is completed, or the project owner would be notified by BLM's Wildlife Biologist and the CPM that coordination with other agencies would require additional time before a determination can be made.

WORKER ENVIRONMENTAL AWARENESS PROGRAM (WEAP)

BIO-6 The project owner shall develop and implement a Project-specific Worker Environmental Awareness Program (WEAP) and shall secure approval for the WEAP from BLM's Wildlife Biologist and the CPM. The WEAP shall be administered to all onsite personnel including surveyors, construction engineers, employees, contractors, contractor's employees, supervisors, inspectors, subcontractors, and delivery personnel. The WEAP shall be implemented during site preconstruction, construction, operation, and closure. The WEAP shall:

1. Be developed by or in consultation with the Designated Biologist and consist of an on-site or training center presentation in which supporting written material and electronic media, including photographs of protected species, is made available to all participants;
2. Discuss the locations and types of sensitive biological resources on the project site and adjacent areas, and explain the reasons for protecting these resources; provide information to participants that no snakes, reptiles, or other wildlife shall be harmed;
3. Place special emphasis on desert tortoises, Mojave fringe-toed lizards, burrowing owls, golden eagles, nesting birds, and badgers including information on physical characteristics, distribution, behavior, ecology, sensitivity to human activities, legal protection, penalties for violations, reporting requirements, and protection measures;
4. Include a discussion of fire prevention measures to be implemented by workers during project activities; request workers dispose of cigarettes and cigars appropriately and not leave them on the ground or buried;
5. Describe the temporary and permanent habitat protection measures to be implemented at the project site;
6. Identify whom to contact if there are further comments and questions about the material discussed in the program; and
7. Include a training acknowledgment form to be signed by each worker indicating that they received training and shall abide by the guidelines.

The specific program can be administered by a competent individual(s) acceptable to the Designated Biologist.

Verification: Within 7 days of publication of the Energy Commission's License Decision, or the Record of Decision/ROW Issuance, whichever comes first, the project owner shall provide to BLM's Wildlife Biologist and the CPM a copy of the final WEAP and all supporting written materials and electronic media prepared or reviewed by the Designated Biologist and a resume of the person(s) administering the program.

The project owner shall provide in the Monthly Compliance Report the number of persons who have completed the training in the prior month and a running total of all persons who have completed the training to date. At least 10 days prior to construction-related ground disturbance activities the project owner shall submit two copies of the BLM- and CPM-approved final WEAP. Training acknowledgement forms signed during construction shall be kept on file by the project owner for at least 6 months after the start of commercial operation.

Throughout the life of the project, the WEAP shall be repeated annually for permanent employees, and shall be routinely administered within one week of arrival to any new construction personnel, foremen, contractors, subcontractors, and other personnel potentially working within the project area. Upon completion of the orientation, employees shall sign a form stating that they attended the program and understand all protection measures. These forms shall be maintained by the project owner and shall be made available to BLM's Wildlife Biologist and the CPM upon request. Workers shall receive and be required to visibly display a hardhat sticker or certificate that they have completed the training.

During project operation, signed statements for operational personnel shall be kept on file for 6 months following the termination of an individual's employment.

BIOLOGICAL RESOURCES MITIGATION IMPLEMENTATION AND MONITORING PLAN

BIO-7 The project owner shall develop a Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP), and shall submit two copies of the proposed BRMIMP to the BLM-Wildlife Biologist and the CPM for review and approval. The project owner shall implement the measures identified in the approved BRMIMP. The BRMIMP shall incorporate avoidance and minimization measures described in final versions of the Hazardous Materials Plan; the Revegetation Plan; the Weed Management Plan; the Special-Status Plant Protection and Monitoring Plan; the Special-Status Plant Remedial Action Plan; the Seed Collection Plan; the Protected Plant Salvage Plan; the Desert Tortoise Relocation/Translocation Plan; the Raven Monitoring, Management, and Control Plan; the Burrowing Owl Monitoring and Mitigation Plan; the Burrowing Owl Relocation Area Management Plan; the Bighorn Sheep Mitigation Plan; the Streambed Management Plan; and the Evaporation Pond Design, Monitoring, and Management Plan.

The BRMIMP shall be prepared in consultation with the Designated Biologist and shall include accurate and up-to-date maps depicting the location of sensitive biological resources that require temporary or permanent protection during construction and operation. The BRMIMP shall include complete and detailed descriptions of the following:

1. All biological resources mitigation, monitoring, and compliance measures proposed and agreed to by the project owner;
2. All biological resources conditions of certification identified as necessary to avoid or mitigate impacts;
3. All biological resource mitigation, monitoring, and compliance measures required in federal agency terms and conditions, such as those provided in the USFWS Biological Opinion, the CDFG 2080.1 consultation, and BLM stipulations;
4. All sensitive biological resources to be impacted, avoided, or mitigated by project construction, operation, and closure;
5. All required mitigation measures for each sensitive biological resource;
6. All measures that shall be taken to avoid or mitigate temporary disturbances from construction activities;
7. Duration for each type of monitoring and a description of monitoring methodologies and frequency;
8. Performance standards to be used to help decide if/when proposed mitigation is or is not successful;
9. All performance standards and remedial measures to be implemented if performance standards are not met;
10. Biological resources-related facility closure measures including a description of funding mechanism(s);
11. A process for proposing plan modifications to BLM's Wildlife Biologist and the CPM and appropriate agencies for review and approval; and
12. A requirement to submit any sightings of any special-status species that are observed on or in proximity to the project site, or during project surveys, to the California Natural Diversity Data Base (CNDDB) per CDFG requirements.

<u>Verification:</u> The project owner shall submit the final BRMIMP to BLM's Wildlife Biologist and the CPM at least 30 days prior to start of any preconstruction site mobilization and construction-related ground disturbance, grading, boring, and trenching. The BRMIMP shall contain all of the required measures included in all biological Conditions of Certification. No construction-related ground disturbance, grading, boring, or trenching may occur prior to approval of the final BRMIMP by BLM's Wildlife Biologist and the CPM.

If any permits have not yet been received when the BRMIMP is first submitted, these permits shall be submitted to BLM's Wildlife Biologist and the CPM within five days of their receipt, and the BRMIMP shall be revised or supplemented to reflect the permit conditions within at least 10 days of their receipt by the project owner. Ten days prior to site and related facilities mobilization, the revised BRMIMP shall be resubmitted to BLM's Wildlife Biologist and the CPM.

To verify that the extent of construction disturbance does not exceed that described in this analysis, the project owner shall submit aerial photographs, at an approved scale, taken before and after construction to the CPM and BLM's Authorized Officer. The first set of aerial photographs shall reflect site conditions prior to any preconstruction site mobilization and construction-related ground disturbance, grading, boring, and trenching, and shall be submitted at least 60 days prior to initiation of such activities. The second set of aerial photographs shall be taken subsequent to completion of construction, and shall be submitted to the CPM and BLM's Wildlife Biologist no later than 90 days after completion of construction. The project owner shall also provide a final accounting of the acreages of vegetation communities/cover types present before and after construction and a depiction of the approved project boundaries superimposed on the post project aerial photograph. If final acreages and/or disturbance footprints exceed those previously approved, the project owner shall coordinate with staff, CDFG, and USFWS to determine appropriate mitigation for such impacts. Such mitigation may exceed the requirements as outlined in these Conditions of Certification (i.e., higher mitigation ratios may be imposed at the discretion of the wildlife agencies).

Any changes to the approved BRMIMP (including the project footprint) must be approved by BLM's Wildlife Biologist and the CPM and in consultation with CDFG and USFWS before such action is taken.

Implementation of BRMIMP measures (for example, construction activities that were monitored, species observed) shall be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of project construction, the project owner shall provide to BLM's Wildlife Biologist and the CPM, for review and approval, a written construction termination report identifying which items of the BRMIMP have been completed, a summary of all modifications to mitigation measures made during the project's preconstruction site mobilization and construction-related ground disturbance, grading, boring, and trenching, and which mitigation and monitoring items are still outstanding as well as a timeline for implementing outstanding items.

IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-8 The project owner shall undertake the following measures to manage the construction site and related facilities in a manner to avoid or minimize impacts to biological resources:

1. Limit Disturbance Areas and Perimeter Fencing. The boundaries of all areas to be disturbed (including staging areas, access roads, and sites for temporary placement of spoils) shall be delineated with stakes and flagging prior to construction activities in consultation with the Designated Biologist. Spoils and topsoil shall be stockpiled in disturbed areas lacking native vegetation and which do not provide habitat for special-status species. Parking areas, staging and disposal site locations shall similarly be located in areas without native vegetation or special-status species habitat. All disturbances, project vehicles, and equipment shall be confined to the flagged areas. Fencing for the proposed retention basins shall be removed after their construction to provide passage and forage opportunities for Bighorn sheep and to facilitate movement of desert tortoise. Vegetation shall be placed along the northern fence line to act as a screen for wildlife.

2. Minimize Road Impacts. New and existing roads that are planned for construction, widening, or other improvements shall not extend beyond the flagged impact area as described above. All vehicles passing or turning around would do so within the planned impact area or in previously disturbed areas. Where new access is required outside of existing roads or the construction zone, the route shall be clearly marked (i.e., flagged and/or staked) prior to the onset of construction.

3. Minimize Traffic Impacts. Vehicular traffic during project construction and operation shall be confined to existing designated routes of travel to and from the project site, and cross country vehicle and equipment use outside designated work areas shall be prohibited. The speed limit shall not exceed 25 miles per hour within the project area, on maintenance roads for linear facilities, or on access roads to the project site.

4. Monitor During Construction. In areas that have not been fenced with desert tortoise exclusion fencing and cleared, the Designated Biologist shall be present at the construction site during all project activities that have potential to disturb soil, vegetation, and wildlife. The Designated Biologist or Biological Monitor shall walk immediately ahead of equipment during brushing and grading activities.

5. Minimize Impacts of Transmission/Pipeline Alignments, Roads, Staging Areas. Staging areas for construction on the plant site shall be within the area that has been fenced with desert tortoise exclusion fencing and cleared. For construction activities outside of the plant site (transmission line, pipeline alignments) access roads, pulling sites, and storage and parking areas shall be designed, installed, and maintained with the goal of minimizing impacts to native plant communities and sensitive biological resources. Transmission lines and all electrical components shall be designed, installed, and maintained in accordance with the Avian Power Line Interaction Committee's (APLIC's) *Suggested Practices for Avian Protection on Power Lines* (APLIC 2006) and *Mitigating Bird Collisions with Power Lines* (APLIC 2004) to reduce the likelihood of large bird electrocutions and collisions.

6. Avoid Use of Toxic Substances. Soil bonding and weighting agents used on unpaved surfaces shall be non-toxic to wildlife and plants.

7. Minimize Lighting Impacts. Facility lighting shall be designed, installed, and maintained to prevent side casting of light towards wildlife habitat.

8. Avoid Vehicle Impacts to Desert Tortoise. Parking and storage shall occur within the area enclosed by desert tortoise exclusion fencing to the extent feasible. No vehicles or construction equipment parked outside the fenced area shall be moved prior to an inspection of the ground beneath the vehicle for the presence of desert tortoise. If a desert tortoise is observed, it shall be left to move on its own. If it does not move within 15 minutes, a Designated Biologist or Biological Monitor under the Designated Biologist's direct supervision may remove and relocate the animal to a safe location if temperatures are within the range described in the USFWS' 2009 *Desert Tortoise Field Manual* (http://www.fws.gov/ventura/speciesinfo/protocols_

guidelines). All access roads outside of the fenced project footprint shall be delineated with temporary desert tortoise exclusion fencing on either side of the access road, unless otherwise authorized by the CPM, BLM Wildlife Biologist, USFWS, and CDFG.

9. Avoid Wildlife Pitfalls:

   a. Backfill Trenches. At the end of each work day, the Designated Biologist shall ensure that all potential wildlife pitfalls (trenches, bores, and other excavations) have been backfilled. If backfilling is not feasible, all trenches, bores, and other excavations shall be sloped at a 3:1 ratio at the ends to provide wildlife escape ramps, or covered completely to prevent wildlife access, or fully enclosed with desert tortoise-exclusion fencing. All trenches, bores, and other excavations outside the areas permanently fenced with desert tortoise exclusion fencing shall be inspected periodically, but no less than three times, throughout the day and at the end of each workday by the Designated Biologist or a Biological Monitor. Should a tortoise or other wildlife become trapped, the Designated Biologist or Biological Monitor shall remove and relocate the individual as described in the Desert Tortoise Relocation/Translocation Plan. Any wildlife encountered during the course of construction shall be allowed to leave the construction area unharmed.

   b. Avoid Entrapment of Desert Tortoise. Any construction pipe, culvert, or similar structure with a diameter greater than 3 inches, stored less than 8 inches aboveground, and within desert tortoise habitat (i.e., outside the permanently fenced area) for one or more nights, shall be inspected for tortoises before the material is moved, buried, or capped. As an alternative, all such structures may be capped before being stored outside the fenced area, or placed on pipe racks. These materials would not need to be inspected or capped if they are stored within the permanently fenced area after the clearance surveys have been completed. Design the retention basins to facilitate the passage of tortoise. Retention/detention basins located at the northern fence line near the foothills of the Cady Mountains shall be designed to allow for the passage of tortoise.

10. Minimize Standing Water. Water applied to dirt roads and construction areas (trenches or spoil piles) for dust abatement shall use the minimal amount needed to meet safety and air quality standards in an effort to prevent the formation of puddles, which could attract desert tortoises and common ravens to construction sites. A Biological Monitor shall patrol these areas to ensure water does not puddle and shall take appropriate action to reduce water application where necessary.

11. Dispose of Road-killed Animals. Road-killed animals or other carcasses detected on roads near the project area shall be picked up immediately and delivered to the Biological Monitor. For special-status species roadkill, the Biological Monitor shall contact USFWS and CDFG within 1 working day of receipt of the carcass for guidance on disposal or storage of the

carcass. The Biological Monitor shall report the special-status species record as described in Conditions of Certification **BIO-2** and **BIO-27**.

12. Minimize Spills of Hazardous Materials. All vehicles and equipment shall be maintained in proper working condition to minimize the potential for fugitive emissions of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. The Designated Biologist shall be informed of any hazardous spills immediately as directed in the project Hazardous Materials Plan. Hazardous spills shall be immediately cleaned up and the contaminated soil properly disposed of at a licensed facility. Servicing of construction equipment shall take place only at a designated area. Service/maintenance vehicles shall carry a bucket and pads to absorb leaks or spills.

13. Worker Guidelines. During construction all trash and food-related waste shall be placed in self-closing containers and removed daily from the site. Workers shall not feed wildlife or bring pets to the project site. Except for law enforcement personnel, no workers or visitors to the site shall bring firearms or weapons. Vehicular traffic shall be confined to existing routes of travel to and from the project site, and cross country vehicle and equipment use outside designated work areas shall be prohibited. The speed limit when traveling on dirt access routes within desert tortoise habitat shall not exceed 25 miles per hour.

14. Implement Erosion Control Measures. Standard erosion control measures shall be implemented for all phases of construction and operation where sediment run-off from exposed slopes threatens to enter "Waters of the State". Sediment and other flow-restricting materials shall be moved to a location where they shall not be washed back into the stream. All disturbed soils and roads within the project site shall be stabilized to reduce erosion potential, both during and following construction. Areas of disturbed soils (access and staging areas) with slopes toward a drainage shall be stabilized to reduce erosion potential.

15. Monitor Ground-Disturbing Activities Prior to Pre-Construction Site Mobilization. If pre-construction site mobilization requires ground-disturbing activities such as for geotechnical borings or hazardous waste evaluations, a Designated Biologist or Biological Monitor shall be present to monitor any actions that could disturb soil, vegetation, or wildlife.

16. Control and Regulate Fugitive Dust. To reduce the potential for the transmission of fugitive dust the project owner shall implement dust control measures. These shall include:

    a. The project owner shall apply non-toxic soil binders, equivalent or better in efficiencies than the CARB-approved soil binders, to active unpaved roadways, unpaved staging areas, and unpaved parking area(s) throughout construction to reduce fugitive dust emissions.

    b. Water the disturbed areas of the active construction sites at least three times per day and more often if uncontrolled fugitive dust is noted.

c. Enclose, cover, water twice daily, and/or apply non-toxic soil binders according to manufacturer's specifications to exposed piles with a 5% or greater silt content.

d. Establish a vegetative ground cover (in compliance with biological resources impact conditions of certification) or otherwise create stabilized surfaces on all unpaved areas at each of the construction sites within 21 days after active construction operations have ceased.

e. Increase the frequency of watering, if water is used as a soil binder for disturbed surfaces, or implement other additional fugitive dust mitigation measures, to all active disturbed fugitive dust emission sources when wind speeds (as instantaneous wind gusts) exceed 25 mph.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP and implemented. Implementation of the measures shall be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of project construction, the project owner shall provide to BLM's Wildlife Biologist and the CPM, for review and approval, a written construction termination report identifying how measures have been completed.

COMPLIANCE VERIFICATION

BIO-9 The project owner shall provide Energy Commission staff, BLM, CDFG, and USFWS with reasonable access to the project site and mitigation lands under the control of the project owner and shall otherwise fully cooperate with the Energy Commission's and BLM's efforts to verify the project owner's compliance with, or the effectiveness of, mitigation measures set forth in the conditions of certification. The project owner shall hold harmless the Designated Biologist, the Energy Commission and staff, BLM, and any other agencies with regulatory requirements addressed by the Energy Commission's sole permitting authority for any costs the project owner incurs in complying with the management measures, including stop work orders issued by the CPM or the Designated Biologist. The Designated Biologist shall do all of the following:

1. Notification. Notify the CPM, BLM, CDFG, and USFWS at least 14 calendar days before initiating ground-disturbing activities. Immediately notify the CPM, BLM, CDFG, and USFWS in writing if the project owner is not in compliance with any conditions of certification, including but not limited to any actual or anticipated failure to implement mitigation measures within the time periods specified in the conditions of certification. CDFG shall be notified at their Southern Region Headquarters Office, 4949 Viewridge Avenue, San Diego, CA 92123; (858) 467-4201. USFWS shall be notified at their Ventura office at 2493 Portola Road, Suite B, Ventura, CA 93003; (805) 644-1766.

2. Monitoring During Grading. Remain on site daily while grubbing and grading are taking place to avoid or minimize take of listed species, to check for compliance with all impact avoidance and minimization measures, and to check all exclusion zones to ensure that signs, stakes, and fencing are intact and that human activities are restricted in these protected zones.

3. Fence Monitoring. During construction maintain and check desert tortoise exclusion fences on a daily basis to ensure the integrity of the fence is maintained. The Designated Biologist shall be present on site to monitor construction and determine fence placement during fence installation. During operation of the project, fence inspections shall occur at least once per month throughout the life of the project, and more frequently after storms or other events that might affect the integrity and function of desert tortoise exclusion fences. Fence repairs shall occur within two days (48 hours) of detecting problems that affect the functioning of the desert tortoise exclusion fencing. All wildlife found entrapped or dead in the fence shall be reported to the BLM, CPM, CDFG, and USFWS.

4. Monthly Compliance Inspections. Conduct compliance inspections at a minimum of once per month after clearing, grubbing, and grading are completed and submit a monthly compliance report to the CPM, BLM, USFWS, and CDFG. All observations of listed species and their sign shall be reported to the Designated Biologist for inclusion in the monthly compliance report.

5. Annual Listed Species Status Report. No later than January 31 of every year the Project facility remains in operation, provide the CPM, BLM, USFWS, and CDFG an annual Listed Species Status Report, which shall include, at a minimum: 1) a general description of the status of the project site and construction/operation activities, including actual or projected completion dates, if known; 2) a copy of the table in the BRMIMP with notes showing the current implementation status of each mitigation measure; 3) an assessment of the effectiveness of each completed or partially completed mitigation measure in minimizing and compensating for project impacts, 4) recommendations on how effectiveness of mitigation measures might be improved, and 5) a summary of any agency approved modifications to the BRMIMP.

6. Final Listed Species Mitigation Report. No later than 45 days after initiation of project operation, provide the CPM a Final Listed Species Mitigation Report that shall include, at a minimum: 1) a copy of the table in the BRMIMP with notes showing when each of the mitigation measures was implemented; 2) all available information about project-related incidental take of listed species; 3) information about other project impacts on the listed species; 4) construction dates; 5) an assessment of the effectiveness of conditions of certification in minimizing and compensating for project impacts; 6) recommendations on how mitigation measures might be changed to more effectively minimize and mitigate the impacts of future projects on the listed species; and 7) any other pertinent information, including the level of take of the listed species associated with the project.

7. Notification of Injured, Dead, or Relocated Listed Species. In the event of a sighting in an active construction area (e.g., with equipment, vehicles, or workers), injury, kill, or relocation of any listed species, the CPM, BLM, CDFG, and USFWS shall be notified immediately by phone. Notification shall occur no later than noon on the business day following the event if it

occurs outside normal business hours so that the agencies can determine if further actions are required to protect listed species. Written follow-up notification via FAX or electronic communication shall be submitted to these agencies within two calendar days of the incident and include the following information as relevant:

a. Injured Desert Tortoise. If a desert tortoise is injured as a result of project-related activities during construction, the Designated Biologist shall immediately take it to a CDFG-approved wildlife rehabilitation and/or veterinarian clinic. Any veterinarian bills for such injured animals shall be paid by the project owner. Following phone notification as required above, the CPM, BLM, CDFG, and USFWS shall determine the final disposition of the injured animal, if it recovers. Written notification shall include, at a minimum, the date, time, location, circumstances of the incident, and the name of the facility where the animal was taken.

b. Desert Tortoise Fatality. If a desert tortoise is killed by project-related activities during construction or operation, or if a desert tortoise is otherwise found dead, submit a written report with the same information as an injury report. These desert tortoises shall be salvaged according to guidelines described in Salvaging Injured, Recently Dead, Ill, and Dying Wild, Free-Roaming Desert Tortoise (Berry 2001). The project owner shall pay to have the desert tortoises transported and necropsied. The report shall include the date and time of the finding or incident.

8. Stop Work Order. The CPM/BLM may issue the project owner a written stop work order to suspend any activity related to the construction or operation of the project to prevent or remedy a violation of one or more conditions of certification (including but not limited to failure to comply with reporting, monitoring, or habitat acquisition obligations) or to prevent the illegal take of an endangered, threatened, or candidate species. The project owner shall comply with the stop work order immediately upon receipt thereof.

Verification: No later than two calendar days following the above-required notification of a sighting, kill, injury, or relocation of a listed species, the project owner shall deliver to the CPM, BLM, CDFG, and USFWS via FAX or electronic communication the written report from the Designated Biologist describing all reported incidents of the sighting, injury, kill, or relocation of a listed species, identifying who was notified and explaining when the incidents occurred. In the case of a sighting in an active construction area, the project owner shall, at the same time, submit a map (e.g., using Geographic Information Systems) depicting both the limits of construction and sighting location to the CPM, BLM, CDFG, and USFWS.

No later than January 31st of every year the Calico Solar Project facility remains in operation, provide the CPM and BLM an annual Listed Species Status Report as described above, and a summary of desert tortoise exclusion fence inspections and repairs conducted in the course of the year.

REVEGETATION PLAN AND COMPENSATION FOR IMPACTS TO NATIVE VEGETATION COMMUNITIES

BIO-10 The project owner shall provide restoration/compensation for impacts to native vegetation communities and develop and implement a Revegetation Plan for all areas subject to temporary project disturbance. Upon completion of construction, all temporarily disturbed areas shall be restored to pre-project grade and conditions. Temporarily disturbed areas within the project area include, but are not limited to: all areas where underground infrastructure was installed, temporary access roads, construction work temporary lay-down areas, and construction equipment staging areas. The following measures shall be implemented for the revegetation effort areas not subject to the facility Landscape Plan. These measures will include:

1. Plan Details. The plans shall include at minimum: (a) locations and details for top soil storage; (b) methods to salvage and replant cacti and the plant species to be used in restoration; (c) seed collection guidelines; (d) a schematic depicting the mitigation area; (e) time of year that the planting will occur and the methodology of the planting; (f) a description of the irrigation methodology if used; (g) measures to control exotic vegetation on site; (h) success criteria; and (i) a detailed monitoring program. All habitats dominated by non-native species prior to project disturbance shall be revegetated using appropriate native species. This plan shall also contain contingency measures for failed restoration efforts (efforts not meeting success criteria).
2. Topsoil Salvage. Topsoil shall be stockpiled from the project site for use in revegetation of the disturbed soils. The topsoil excavated shall be segregated, kept intact, and protected, under conditions shown to sustain seed bank viability. The upper 1 inch of topsoil which contains the seed bank shall be scraped and stockpiled for use as the top-dressing for the revegetation area. An additional 6 to 8 inches of soil below the top 1 inch of soil shall also be scraped and separately stockpiled for use in revegetation areas. Topsoil shall be replaced in its original vertical orientation following ground disturbance, ensuring the integrity of the top one inch in particular. All other elements of soil stockpiling shall be conducted as described on pages 39-40 of *Rehabilitation of Disturbed Lands in California* (Newton and Claassen 2003).
3. Seed Stock. Only seed of locally occurring native species shall be used for revegetation. Seeds shall contain a mix of short-lived early pioneer species such as native annuals and perennials and subshrubs. Seeding shall be conducted as described in Chapter 5 of *Rehabilitation of Disturbed Lands in California* (Newton and Claassen 2003). A list of plant species suitable for Mojave Desert region revegetation projects, including recommended seed treatments, are included in Appendix A-8 of the same report. The list of plants observed during the 2010 special-status plant surveys of the Project area can also be used as a guide to site-specific plant selection for revegetation.

4. Monitoring Requirement and Success Criteria. Post-seeding and planting monitoring will be yearly and shall continue for a period of no less than 10 years until the defined success criteria are achieved. If the survival and cover requirements have not been met, the project owner is responsible for replacement planting to achieve these requirements or other remedial action as agreed to by BLM and CPM. Replacement plants shall be monitored with the same survival and growth requirements as required for original revegetation plantings. Remediation activities (e.g., additional planting, removal of non-native invasive species, or erosion control) shall be taken during the 10-year period if necessary to ensure the success of the restoration effort. If the mitigation fails to meet the established performance criteria after the 10-year maintenance and monitoring period, monitoring and remedial activities shall extend beyond the 10-year period until the criteria are met or unless otherwise specified by the Energy Commission and BLM. The following performance standards must be met by the end of monitoring year two: (a) at least 80% of the species observed within the temporarily disturbed areas shall be native species that naturally occur in desert scrub habitats; and (b) Relative cover and density of plant species within the temporarily disturbed areas shall equal at least 60%.

   If a fire occurs in a revegetation area within the 10-year monitoring period, the owner shall be responsible for a one-time replacement. If a second fire occurs, no replanting is required, unless the fire is caused by the owner's activity.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP and implemented. Within 90 days after completion of each year of project construction, the project owner shall provide to the CPM verification of the total vegetation and community subject to temporary and permanent disturbance. To monitor and evaluate the success of the restoration, the project owner shall submit annual reports of the restoration including the status of the site, percent cover of native and exotics, and any remedial actions conducted by the owner to the CPM and BLM Authorized Officer.

No less than 30 days following the publication of the Energy Commission License Decision or the Record of Decision/ROW Issuance, whichever comes first, the project owner shall submit to the CPM and BLM's Wildlife Biologist a final agency-approved Revegetation Plan that has been reviewed and approved by BLM's Wildlife Biologist and the CPM. All modifications to the Revegetation Plan shall be made only after approval from BLM's Wildlife Biologist and the CPM.

Within 30 days after completion of each year of project construction, the project owner shall provide to the CPM for review and approval, a written report identifying which items of the Revegetation Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which items are still outstanding.

On January 31st of each year following construction until the completion of the revegetation monitoring specified in the Revegetation Plan, the Designated Biologist shall provide a report to the CPM and BLM's Wildlife Biologist that includes: a summary of revegetation activities for the year, a discussion of whether revegetation performance standards for the year were met; and recommendations for revegetation remedial action, if warranted, are planned for the upcoming year.

WEED MANAGEMENT PLAN

BIO-11 The project owner shall implement a Weed Management Plan that meets the approval of BLM and CPM. The draft Noxious Weed Management Plan submitted by the applicant shall provide the basis for the final plan, subject to review and revisions from BLM, USFWS, CDFG, and the CPM. In addition to describing weed eradication and control methods, and a reporting plan for weed management during and after construction, the final Weed Management Plan shall include at least the following Best Management Practices to prevent the spread and propagation of weeds:

- Limit the extent of any vegetation and/or ground disturbance to the absolute minimum needed, and limit ingress and egress to defined routes.
- Install and maintain vehicle wash and inspection stations and closely monitor the types of materials brought onto the site.
- Reestablish vegetation quickly on disturbed sites with native seed mixes.
- Monitoring and rapid implementation of control measures to ensure early detection and eradication for weed invasions.
- Use only weed-free straw or hay bales used for sediment barrier installations, and weed-free seed.
- Reclamation and revegetation shall occur on all temporarily disturbed areas, including, but not limited to, transmission lines, temporary access roads, construction work temporary lay-down areas, and staging areas.
- Control weeds in areas where irrigation and mirror washing take place.
- Prohibit disposal of mulch or green waste from mown weed infestations around the solar generators to prevent inadvertent introduction and spread of invasive plants beyond the immediate vicinity of the project area and possibly into rare plant populations off-site.

From the time construction begins until 5 years after construction is complete, surveying for new invasive weed populations and the monitoring of identified and treated populations shall be required within the project area. Surveying and monitoring for weed infestations shall occur annually. Treatment of all identified weed populations shall occur at a minimum of once annually. When no new seedlings or resprouts are observed at treated sites for three consecutive, normal rainfall years, the weed population can be considered eradicated and weed control efforts may cease for that impact site.

Verification: At least 30 days prior to start of any project-related ground disturbance activities, the project owner shall provide the BLM's Wildlife Biologist and the CPM with the final version of a Weed Management Plan. All modifications to the approved Weed Management Plan shall be made only after consultation with the CPM and BLM's authorized officer, in consultation with USFWS and CDFG. Within 30 days after completion of project construction, the project owner shall provide to the BLM's Wildlife Biologist and the CPM for review and approval, a written report identifying which items of the Weed Management Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which items are still outstanding. A summary report on weed management on the project site shall be submitted in the Annual Compliance Report during plant operations.

SPECIAL-STATUS PLANT IMPACT AVOIDANCE AND MINIMIZATION

BIO-12 The project owner shall implement the following measures to avoid and minimize impacts to special-status plant species.

1. On-Site Pre-Construction Surveys: During the calendar year 2010, the project owner shall conduct floristic surveys for special-status plant species, including all special-status species listed in **Biological Resources Table 1**, to provide conclusive evidence of presence or absence of the federally listed Lane Mountain milk-vetch and to quantify acres of occupied habitat for all other special-status plants that could be lost or degraded by construction.

    - All surveys shall be conducted by a qualified botanist in accordance with BLM (2009) and CDFG (2009) plant survey guidelines and shall be conducted during appropriate seasons (including both spring and summer blooming periods);
    - The survey area shall be delineated on the ground using survey lath and plastic flagging, or similar materials. Botanical surveys shall cover each marked area and shall extend over a 250-foot surrounding buffer area (to extend off-site beyond the project area fenceline and limits of grading as appropriate);
    - Energy Commission offers its staff to assist in planning, managing, and conducting the required surveys. Staff anticipates that rainfall during 2010 should provide for good detectability of most special-status plants. Furthermore, staff notes that time is of the essence and anticipates completing all or most of these field surveys, in coordination with the applicant, before finalizing the Staff Assessment;
    - Survey results shall be reported to the CPM, BLM's Authorized Officer, and CDFG, and shall follow CDFG and BLM plant survey guidelines, and shall include complete descriptions of survey methodology, including field dates and staff for each date, summaries of field conditions (e.g., rainfall or other factors that may affect ability to locate special-status plants), locations and condition of special-status plant reference locations visited for verification, the locations of any special-status species found during the surveys, delineations of acreage of occupied habitat, and copies of California Natural Diversity Data Base field forms submitted to the CDFG;
    - Following completion of pre-construction clearance surveys, the CPM shall review and modify onsite plant avoidance and minimization

measures (below), to the extent feasible, to avoid or minimize loss or degradation of occupied special-status plant habitat on site;

- Special-status plant occurrences in the 250-foot buffer areas surrounding construction sites shall be marked on the ground by field botanists and shall be designated as Environmentally Sensitive Areas on plans and specifications, and shall be protected from accidental impacts during construction (e.g., vehicle traffic, temporary placement of soils or vegetation) and from the indirect impacts of project operation (herbicide spraying, changes in upstream hydrology, etc).;

2. <u>On-Site Plant Avoidance/Minimization Areas</u>: The project owner shall avoid and minimize disturbance to all white-margined beardtongue occurrences on the project site and within a 250 foot buffer area, and, to the extent feasible, shall avoid and minimize disturbance to 75% of all Emery's crucifixion thorn, Coves' cassia, small-flowered sand-verbena, and any other CNPS List 1B or List 2 taxa (excluding small-flowered androstephium) occurring on the site. Specific requirements for on-site plant avoidance and protection are set forth below, in measures 4 through 9.

3. <u>Surveys on Acquired Compensation Lands</u>: The project owner shall conduct floristic surveys for special-status plants on all lands acquired by the owner as part of the desert tortoise compensatory mitigation requirements (see Condition of Certification **BIO-17**). Target species for the surveys shall be white-margined beardtongue, Emery's crucifixion thorn, Coves' cassia, small-flowered sand-verbena, and any other special-status plants located on the project site during onsite pre-construction surveys described under Item 1 above. The purposes of the surveys shall be (1) to document biological resource values of the compensation lands, and (2) to determine presence of special-status plant occurrences that may serve to mitigate project impacts to Emery's crucifixion thorn, Coves' cassia, small-flowered sand-verbena, and any other special-status plants located on the project site. If these species are documented on compensation lands, then they occurrences may serve to replace requirements for on-site avoidance. Note that off-site occurrences of white-margined beardtongue may not substitute for on-site avoidance.

    - Surveys shall be conducted according to methods described for pre-construction surveys above, and shall be conducted in seasons of adequate rainfall to verify ability to find the target species in condition for confident identifications;

    - For each year surveys are conducted, yearly survey results shall be provided to the CPM, BLM's Authorized Officer, and CDFG, and shall include CNDDB field survey forms for all special-status plant species encountered during the surveys; and

    - All field survey forms shall be submitted to the CNDDB at the time of submittal to the CPM, BLM and CDFG.

For each of the species for which surveys were conducted, the project owner's qualified botanist shall submit a completion report documenting fulfillment of the target goals and which describe the number of new, previously undiscovered occurrences identified and mapped. Locations shall be reported with GPS coordinates compatible with inclusion in a GIS database.

4. Onsite Protection Goals: The project owner shall implement all feasible measures to protect 75% of the occupied habitat of white-margined beard-tongue, Emery's crucifixion thorn, Coves' cassia, small-flowered sand-verbena, and any other CNPS List 1B or List 2 taxa (excluding small-flowered androstephium) found during pre-construction clearance surveys within the project area. Each year during construction the measurement of percent protection achieved shall be calculated based on a comparison of extent of occupied habitat of each species present in this area identified before construction compared to the extent of occupied habitat remaining post–construction. These pre- and post-construction acreages shall be based on floristic surveys conducted by a qualified botanist following survey methodology described above.

5. Identify and Establish Special-Status Plant Protection Areas and Environmentally Sensitive Areas : The project owner shall identify Special-Status Plant Protection Areas within the project footprint as needed to achieve the 75% protection goal, based on pre-construction surveys described above. The locations of the Special-Status Plant Protection Areas shall be clearly depicted on all final maps and project drawings and descriptions. The areal extent of special-status plants shall be mapped and the designated Special-Status Plant Protection Area shall provide a 250-foot buffer from all project activities wherever feasible. In addition, the project owner shall identify special-status plant occurrences within 250 feet of the project fenceline during the pre-construction plant surveys described above. A qualified botanist shall delineate the boundaries of these special-status plant occurrences at least 30 days prior to the initiation of ground-disturbing activities. These flagged special-status plant occurrences shall be designated as Environmentally Sensitive Areas on plans and specifications, and shall be protected from accidental impacts during construction (e.g., vehicle traffic, temporary placement of soils or vegetation) and from the indirect impacts of project operation (herbicide spraying, changes in upstream hydrology, etc).

6. Prepare and Implement a Special-Status Plant Protection and Monitoring Plan: The project owner shall prepare and implement a Special-Status Plant Protection and Monitoring Plan for special-status plants occurring within the Special-Status Plant Protection Areas. The goal of the Special-Status Plant Protection and Monitoring Plan shall be to maintain the special-status plant species within the Special-Status Plant Protection Areas as healthy, reproductive populations that can be sustained in perpetuity. At a minimum, the Special-Status Plant Protection and Monitoring Plan shall:

- Establish baseline conditions, including numbers and areal extent of special-status plant occurrences within the Special-Status Plant Protection Areas;
- Establish success standards for protection of special-status plant occurrences within the Plant Protection Areas;
- Provide any available information about microhabitat preferences and fecundity, essential pollinators, reproductive biology, and propagation and culture requirements for each special-status species;
- Describe measures (e.g., fencing, signage) to avoid direct construction and operation impacts to special-status plants within the Special-Status Plant Protection Areas;
- Describe measures to avoid or minimize indirect construction and operations impacts to special-status plants within the Special-Status Plant Protection Areas (e.g., runoff from mirror-washing, use of soil stabilizers/tackifiers, alterations of hydrology from drainage diversions, erosion/sedimentation from disturbed soils upslope, herbicide drift, the spread of non-native plants, etc).
- Provide a monitoring schedule and plan for assessing the numbers and condition of special-status plants within the Special-Status Plant Protection Areas; and
- Identify specific triggers for remedial action (e.g., numbers of plants dropping below a threshold).

7. Develop Special-Status Plant Remedial Action Plan : The project owner shall develop a detailed Special-Status Plant Remedial Action Plan to be implemented if special-status plants within the Plant Protection Areas fail to meet success standards described in the Special-Status Plant Protection and Monitoring Plan. The Plant Remedial Action Plan shall include specifications for ex-situ/offsite conservation of seed and other propagules, and the seed bank and other symbionts contained in the topsoil where these plants occur. The remedial measures described in the Plant Remedial Action Plan shall not substitute for plant protection or other mitigation measures. The Special-Status Plant Remedial Action Plan shall include, at a minimum:
   - Guidelines for pre-construction seed collection (and/or other propagules) for each special-status species;
   - Specifications for collecting, storing, and preserving the upper layer of soil containing seed and important soil organisms;
   - Detailed replacement planting program with biologically meaningful quantitative and qualitative success criteria (see Pavlik 1996), monitoring specifications, and triggers for remedial action; and
   - Ecological specifications for suitable planting sites.
8. Seed Collection: Implementation of the Special-Status Plant Remedial Action Plan would require a local source of seeds/propagules. In addition,

seed collection would serve to preserve germplasm in the event that all mitigation fails. The project owner shall develop and implement a Seed Collection Plan to collect and store seed for white-margined beard-tongue, Emery's crucifixion thorn, Coves' cassia, small-flowered sand-verbena, and any other CNPS List 1B or List 2 taxa (excluding small-flowered androstephium) found during pre-construction clearance surveys within the project area. The source of these seeds shall be from plants proposed for removal within the project footprint. The project owner shall engage the services of a qualified contractor approved by the CPM to undertake seed collection and storage.

9. <u>Security for Implementation of Plans</u>: The project owner shall provide security adequate to fund implementation of the Special-Status Plant Protection and Monitoring Plan, the Special-Status Plant Remedial Action Plan for the life of the project, and the Seed Collection Plan.

10. <u>San Bernardino County Plant Protection and Management Ordinance</u>: The San Bernardino County Plant Protection and Management Ordinance regulates the following where they occur on non-government land (San Bernardino County Code 88.01): desert native plants with stems 2 inches or greater in diameter or 6 feet or greater in height: *Psorothamnus* [*Dalea*] *spinosa* (smoke tree), *Prosopis* spp. (mesquites), all species of the family Agavaceae (century plants, nolinas, yuccas), creosote rings 10 feet or greater in diameter, all Joshua trees; and any part of any of the following species, whether living or dead: *Olneya tesota* (desert ironwood), all species of the genus *Prosopis* (mesquites), and all species of the genus *Cercidium* (palo verdes). Staff recognizes that the project site is on public land and thus not strictly subject to the County ordinance. However, staff notes that the proposed project would convert the site to exclusive private use and is, in effect, a private project. Staff recommends conformance with County standards, as follows:

    a. The project owner shall inventory all plants on the project site that would be removed or damaged by proposed project construction.

    b. The project owner shall prepare a Protected Plant Salvage Plan in conformance with San Bernardino County standards for review and approval by the CPM. The plan shall include detailed descriptions of proposed methods to salvage plants; transport them; store them temporarily (as needed); maintain them in temporary storage (i.e., irrigation, shade protection, etc.); proposed transplantation locations and methods for permanent relocation; proposed irrigation and maintenance methods at transplantation sites; and a monitoring plan to verify survivorship and establishment of translocated plants for a minimum of five years.

    c. Prior to initiating any ground-disturbing activities on the project site, the project owner shall implement the Protected Plant Salvage Plan as approved by the CPM.

<u>Verification:</u> No more than 30 days following the publication of the Energy Commission Decision the project owner shall submit final maps and design drawings depicting the location of Special-Status Plant Protection Areas within and Environmentally Sensitive Areas adjacent to the project site, and shall identify the species and numbers of plants within each of the Special-Status Plant Protection Areas and Environmentally Sensitive Areas.

No more than 30 days following the publication of the Energy Commission Decision the project owner shall submit draft versions of the Special-Status Plant Protection and Monitoring Plan, the Special-Status Plant Remedial Action Plan, the Seed Collection Plan, and the Protected Plant Salvage Plan for review by the CPM, BLM's Authorized Officer, and CDFG. The project owner shall also provide a cost estimate for implementation of these plans which shall be subject to approval by the CPM, BLM's Authorized Officer, and the CDFG. The final plans shall be submitted for approval by the CPM, in consultation with BLM's Authorized Officer, CDFG, and CNPS within 90 days of the publication of the Commission Decision. The final plans shall be incorporated into the BRMIMP. At this time, the project owner shall also provide security sufficient to fund the implementation of the plans.

Within 30 days of the start of construction, the project owner shall submit a copy of the contract with the CPM-approved seed contractor and the check for seed collection and curation fees to the CPM.

On January 31st of each year following construction the project owner's qualified botanist shall submit a report, including CNDDB field survey forms, describing the results of off-site plant surveys to the BLM's Authorized Officer, the CPM, CDFG, and CNDDB. Submittal of survey reports shall continue until the same number of occurrences and areal extent of occupied habitat impacted by the project for small-flowered androstephium, white-margined beard-tongue, and any other special-status plants identified on these off-site lands as were impacted by the project. For each of the species for which surveys were conducted, the project owner's qualified botanist shall submit a completion report documenting fulfillment of the target goals and which describe the number of new, previously undiscovered occurrences identified and mapped using GPS/GIS techniques for each species. Mapping results shall include GPS coordinates of the plants found.

The Designated Biologist shall submit monthly and annual compliance reports to the CPM, BLM Authorized Officer, and CDFG describing all project activities pertinent to mitigation measures listed above. Compliance reports shall include summaries of written and photographic records of the tasks described above. Compliance reports shall be submitted monthly and annually for a period not less than 5 years for the Protected Plant Salvage Plan and for the life of the project for the Special-Status Plant Protection and Monitoring Plan and the Special-Status Plant Remedial Action Plan, including funding for the seed storage.

The Designated Biologist shall maintain written and photographic records of the tasks described above, and make these records available to the CPM, BLM Authorized Officer, and CDFG upon request.

MOJAVE FRINGE-TOED LIZARD MITIGATION

BIO-13 To mitigate for habitat loss and direct impacts to Mojave fringe-toed lizards the project owner shall provide compensatory mitigation at a 5:1 ratio for impacts to the 16.9 acres of stabilized or partially stabilized desert dune habitat present in the project footprint. Mitigation is required because even if avoided, the population in this area is not expected to persist. The project owner shall provide funding for the acquisition, initial habitat improvements, and long-term management endowment of the compensation lands. The terms and conditions of this acquisition or easement, including Security requirements, shall be as described in **BIO-17** [Desert Tortoise Compensatory Mitigation]. The compensation lands selected for acquisition shall:

1. Be sand dune or partially stabilized sand dune habitat with potential to contribute to Mojave fringe-toed lizard habitat connectivity and build linkages between known populations of Mojave fringe-toed lizards and preserve lands with suitable habitat;
2. Be connected to lands currently occupied by Mojave fringe-toed lizard;
3. Be near larger blocks of lands that are either already protected or planned for protection, or which could feasibly be protected long-term by a public resource agency or a non-governmental organization dedicated to habitat preservation;
4. Provide quality habitat for Mojave fringe-toed lizard, that has the capacity to regenerate naturally when disturbances are removed;
5. Not have a history of intensive recreational use or other disturbance that might make habitat recovery and restoration infeasible;
6. Not be characterized by high densities of invasive species, either on or immediately adjacent to the parcels under consideration, that might jeopardize habitat recovery and restoration;
7. Not contain hazardous wastes;
8. Not be subject to property constraints (i.e., mineral leases, cultural resources); and
9. Be on land for which long-term management is feasible.

The project owner or an approved third party shall complete acquisition of the proposed compensation lands prior to initiating ground-disturbing project activities. Alternatively, financial assurance can be provided to the CPM in the form of an irrevocable letter of credit, a pledged savings account or another form of security (“Security”) in the amount of $212,095 prior to initiating ground-disturbing project activities. This Security amount was calculated as described in **BIO-17** and may be revised upon completion of a Property Analysis Record (PAR) or PAR-like analysis of the proposed compensation lands. Prior to submittal to the CPM and the BLM Authorized Officer, the Security shall be approved by the CPM and the BLM Authorized Officer, in consultation with CDFG, to ensure funding in an amount determined by a PAR or PAR-like analysis of the proposed compensation lands.

Verification: A minimum of 30 days prior to acquisition of the property, the project owner shall submit a formal acquisition proposal to BLM's Wildlife Biologist, the CPM, and CDFG describing the parcels intended for purchase.

No later than 30 days prior to beginning project ground-disturbing activities, the project owner shall provide written verification of Security in accordance with this condition of certification. The project owner, or an approved third party, shall complete and provide written verification of the proposed compensation lands acquisition within 18 months of the start of project ground-disturbing activities. Within six months of the land or easement purchase, as determined by the date on the title, the project owner, or an approved third party, shall provide the CPM, BLM's Wildlife Biologist, and CDFG with a management plan for the compensation lands and associated funds. The CPM and BLM's Wildlife Biologist shall review and approve the management plan, in consultation with CDFG.

Within 90 days after completion of project construction, the project owner shall provide to the CPM and BLM's Wildlife Biologist an analysis with the final accounting of the amount of sand dune/stabilized sand dune habitat disturbed during project construction.

GILA MONSTER MITIGATION

BIO-14 Concurrent with Desert Tortoise Clearance surveys, the project owner shall conduct pre-construction surveys for Gila monsters. If a Gila monster is encountered during clearance surveys or during construction, a qualified biologist experienced with Gila monster survey and capture techniques shall capture and maintain it in a cool (<85 degrees F) environment until it can be released to a safe, suitable area beyond the construction impact zone. The biologist shall coordinate with staff and CDFG biologists in the transport and relocation of any Gila monsters encountered during project surveys, construction, or operation. A written report documenting any Gila monsters relocated shall be provided to the CPM within 30 days of relocation.

Verification: The project owner shall submit a report to the CPM, BLM, and CDFG within 30 days of any relocation of Gila monsters. The report shall include the number of Gila monsters moved; their state of health, including wounds or visible signs of illness; and the location of relocation.

DESERT TORTOISE CLEARANCE SURVEYS AND EXCLUSION FENCING

BIO-15 The project owner shall undertake appropriate measures to manage the construction site and related facilities in a manner to avoid or minimize impacts to desert tortoise. Methods for clearance surveys, fence specification and installation, tortoise handling, artificial burrow construction, egg handling and other procedures shall be consistent with those described in the USFWS' 2009 *Desert Tortoise Field Manual* <http://www.fws.gov/ventura/speciesinfo/protocols_guidelines> or more current guidance provided by CDFG and USFWS. The project owner shall also implement all terms and conditions described in the Biological Opinion for the Project prepared by USFWS. These measures include, but are not limited to, the following:

1. Desert Tortoise Exclusion Fence Installation. To avoid impacts to desert tortoises, permanent desert tortoise exclusion fencing shall be installed along the permanent perimeter security fence and temporarily installed along the utility corridors. The proposed alignments for the permanent perimeter fence and utility rights-of-way fencing shall be flagged and surveyed within 24 hours prior to the initiation of fence construction. Clearance surveys of the perimeter fence and utility rights-of-way alignments shall be conducted by the Designated Biologist(s) using techniques approved by the USFWS and CDFG and may be conducted in any season with USFWS and CDFG approval. Biological Monitors may assist the Designated Biologist under his or her supervision with the approval of the CPM, BLM, USFWS, and CDFG. These fence clearance surveys shall provide 100-percent coverage of all areas to be disturbed and an additional transect along both sides of the fence line. This fence line transect shall cover an area approximately 90 feet wide centered on the fence alignment. Transects shall be no greater than 15 feet apart. All desert tortoise burrows, and burrows constructed by other species that might be used by desert tortoises, shall be examined to assess occupancy of each burrow by desert tortoises and handled in accordance with the USFWS' 2009 *Desert Tortoise Field Manual*. Any desert tortoise located during fence clearance surveys shall be handled by the Designated Biologist(s) in accordance with the USFWS' 2009 *Desert Tortoise Field Manual*.

   a. Timing, Supervision of Fence Installation. The exclusion fencing shall be installed prior to the onset of site clearing and grubbing. Fencing shall also be placed on the proposed access roads in tortoise habitat unless otherwise approved by the CPM, BLM Wildlife Biologist, USFWS, and CDFG. The fence installation shall be supervised by the Designated Biologist and monitored by the Biological Monitors to ensure the safety of any tortoise present.

   b. Fence Material and Installation. The permanent tortoise exclusionary fencing shall be constructed in accordance with the USFWS' 2009 *Desert Tortoise Field Manual* (Chapter 8 – Desert Tortoise Exclusion Fence).

   c. Security Gates. Security gates shall be designed with minimal ground clearance to deter ingress by tortoises. The gates may be electronically activated to open and close immediately after the vehicle(s) have entered or exited to prevent the gates from being kept open for long periods of time. Cattle grating designed to safely exclude desert tortoise shall be installed at the gated entries to discourage tortoises from gaining entry

   d. Fence Inspections. Following installation of the desert tortoise exclusion fencing for both the permanent site fencing and temporary fencing in the utility corridors, the fencing shall be regularly inspected.

If tortoise were moved out of harm's way during fence construction, permanent and temporary fencing shall be inspected at least two times a day for the first 7 days to ensure a recently moved tortoise has not been trapped within the fence. Thereafter, permanent fencing shall be inspected monthly and during and within 24 hours following all major rainfall events. A major rainfall event is defined as one for which flow is detectable within the fenced drainage. Any damage to the fencing shall be temporarily repaired immediately to keep tortoises out of the site, and permanently repaired within 48 hours of observing damage. Inspections of permanent site fencing shall occur for the life of the project. Temporary fencing shall be inspected weekly and, where drainages intersect the fencing, during and within 24 hours following major rainfall events. All temporary fencing shall be repaired immediately upon discovery and, if the fence may have permitted tortoise entry while damaged, the Designated Biologist shall inspect the area for tortoise.

2. Desert Tortoise Clearance Surveys within the Plant Site. Following construction of the permanent perimeter security fence and the attached tortoise exclusion fence, the permanently fenced power plant site shall be cleared of tortoises by the Designated Biologist, who may be assisted by the Biological Monitors. Clearance surveys shall be conducted in accordance with the USFWS' 2009 *Desert Tortoise Field Manual* (Chapter 6 – Clearance Survey Protocol for the Desert Tortoise – Mojave Population) and shall consist of two surveys covering 100% the project area by walking transects no more than 15-feet apart. If a desert tortoise is located on the second survey, a third survey shall be conducted. Each separate survey shall be walked in a different direction to allow opposing angles of observation. Clearance surveys of the power plant site may only be conducted when tortoises are most active (April through May or September through October). Surveys outside of these time periods require approval by USFWS and CDFG. Any tortoise located during clearance surveys of the power plant site shall be relocated and monitored in accordance with the Desert Tortoise Relocation/Translocation Plan (Condition of Certification **BIO-16**).

    a. Burrow Searches. During clearance surveys all desert tortoise burrows, and burrows constructed by other species that might be used by desert tortoises, shall be examined by the Designated Biologist, who may be assisted by the Biological Monitors, to assess occupancy of each burrow by desert tortoises and handled in accordance with the USFWS' 2009 *Desert Tortoise Field Manual*. To prevent reentry by a tortoise or other wildlife, all burrows shall be collapsed once absence has been determined. Tortoises taken from burrows and from elsewhere on the power plant site shall be relocated or translocated as described in the Desert Tortoise Relocation/Translocation Plan.

    b. Burrow Excavation/Handling. All potential desert tortoise burrows located during clearance surveys would be excavated by hand, tortoises removed, and collapsed or blocked to prevent occupation by desert tortoises. All desert tortoise handling and removal, and burrow excavations, including nests, would be conducted by the Designated Biologist, who may be assisted by a Biological Monitor in accordance with the USFWS' 2009 *Desert Tortoise Field Manual.*

3. Monitoring Following Clearing. Following the desert tortoise clearance and removal from the power plant site and utility corridors, workers and heavy equipment shall be allowed to enter the project site to perform clearing, grubbing, leveling, and trenching. A Designated Biologist shall monitor clearing and grading activities to find and move tortoises missed during the initial tortoise clearance survey. Should a tortoise be discovered, it shall be relocated or translocated as described in the Desert Tortoise Relocation/ Translocation Plan to an area approved by the Designated Biologist.
4. Reporting. The Designated Biologist shall record the following information for any desert tortoises handled: a) the locations (narrative and maps) and dates of observation; b) general condition and health, including injuries, state of healing and whether desert tortoise voided their bladders; c) location moved from and location moved to (using GPS technology); d) gender, carapace length, and diagnostic markings (i.e., identification numbers or marked lateral scutes); e) ambient temperature when handled and released; and f) digital photograph of each handled desert tortoise as described in the paragraph below. Desert tortoise moved from within project areas shall be marked and monitored in accordance with the Desert Tortoise Relocation/Translocation Plan.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP and implemented. Implementation of the measures shall be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of desert tortoise clearance surveys the Designated Biologist shall submit a report to BLM's Authorized Officer, the CPM, USFWS, and CDFG describing implementation of each of the mitigation measures listed above. The report shall include the desert tortoise survey results, capture and release locations of any relocated desert tortoises, and any other information needed to demonstrate compliance with the measures described above.

DESERT TORTOISE RELOCATION/TRANSLOCATION PLAN

BIO-16 The project owner shall develop and implement a final Desert Tortoise Relocation/Translocation Plan (Plan) that is consistent with current USFWS approved guidelines, and meets the approval of BLM's Wildlife Biologist and the CPM. The goal of the Plan shall be to safely exclude desert tortoises from within the fenced project area and relocate/translocate them to suitable habitat capable of supporting them, while minimizing stress and potential for disease transmission. The final Plan shall be based on the draft Desert Tortoise Relocation/Translocation Plan prepared by the applicant and shall include all revisions deemed necessary by USFWS, CDFG and staff. The Plan shall include but not be limited to, a list of the authorized handlers, protocols for disease testing and assessing tortoise health, proposed translocation locations and procedures, schedule of translocations, a habitat assessment of translocation lands, monitoring and reporting, and contingency planning.

Verification: Within 7 days of publication of the Energy Commission License Decision Record of Decision/ROW Issuance, whichever comes first, the project owner shall provide BLM's Wildlife Biologist and the CPM with the final version of a Desert Tortoise Relocation/Translocation Plan that has been reviewed and approved by BLM's Authorized Office and the CPM in consultation with USFWS and CDFG. All modifications to the approved Plan shall be made only after approval by BLM's Wildlife Biologist and the CPM, in consultation with USFWS and CDFG.

Within 30 days after initiation of relocation and/or translocation activities, the Designated Biologist shall provide to BLM's Wildlife Biologist and the CPM for review and approval, a written report identifying which items of the Plan have been completed, and a summary of all modifications to measures made during implementation of the Plan. Written monthly progress reports shall be provided to the BLM's Wildlife Biologist and CPM for the duration of the Plan implementation.

DESERT TORTOISE COMPENSATORY MITIGATION

BIO-17 To fully mitigate for habitat loss and potential take of desert tortoise, the project owner shall provide compensatory mitigation for impacts to 8,219 acres. Impacts to the area south of the BNSF Railroad shall be mitigated at a 1:1 ratio. Impacts to the area north of the BNSF Railroad tracks shall be mitigated at a 3:1 ratio. In addition, 1,180 acres of donated and acquired lands occur within the project boundary, which were obtained as mitigation/conservation lands for a previous project. These lands shall be mitigated at an additional 3:1 ratio. The BLM's compensatory mitigation plan (fee based) serves as all of the 1:1 mitigation ratio below the railroad tracks, one-third of the 3:1 mitigation ratio required to satisfy CESA above the railroad tracks, and one-third of the additional mitigation ratio required for donated and acquired lands. This 1:1 component of the total compensatory mitigation shall be provided in fee to the BLM. The remaining two-thirds of the 3:1 compensation mitigation above the railroad tracks and the remaining two-thirds of the 3:1 compensation mitigation for the donated and acquired lands shall satisfy the requirements of the Energy Commission Complementary Mitigation Measures described in this condition, and shall require the acquisition of 14,018 acres of land. The requirements for acquisition of the 14,018 acres of Energy Commission compensation lands shall include the following:

1. Responsibility for Acquisition of Lands: The responsibility for acquisition of lands may be delegated by written agreement from the Energy Commission and CDFG to a third party, such as a non-governmental organization supportive of habitat conservation or approved governmental agencies such as the NPS. Such delegation shall be subject to approval by the CPM and CDFG, in consultation with BLM and USFWS, prior to land acquisition, enhancement, or management activities. If habitat disturbance exceeds that described in this analysis, the project owner shall be responsible for funding acquisition, habitat improvements, and long-term management of additional compensation lands or additional funds required to compensate for any additional habitat disturbances. Additional funds shall be based on the adjusted market value of compensation lands at the time of construction to acquire and manage

habitat. Water and mineral rights shall be included as part of the land acquisition. Agreements to delegate land acquisition to CDFG or an approved third party and to manage compensation lands shall be implemented within 18 months of the Energy Commission's License Decision.

2. Selection Criteria for Compensation Lands. The compensation lands selected for acquisition to meet Energy Commission and CESA requirements shall:

   a. be within the Western Mojave Recovery Unit, with potential to contribute to desert tortoise habitat connectivity and build linkages between desert tortoise designated critical habitat, known populations of desert tortoise, and/or other preserve lands;

   b. provide habitat for desert tortoise with capacity to regenerate naturally when disturbances are removed;

   c. be near larger blocks of lands that are either already protected or planned for protection, or which could feasibly be protected long-term by a public resource agency or a non-governmental organization dedicated to habitat preservation;

   d. be connected to lands currently occupied by desert tortoise, ideally with populations that are stable, recovering, or likely to recover;

   e. not have a history of intensive recreational use or other disturbance that might make habitat recovery and restoration infeasible;

   f. not be characterized by high densities of invasive species, either on or immediately adjacent to the parcels under consideration, that might jeopardize habitat recovery and restoration; and

   g. not contain hazardous wastes.

3. Review and Approval of Compensation Lands Prior to Acquisition. A minimum of three months prior to acquisition of the property, the project owner shall submit a formal acquisition proposal to the CPM, CDFG, USFWS, and BLM describing the parcel(s) intended for purchase. This acquisition proposal shall discuss the suitability of the proposed parcel(s) as compensation lands for desert tortoise in relation to the criteria listed above. Approval from CDFG and the CPM, in consultation with BLM and the USFWS, shall be required for acquisition of all parcels comprising the 14,018 acres.

4. Commission Mitigation Security: The project owner shall provide financial assurances to the CPM and CDFG with copies of the document(s) to BLM and the USFWS, to guarantee that an adequate level of funding is available to implement the Energy Commission Complementary Mitigation Measures described in this condition. These funds shall be used solely for implementation of the measures associated with the project. Alternatively, financial assurance can be provided to the CPM and CDFG in the form of an irrevocable letter of credit, a pledged savings account or another form of security ("Security") prior to initiating ground-disturbing project activities.

Prior to submittal to the CPM, the Security shall be approved by CDFG and the CPM, in consultation with BLM and the USFWS, to ensure funding in the amount of $35,185,180. The Security requirement would be $23,393,200 if the Avoidance of Donated and Acquired Lands Alternative were constructed or $10,737,780 for the Reduced Acreage Alternative. This Security amount was calculated as follows and may be revised upon completion of a Property Analysis Record (PAR) or PAR-like analysis of the proposed compensation lands:

a. land acquisition costs for compensation lands, calculated at $910/acre = $12,756,380;

b. costs of initial habitat improvements to compensation lands, calculated at $250/acre = $3,504,500;

c. costs of establishing an endowment for long-term management of compensation lands, calculated at $1,350/acre = $18,924,300.

5. Compensation Lands Acquisition Conditions: The project owner shall comply with the following conditions relating to acquisition of the compensation lands after the CDFG and the CPM, in consultation with BLM and the USFWS, have approved the proposed compensation lands and received Security as applicable and as described above.

   a. Preliminary Report: The project owner, or approved third party, shall provide a recent preliminary title report, initial hazardous materials survey report, biological analysis, and other necessary documents for the proposed 14,018 acres. All documents conveying or conserving compensation lands and all conditions of title/easement are subject to a field review and approval by CDFG and the CPM, in consultation with BLM and the USFWS, California Department of General Services and, if applicable, the Fish and Game Commission and/or the Wildlife Conservation Board.

   b. Title/Conveyance: The project owner shall transfer fee title or a conservation easement to the 14,018 acres of compensation lands to CDFG under terms approved by CDFG. Alternatively, a non-profit organization qualified to manage compensation lands (pursuant to California Government Code section 65965) and approved by CDFG and the CPM may hold fee title or a conservation easement over the habitat mitigation lands. If the approved non-profit organization holds title, a conservation easement shall be recorded in favor of CDFG in a form approved by CDFG. If the approved non-profit holds a conservation easement, CDFG shall be named a third party beneficiary. If a Security is provided, the project owner or an approved third party shall complete the proposed compensation lands acquisition within 18 months of the start of project ground-disturbing activities.

   c. Initial Habitat Improvement Fund. The project owner shall fund the initial protection and habitat improvement of the 14,018 acres. Alternatively, a non-profit organization may hold the habitat improvement funds if they are qualified to manage the compensation lands (pursuant to California Government Code section 65965) and if they meet the approval of CDFG and the CPM. If CDFG takes fee title to the compensation lands, the habitat improvement fund must go to CDFG.

d. Long-Term Management Endowment Fund. Prior to ground-disturbing project activities, the project owner shall provide to CDFG a non-wasting capital endowment in the amount determined through the Property Analysis Record (PAR) or PAR-like analysis that would be conducted for the 14,018 acres. Alternatively, a non-profit organization may hold the endowment fees if they are qualified to manage the compensation lands (pursuant to California Government Code section 65965) and if they meet the approval of CDFG and the CPM. If CDFG takes fee title to the compensation lands, the endowment must go to CDFG, where it would be held in the special deposit fund established pursuant to California Government Code section 16370. If the special deposit fund is not used to manage the endowment, the California Wildlife Foundation or similarly approved entity identified by CDFG shall manage the endowment for CDFG and with CDFG supervision.

e. Interest, Principal, and Pooling of Funds. The project owner, CDFG and the CPM shall ensure that an agreement is in place with the endowment holder/manager to ensure the following conditions:

   i. Interest. Interest generated from the initial capital endowment shall be available for reinvestment into the principal and for the long-term operation, management, and protection of the approved compensation lands, including reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and any other action approved by CDFG designed to protect or improve the habitat values of the compensation lands.

   ii. Withdrawal of Principal. The endowment principal shall not be drawn upon unless such withdrawal is deemed necessary by the CDFG or the approved third-party endowment manager to ensure the continued viability of the species on the 14,018 acres. If CDFG takes fee title to the compensation lands, monies received by CDFG pursuant to this provision shall be deposited in a special deposit fund established pursuant to Government Code section 16370. If the special deposit fund is not used to manage the endowment, the California Wildlife Foundation or similarly approved entity identified by CDFG would manage the endowment for CDFG with CDFG supervision.

   iii. Pooling Endowment Funds. CDFG, or a CPM and CDFG approved non-profit organization qualified to hold endowments pursuant to California Government Code section 65965, may pool the endowment with other endowments for the operation, management, and protection of the 14,018 acres for local populations of desert tortoise. However, for reporting purposes, the endowment fund must be tracked and reported individually to the CDFG and CPM.

iv. Reimbursement Fund. The project owner shall provide reimbursement to CDFG or an approved third party for reasonable expenses incurred during title, easement, and documentation review; expenses incurred from other State or State-approved federal agency reviews; and overhead related to providing compensation lands.

The project owner is responsible for all compensation lands acquisition/ easement costs, including but not limited to, title and document review costs, as well as expenses incurred from other State agency reviews and overhead related to providing compensation lands to the department or approved third party; escrow fees or costs; environmental contaminants clearance; and other site cleanup measures.

Verification: No less than 90 days prior to acquisition of the property, the project owner shall submit a formal acquisition proposal to BLM's Wildlife Biologist, the CPM, CDFG, and USFWS describing the parcels intended for purchase.

No later than 30 days prior to beginning project ground-disturbing activities, the project owner shall provide written verification of Security in accordance with this condition of certification. The project owner, or an approved third party, shall complete and provide written verification of the proposed compensation lands acquisition within 18 months of the start of project ground-disturbing activities. Within 180 days of the land or easement purchase, as determined by the date on the title, the project owner, or an approved third party, shall provide BLM's Wildlife Biologist, the CPM, CDFG, and USFWS with a management plan for the compensation lands and associated funds. BLM's Wildlife Biologist and the CPM shall review and approve the management plan, in consultation with CDFG and the USFWS.

Within 90 days after completion of project construction, the project owner shall provide to the CPM and CDFG an analysis with the final accounting of the amount of habitat disturbed during project construction.

RAVEN MONITORING, MANAGEMENT, AND CONTROL PLAN

BIO-18 The project owner shall design and implement a Raven Monitoring, Management, and Control Plan (Raven Plan) that is consistent with the most current USFWS-approved raven management guidelines and that meets the approval of the USFWS, CDFG, and the CPM. The goal of the Raven Plan shall be to minimize predation on desert tortoises by minimizing project-related increases in raven abundance. The Raven Plan shall identify conditions associated with the project that might provide raven subsidies or attractants; describe management practices to avoid or minimize conditions that might increase raven numbers and predatory activities; describe control practices for ravens; address monitoring during construction and for the life of the project; and discuss reporting requirements. For the first year of reporting the project owner shall provide quarterly reports describing implementation of the Raven Plan. Thereafter the reports shall be submitted annually for the life of the project. The Raven Plan shall also include a requirement for payment of an in-lieu fee to a third-party account established by the USFWS to support a regional raven monitoring and management plan (USFWS 2009b) if it is implemented.

Verification: At least 60 days prior to start of any project-related ground disturbance activities, the project owner shall provide the CPM, the BLM's Wildlife Biologist, USFWS, and CDFG with the final version of the Raven Plan that has been reviewed and approved by USFWS and CDFG. All modifications to the approved Raven Plan must be made only after consultation with staff, USFWS, and CDFG. The project owner shall notify the CPM and the BLM's Wildlife Biologist no less than five working days before implementing any CPM- and BLM-approved modifications to the Raven Plan.

Within 30 days after completion of project construction, the project owner shall provide to the CPM and the BLM's Wildlife Biologist for review and approval a report identifying which items of the Raven Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which items are still outstanding.

PRE-CONSTRUCTION NEST SURVEYS AND IMPACT AVOIDANCE MEASURES FOR MIGRATORY BIRDS

BIO-19 Pre-construction nest surveys shall be conducted if construction activities will occur during the breeding period (from February 1 through August 15). The Designated Biologist or Biological Monitor conducting the surveys shall be experienced bird surveyors and familiar with standard nest-locating techniques such as those described in Martin and Guepel (1993). Surveys shall be conducted in accordance with the following guidelines:

1. Surveys shall cover all potential nesting habitat in the project site and within 500 feet of the boundaries of the plant site and linear facilities;
2. At least two pre-construction surveys shall be conducted, separated by a minimum 10-day interval. One of the surveys shall be conducted within the 10 days preceding initiation of construction activity. Additional follow-up surveys may be required if periods of construction inactivity exceed one week in any given area, an interval during which birds may establish a nesting territory and initiate egg laying and incubation;
3. If active nests are detected during the survey, a 500 foot no-disturbance buffer zone shall be implemented and a monitoring plan shall be developed. This protected area surrounding the nest may be adjusted by the Designated Biologist in consultation with CDFG, BLM, USFWS, and CPM. Nest locations shall be mapped using GPS technology and submitted, along with a weekly report stating the survey results, to the CPM and BLM Authorized Officer; and
4. The Designated Biologist shall monitor the nest until he or she determines that nestlings have fledged and dispersed. Activities that might, in the opinion of the Designated Biologist and in consultation with the CPM and BLM, disturb nesting activities shall be prohibited within the buffer zone until such a determination is made.

Verification: At least 10 days prior to the start of any project-related ground disturbance activities, the project owner shall provide the CPM and BLM a letter-report describing the findings of the pre-construction nest surveys, including the time, date, and duration of the survey; identity and qualifications of the surveyor(s); and a list of species observed. If active nests are detected during the survey, the report shall include a map or aerial photo identifying the location of the nest and shall depict the boundaries of the no-disturbance buffer zone around the nest.

PRE CONSTRUCTION SURVEYS FOR GOLDEN EAGLES

BIO-20 Pre-construction nest surveys for Golden Eagles shall be conducted annually if construction activities will occur during the breeding period (from February 1 through August 15). The Designated Biologist or Biological Monitor conducting the surveys shall be experienced bird surveyors familiar with the ecology and nesting habits of Golden Eagles. Surveys shall be conducted in accordance with the following guidelines unless approved by the BLM, CPM, CDFG, and USFWS:

1. Surveys shall cover all potential nesting habitat in the project site and within 1 mile of the boundaries of the plant site and linear facilities;
2. At least two pre-construction surveys shall be conducted, separated by a minimum 10-day interval. One of the surveys shall be conducted within the 10 days preceding initiation of construction activity.
3. If active nests are detected during the survey, a 0.5-mile no-disturbance buffer zone shall be implemented. This protected area surrounding the nest may be adjusted by the Designated Biologist in consultation with CDFG, BLM, USFWS, and CPM. If present a monitoring plan shall be developed identifying the schedule of monitoring required to ensure nest protection. Nest locations shall be mapped using GPS technology and submitted, along with a weekly report stating the survey results, to the CPM and BLM Wildlife Biologist; and
4. The Designated Biologist shall monitor the nest until he or she determines that nestlings have fledged and dispersed. Activities that might, in the opinion of the Designated Biologist and in consultation with the CPM and BLM, disturb nesting activities shall be prohibited within the buffer zone until such a determination is made.

Verification: At least 10 days prior to the start of any project-related ground disturbance activities, the project owner shall provide the CPM and BLM a letter-report describing the findings of the pre-construction nest surveys, including the time, date, and duration of the survey; identity and qualifications of the surveyor(s); and a list of species observed. If active nests are detected during the survey, the report shall include a map or aerial photo identifying the location of the nest and shall depict the boundaries of the no-disturbance buffer zone around the nest.

DOCUMENTATION OF BALD AND GOLDEN EAGLE PROTECTION ACT COMPLIANCE

BIO-21 The project owner shall provide documentation to the CPM, BLM, CDFG, and USFWS that the project is in compliance with the Bald and Golden Eagle Protection Act (Title 16, United States Code, sections 668-668c).

Verification: No more than 60 days following the publication of the Energy Commission License Decision or the Record of Decision/ROW Issuance, whichever comes first, the project owner shall submit to the CPM, BLM's Authorized Officer, USFWS, and CDFG documentation that the project is in compliance with the Bald and Golden Eagle Protection Act (Title 16, United States Code, sections 668-668c). This shall include documentation from the USFWS in the form of written or electronic transmittal indicating the status of the permit, if required, and any follow up actions required by the applicant.

BURROWING OWL IMPACT AVOIDANCE, MINIMIZATION, AND COMPENSATION MEASURES

BIO-22 The project owner shall implement the following measures to avoid and offset impacts to burrowing owls:

1. Pre-Construction Surveys. Concurrent with desert tortoise clearance surveys, the Designated Biologist shall conduct pre-construction surveys for burrowing owls no more than 30 days prior to the start of ground disturbing activities. Surveys shall be conducted within the project site and along all linear facilities in accordance with CDFG guidelines (CBOC 1993). Surveys shall also be completed within 500 feet of all project disturbances.
2. Burrowing Owl Monitoring and Mitigation Plan. The Designated Biologist shall prepare a Burrowing Owl Monitoring and Mitigation Plan in consultation with CDFG, USFWS, and staff. This plan shall include detailed measures to avoid and minimize impacts to burrowing owls in and near the construction areas and shall be consistent with CDFG guidance (CDFG 1995).
3. Artificial Burrow Installation. Prior to any ground-disturbing activities, the project owner shall install no less than four artificial burrows, or at least two burrows for each owl displaced by the project as close as possible to the existing location if owls are detected in the project footprint or within 250 feet of construction. Design of the artificial burrows shall be consistent with CDFG guidelines (CDFG 1995). The Designated Biologist shall survey the site selected for artificial burrow construction to verify that such construction will not affect desert tortoise. The design of the burrows shall be approved by the CPM and BLM Wildlife Biologist in consultation with CDFG and USFWS. If artificial burrows are required, the project owner shall obtain by purchase the land required to support the burrows or ensure the burrows are located in an area such as the transmission line easement where construction/development would not occur.
4. Burrowing Owl Relocation Area Management Plan. If artificial burrows are constructed, the project owner shall develop a Burrowing Owl Relocation Area Management Plan. The Burrowing Owl Relocation Area Management Plan shall include monitoring and maintenance requirements, details on methods for measuring compliance goals, and remedial actions to be taken if management goals are not met. A report describing results of monitoring and management of the relocation area shall be submitted to the CPM, BLM Authorized Officer, CDFG, and USFWS no later than January 31st of each year for the life of the project.

5. Surveys of Relocation Area. The Designated Biologist shall survey the relocation area(s) containing the artificial burrows installed in accordance with Item 2 above during the nesting season to assess use of the artificial burrows by owls using methods consistent with Phase II and Phase III California Burrowing Owl Consortium Guideline protocols (CBOC 1993). Surveys shall start upon completion of artificial burrow construction and shall continue for a period of five years. If survey results indicate burrowing owls are not nesting on the relocation area, remedial actions shall be developed and implemented in consultation with the CPM, BLM Authorized Officer, CDFG, and USFWS to correct conditions at the site that might be preventing owls from nesting there. A report describing survey results and remedial actions taken shall be submitted to the CPM, BLM Authorized Officer, CDFG, and USFWS no later than January 31st of each year for five years.

Verification: Within 30 days of publication of the Energy Commission Decision, the project owner shall submit to the CPM, BLM Wildlife Biologist, CDFG, and USFWS a draft Burrowing Owl Relocation Area Management Plan if burrowing owls will need to be relocated. Prior to any ground-disturbing activities on the project site, the project owner shall submit to the CPM a final Burrowing Owl Relocation Area Management Plan that reflects review and approval by staff in consultation with CDFG and USFWS.

If pre-construction surveys detect burrowing owls within 500 feet of proposed construction activities, the Designated Biologist shall provide to CDFG, USFWS, BLM Wildlife Biologist, and the CPM a Burrowing Owl Monitoring and Mitigation Plan at least 30 days prior to the start of any project-related site disturbance activities. The project owner shall report monthly to CDFG, USFWS, the BLM Wildlife Biologist, and the CPM for the duration of construction on the implementation of burrowing owl avoidance and minimization measures described in the Burrowing Owl Monitoring and Mitigation Plan. Within 30 days after completion of construction the project owner shall provide to the CDFG, the BLM Wildlife Biologist, and the CPM a written construction termination report identifying how mitigation measures described in the plan have been completed.

MONITORING BIRD IMPACTS FROM SOLAR TECHNOLOGY

BIO-23 The project owner shall prepare and implement a Bird Monitoring Study to monitor the death and injury of birds from collisions with facility features such as reflective mirror-like surfaces and from heat, and bright light from concentrating sunlight. The study design shall be approved by BLM's Wildlife Biologist and the CPM in consultation with CDFG and USFWS, and shall be incorporated into the project's BRMIMP and implemented. The Bird Monitoring Study shall include detailed specifications on data and carcass collection protocol and a rationale justifying the proposed schedule of carcass searches. The study shall also include seasonal trials to assess bias from carcass removal by scavengers as well as searcher bias. The Plan shall include adaptive management strategies that include the placement of bird flight diverters, aerial markers, or other strategies to minimize collisions with the SunCatcher units.

Verification: No more than 30 days following the publication of the Energy Commission License Decision or the Record of Decision/ROW Issuance, whichever comes first, the project owner shall submit to the CPM, BLM's Authorized Officer, USFWS and CDFG a final Bird Monitoring Study. Modifications to the Bird Monitoring Study shall be made only after approval from BLM's Wildlife Biologist and the CPM.

For one year following the beginning of power plant operation the Designated Biologist shall submit quarterly reports to BLM's Authorized Officer, CPM, CDFG, and USFWS describing the dates, durations, and results of monitoring. The quarterly reports shall provide a detailed description of any project-related bird or wildlife deaths or injuries detected during the monitoring study or at any other time. Following the completion of the fourth quarter of monitoring the Designated Biologist shall prepare an Annual Report that summarizes the year's data, analyzes any project-related bird fatalities or injuries detected, and provides recommendations for future monitoring and any adaptive management actions needed. The Annual Report shall be provided to the CPM, BLM's Authorized Officer, CDFG, and USFWS. Quarterly reporting shall continue until BLM's Wildlife Biologist and the CPM, in consultation with CDFG and USFWS determine whether more years of monitoring are needed, and whether mitigation and adaptive management measures are necessary. After the Bird Monitoring Study is determined by BLM's Wildlife Biologist and the CPM to be complete, the project owner or contractor shall prepare a paper that describes the study design and monitoring results to be submitted to a peer-reviewed scientific journal. Proof of submittal shall be provided to BLM's Wildlife Biologist and the CPM within one year of concluding the monitoring study.

NELSON'S BIGHORN SHEEP MITIGATION

BIO-24 To compensate for project impacts to Nelson's bighorn sheep the project owner shall finance, construct, and manage an artificial water source (guzzler) in the eastern part of the Cady Mountains for the life of the project. The project owner will maintain access to the existing guzzler in the Cady Mountains that is currently accessed through the proposed project site. This access will be maintained post development. In addition, all construction activities shall be monitored as described in staff's proposed Conditions of Certification **BIO-4** and **BIO-8**. All construction activities within 500 feet of Nelson's bighorn sheep shall cease until the animals have moved farther than 500 feet away from construction activities, even if construction is occurring within an area that had been fenced with tortoise exclusion fencing. This buffer may be modified with the approval of the CPM, BLM, and CDFG.

Verification: Within 60 days of publication of the Energy Commission Decision the project owner shall submit to the BLM's Wildlife Biologist, the CPM, and CDFG a Draft Bighorn Sheep Mitigation Plan identifying a proposed location for the artificial water source and providing plans for its construction and management. At least 30 days prior to start of any project-related ground disturbance activities, the project owner shall provide BLM's Wildlife Biologist and the CPM with the final version of the Bighorn Sheep Mitigation Plan that has been reviewed and approved by CDFG and staff. BLM's Wildlife Biologist and the CPM will determine the plan's acceptability within 30 days of receipt of the final plan. No later than 18 months following the publication of the Energy Commission Decision, the project owner shall provide written verification to BLM's

Wildlife Biologist and the CPM that the construction of the artificial water source has been completed. At the same time, the project owner shall provide evidence of an agreement (Memorandum of Understanding) and a funding mechanism to provide ongoing maintenance of the water source by CDFG or some other party approved by BLM's Authorized Office and the CPM.

Impact minimization measures for Nelson's bighorn sheep and their implementation methods shall be included in the final BRMIMP and implemented. Implementation of the measures shall be reported in the Monthly Compliance Reports by the Designated Biologist.

AMERICAN BADGER AND DESERT KIT FOX IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-25 Prior to ground disturbance the project owner shall conduct pre-construction surveys for American badgers and desert kit fox. These surveys may be conducted concurrent with the desert tortoise surveys. Surveys shall be conducted as described below:

Biological Monitors shall perform pre-construction surveys for badger and kit fox dens in the project area, including areas within 250 feet of all project facilities, utility corridors, and access roads. If dens are detected, each den shall be classified as inactive, potentially active, or definitely active.

Inactive dens that would be directly impacted by construction activities shall be excavated by hand and backfilled to prevent reuse by badgers or kit fox. Potentially active dens that would be directly impacted by construction activities shall be monitored by the Biological Monitor for three consecutive nights using a tracking medium (such as diatomaceous earth or fire clay) and/or infrared camera stations at the entrance. If no tracks are observed in the tracking medium or no photos of the target species are captured after three nights, the den shall be excavated and backfilled by hand.

If present, occupied badger dens shall be flagged and ground-disturbing activities avoided within 50 feet of the occupied den. Maternity dens shall be avoided during the pup-rearing season (15 February through 1 July) and a minimum 200-foot disturbance-free buffer established. Buffers may be modified with the concurrence of CDFG and CPM. Maternity dens shall be flagged for avoidance, identified on construction maps, and a biological monitor shall be present during construction.

If avoidance of a non-maternity den is not feasible, badgers shall be relocated by slowly excavating the burrow (either by hand or mechanized equipment under the direct supervision of the biologist, removing no more that 4 inches at a time) before or after the rearing season (15 February through 1 July). Any relocation of badgers shall occur only after consultation with the CDFG and CPM. A written report documenting the badger removal shall be provided to the CPM within 30 days of relocation.

Verification: The project owner shall submit a report to the CPM, BLM, and CDFG within 30 days of completion of badger and kit fox surveys. The report shall describe survey methods, results, mitigation measures implemented, and the results of the mitigation.

BAT IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-26 The project owner shall conduct a survey for roosting bats prior to any ground disturbance activities in all areas within 200 feet of rocky outcrops or the existing BNSF railroad trestles. The project owner shall also conduct surveys for roosting bats during the maternity season (1 March to 31 July) within 300 feet of project activities at the existing railroad trestles and rocky outcrops. These areas shall be surveyed by a qualified bat biologist, who shall be approved by the Designated Biologist. Surveys shall include a minimum of one day and one evening visit. If active maternity roosts or hibernacula are found, the rock outcrop or trestle occupied by the roost shall be avoided (i.e., not removed) by the project, if feasible. If avoidance of the maternity roost is not feasible, the bat biologist shall survey (through the use of radio telemetry or other CDFG/CPM/BLM-approved methods) for nearby alternative maternity colony sites. If the bat biologist determines in consultation with and with the approval of the CDFG, BLM Wildlife Biologist, and CPM that there are alternative roost sites used by the maternity colony and young are not present, then no further action is required. However, if there are no alternative roost sites used by the maternity colony, provision of substitute roosting bat habitat is required. If active maternity roosts are absent, but a hibernaculum (i.e., a non-maternity roost) is present, then exclusion of bats prior to demolition of roosts is required.

1. <u>Provision of substitute roosting bat habitat</u>. If a maternity roost will be impacted by the project, and no alternative maternity roosts are in use near the site, substitute roosting habitat for the maternity colony shall be provided on, or in close proximity to, the project site no less than three months prior to the eviction of the colony. Alternative roost sites will be constructed in accordance with the specific bats' requirements in coordination with CDFG, BLM Wildlife Biologist, and the CPM. Alternative roost sites must be of comparable size and proximal in location to the impacted colony. The CDFG shall also be notified of any hibernacula or active nurseries within the construction zone.

2. <u>Exclude bats prior to demolition of roosts</u>. If non-breeding bat hibernacula are found in rocky outcrops scheduled to be removed or in crevices in rock outcrops within the grading footprint, the individuals shall be safely evicted, under the direction of the qualified bat biologist, by opening the roosting area to allow airflow through the cavity or other means determined appropriate by the bat biologist (e.g., installation of one-way doors). In situations requiring one-way doors, a minimum of one week shall pass after doors are installed and temperatures should be sufficiently warm for bats to exit the roost. This action should allow all bats to leave during the course of one week. Roosts that need to be removed in situations where the use of one-way doors is not necessary in the judgment of the qualified bat biologist shall first be disturbed by various means at the direction of the bat biologist at dusk to allow bats to escape during the darker hours, and the roost tree shall be removed or the grading shall occur the next day (i.e., there shall be no less or more than one night between initial disturbance and the grading or tree removal).

If an active maternity roost is located in an area to be impacted by the project, and alternative roosting habitat is available, the demolition of the roost site must commence before maternity colonies form (i.e., prior to 1 March) or after young are flying (i.e., after 31 July) using the exclusion techniques described above.

Verification: The project owner shall submit a report to the CPM, the BLM Wildlife Biologist, and the CDFG within 30 days of completion of roosting bat surveys and any subsequent mitigation. The report shall describe survey methods, results, mitigation measures implemented, and the results of the mitigation.

STREAMBED IMPACT MINIMIZATION AND COMPENSATION MEASURES

BIO-27 The project owner shall implement the following measures to avoid, minimize and mitigate for direct and indirect impacts to waters of the State and to satisfy requirements of California Fish and Game Code sections 1600 and 1607.

1. Acquire Off-Site State Waters: The project owner shall acquire, in fee or in easement, a parcel or parcels of land that includes at least 436 acres of State jurisdictional waters. Prior to any activities that cross or have the potential to impact any jurisdictional drainage, the project owner shall provide a detailed map to the CDFG, BLM Wildlife Biologist, and CPM in a GIS format that identifies all potential crossings of jurisdictional habitats including retention basins, detention basins, reconfigured channels and culverts. The maps shall identify the type of crossing proposed by the owner such as bridges, culverts, or other mechanism and the best management practices that would be employed. Prior to construction the applicant shall map the vegetation with emphasis on the smoke tree woodland and big galleta shrub-steppe communities within the drainages subject to project disturbance and provide a map to the CPM, CDFG and BLM. All catclaw acacia or smoke tree habitat lost will be mitigated at a minimum 3:1 ratio. The parcel or parcels comprising the 436 acres of ephemeral washes shall include the same types of vegetation as mapped in the project footprint. The terms and conditions of this acquisition or easement shall be as described in Condition of Certification **BIO-17**. Mitigation for impacts to State waters shall occur within the surrounding watersheds, as close to the project site as possible.

2. Preparation of Management Plan: The project owner shall submit to Energy Commission CPM and CDFG a draft Management Plan that reflects site-specific enhancement measures for the drainages on the acquired compensation lands. The objective of the Management Plan shall be to enhance the wildlife value of the drainages, and may include enhancement actions such as weed control, fencing to exclude livestock, or erosion control.

3. Code of Regulations: The project owner shall provide a copy of the Streambed Impact Minimization and Compensation Measures from the Energy Commission Decision and BLM Record of Decision to all

contractors, subcontractors, and the applicant's project supervisors. Copies shall be readily available at work sites at all times during periods of active work and must be presented to any CDFG personnel or personnel from another agency upon demand. The CPM reserves the right to issue a stop work order or allow CDFG to issue a stop work order after giving notice to the project owner, the CPM, if the CPM in consultation with CDFG, determines that the project owner has breached any of the terms or conditions or for other reasons, including but not limited to the following:

a. The information provided by the applicant regarding streambed alteration is incomplete or inaccurate;

b. New information becomes available that was not known to it in preparing the terms and conditions; or

c. The project or project activities as described in the Supplemental Staff Assessment/ Final Environmental Impact Statement have changed.

4. <u>Best Management Practices</u>: The project owner shall also comply with the following conditions to protect drainages near the Project Disturbance Area:

   a. The project owner shall not operate vehicles or equipment in ponded or flowing water except as described in this condition.

   b. With the exception of the retention basins and drainage control system installed for the project the installation of bridges, culverts, or other structures shall be such that water flow (velocity and low flow channel width) is not impaired. Bottoms of temporary culverts shall be placed at or below stream channel grade.

   c. When any activity requires moving of equipment across a flowing drainage, such operations shall be conducted without substantially increasing stream turbidity.

   d. Vehicles driven across ephemeral drainages when water is present shall be completely clean of petroleum residue and water levels shall be below the vehicles' axels.

   e. The project owner shall minimize road building, construction activities and vegetation clearing within ephemeral drainages to the extent feasible.

   f. The project owner shall not allow water containing mud, silt, or other pollutants from grading, aggregate washing, or other activities to enter ephemeral drainages or be placed in locations that may be subjected to high storm flows.

   g. The project owner shall comply with all litter and pollution laws. All contractors, subcontractors, and employees shall also obey these laws, and it shall be the responsibility of the project owner to ensure compliance.

h. Spoil sites shall not be located at least 30 feet from the boundaries and drainages or in locations that may be subjected to high storm flows, where spoils might be washed back into drainages.

i. Raw cement/concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products, or any other substances that could be hazardous to vegetation or wildlife resources, resulting from project-related activities, shall be prevented from contaminating the soil and/or entering waters of the State. These materials, placed within or where they may enter a drainage by the project owner or any party working under contract or with the permission of the project owner, shall be removed immediately.

j. No broken concrete, debris, soil, silt, sand, bark, slash, sawdust, rubbish, cement or concrete or washings thereof, oil or petroleum products or other organic or earthen material from any construction or associated activity of whatever nature shall be allowed to enter into, or placed where it may be washed by rainfall or runoff into, waters of the State.

k. When operations are completed, any excess materials or debris shall be removed from the work area. No rubbish shall be deposited within 150 feet of the high water mark of any drainage.

l. No equipment maintenance shall occur within 150 feet of any ephemeral drainage where petroleum products or other pollutants from the equipment may enter these areas under any flow.

m. Stationary equipment such as motors, pumps, generators, and welders, located within or adjacent to a drainage shall be positioned over drip pans. Stationary heavy equipment shall have suitable containment to handle a catastrophic spill/leak. Clean up equipment such as booms, absorbent pads, and skimmers, shall be on site prior to the start of construction.

n. The cleanup of all spills shall begin immediately. The CDFG, BLM Authorized Officer, and CPM shall be notified immediately by the project owner of any spills and shall be consulted regarding clean-up procedures.

5. Non-Native Vegetation Removal. The owner shall remove any non-native vegetation (Consistent with the Weed Management Plan) from any drainage that requires the placement of a bridge, culvert or other structure. Removal shall be done at least twice annually (Spring/Summer) during implementation of the Project.

6. Reporting of Special-Status Species: If any special-status species are observed on or in proximity to the project site, or during project surveys, the project owner shall submit California Natural Diversity Data Base (CNDDB) forms and maps to the CNDDB within five working days of the sightings and provide the regional CDFG office with copies of the CNDDB forms and survey maps. The CNDDB form is available online at: www.dfg.ca.gov/whdab/pdfs/natspec.pdf. This information shall be mailed

within five days to: California Department of Fish and Game, Natural Diversity Data Base, 1807 13th Street, Suite 202, Sacramento, CA 95814, (916) 324-3812. A copy of this information shall also be mailed within five days to CDFG, BLM Authorized Officer, and the CPM.

7. Notification: The project owner shall notify the CPM, BLM Wildlife Biologist, and CDFG, in writing, at least five days prior to initiation of project activities in jurisdictional areas and at least five days prior to completion of project activities in jurisdictional areas. The project owner shall notify the CPM, BLM Wildlife Biologist, and CDFG of any change of conditions to the project, the jurisdictional impacts, or the mitigation efforts, if the conditions at the site of the proposed project change in a manner which changes risk to biological resources that may be substantially adversely affected by the proposed project. The notifying report shall be provided to the CPM, BLM Wildlife Biologist, and CDFG no later than 7 days after the change of conditions is identified. As used here, change of condition refers to the process, procedures, and methods of operation of a project; the biological and physical characteristics of a project area; or the laws or regulations pertinent to the project, as described below. A copy of the notifying change of conditions report shall be included in the annual reports.

    a. Biological Conditions: a change in biological conditions includes, but is not limited to, the following: 1) the presence of biological resources within or adjacent to the project area, whether native or non-native, not previously known to occur in the area; or 2) the presence of biological resources within or adjacent to the project area, whether native or non-native, the status of which has changed to endangered, rare, or threatened, as defined in section 15380 of Title 14 of the California Code of Regulations.

    b. Physical Conditions: a change in physical conditions includes, but is not limited to, the following: 1) a change in the morphology of a river, stream, or lake, such as the lowering of a bed or scouring of a bank, or changes in stream form and configuration caused by storm events; 2) the movement of a river or stream channel to a different location; 3) a reduction of or other change in vegetation on the bed, channel, or bank of a drainage, or 4) changes to the hydrologic regime such as fluctuations in the timing or volume of water flows in a river or stream.

    c. Legal Conditions: a change in legal conditions includes, but is not limited to, a change in Regulations, Statutory Law, a Judicial or Court decision, or the listing of a species, the status of which has changed to endangered, rare, or threatened, as defined in section 15380 of Title 14 of the California Code of Regulations.

Verification: No fewer than 30 days prior to the start of any site or related facilities mobilization activities, the project owner shall implement the mitigation measures described above. No fewer than 30 days prior to the start of work potentially affecting waters of the State, the project owner shall provide written verification (i.e., through incorporation into the BRMIMP) to the CPM and BLM Wildlife Biologist that the above best management practices will be implemented and provide a discussion of work in waters of the State in Compliance Reports for the duration of the project.

Within 30 days after completion of the first year of project construction, the project owner shall provide to the CPM for review and approval a report identifying that appropriate mitigation lands have been obtained, verification on ongoing enhancement techniques, and a summary of all modifications made to the existing channels.

EVAPORATION POND DESIGN, MONITORING, AND MANAGEMENT PLAN

BIO-28 The project owner shall install netting over the evaporation ponds and design and implement an Evaporation Pond Design, Monitoring, and Management Plan (Evaporation Pond Plan) that meets the approval of the USFWS, CDFG, BLM's Wildlife Biologist, and the Energy Commission staff. The goal of the Evaporation Pond Plan shall be to avoid the potential for wildlife mortality associated with the evaporation ponds. The Evaporation Pond Plan shall include: a discussion of the objectives of the Evaporation Pond Plan; a description of project design features such as side slope specifications, freeboard and depth requirements, covering, and fencing; a discussion on the placement of the evaporation pond as to reduce the potential of collision or electrocution of wildlife near the transmission line; avian, pond, and water quality monitoring, management actions such as bird deterrence/hazing and water level management, triggers for those management actions; and reporting requirements.

Verification: At least 30 days prior to start of any project-related ground disturbance activities, the project owner shall provide the CPM, BLM's Wildlife Biologist, USFWS, and CDFG with the final version of the Evaporation Pond Plan that has been reviewed and approved by USFWS, CDFG, and staff. The CPM and BLM's Wildlife Biologist would determine the plan's acceptability within 15 days of receipt of the final plan. All modifications to the approved Evaporation Pond Plan must be made only after consultation the staff, USFWS, and CDFG. The project owner shall notify the CPM and BLM's Wildlife Biologist no less than 5 working days before implementing any BLM- and CPM-approved modifications to the Evaporation Pond Plan.

Within 30 days after completion of project construction, the project owner shall provide to the CPM for review and approval a report identifying which items of the Evaporation Pond Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and as-built drawings of the evaporation ponds.

CHANNEL DECOMMISSIONING AND RECLAMATION PLAN

BIO-29 Upon project closure, the project owner shall implement a final Decommissioning and Reclamation Plan to remove the engineered diversion channels, detention basins, and other sediment control features from the project site. The goal of the plan shall be to restore the site's topography and hydrology to a relatively natural condition and to establish native plant communities within the Project Disturbance Area. The Channel Decommissioning and Reclamation Plan shall include a cost estimate for implementing the proposed decommissioning and reclamation activities, and shall be consistent with the guidelines in BLM's 43 CFR 3809.550 et seq., subject to review and revisions from BLM's Wildlife Biologist and the CPM in consultation with USFWS and CDFG.

Verification: No less than 90 days from publication of the Energy Commission Decision or the Record of Decision, whichever comes first, the project owner shall provide to BLM's Wildlife Biologist and the CPM an agency-approved final Channel Decommissioning and Reclamation Plan. Modifications to the approved Channel Decommissioning Plan shall be made only after approval from BLM's Wildlife Biologist and the CPM, in consultation with USFWS, and CDFG.

No more that 10 days prior to initiating project-related ground disturbance activities the project owner shall provide financial assurances to BLM's Wildlife Biologist and the CPM to guarantee that an adequate level of funding would be available to implement measures described in the Channel Decommissioning and Reclamation Plan.

CLOSURE PLAN MEASURES

BIO-30 The project owner shall implement and incorporate into the facility closure plan measures to address the local biological resources related to facility closure. A funding mechanism shall be developed in consultation with staff to ensure sufficient funds are available for revegetation, reclamation, and decommissioning. The facility closure plan shall address biological resources-related mitigation measures. In addition to these measures, the plan must include the following:

1. Removal of transmission conductors when they are no longer used and useful;
2. Removal of all above-ground and subsurface power plant site facilities and related facilities;
3. Methods for restoring wildlife habitat and promoting the re-establishment of native plant and wildlife species;
4. Revegetation of the project site and other disturbed areas utilizing appropriate methods for establishing native vegetation;
5. A cost estimate to complete closure-related activities.

In addition, the project owner shall secure funding to ensure implementation of the plan and provide to the CPM and BLM Wildlife Biologist written evidence of the dedicated funding mechanism(s).

Verification: Prior to initiating ground-disturbing project activities, the project owner shall provide financial assurances to the CPM and BLM Wildlife Biologist to guarantee that an adequate level of funding will be available to implement decommissioning and closure activities described above. The financial assurances may be in the form of an irrevocable letter of credit, a performance bond, a pledged savings account, or another equivalent form of security, as approved by the CPM and BLM Wildlife Biologist.

At least 12 months prior to commencement of planned closure activities, the project owner shall address all biological resources-related issues associated with facility closure, and provide final measures, in a Biological Resources Element. The draft planned permanent or unplanned closure measures shall be submitted to the CPM, BLM Wildlife Biologist, CDFG, and USFWS. After revision, final measures shall comprise the Biological Resources Element, which shall include the items listed above as well as written evidence of the dedicated funding mechanism(s) for these measures. The final Biological Resources Element shall become part of the facility closure plan, which is submitted to the CPM and BLM Wildlife Biologist within 90 days of the permanent closure or another period of time agreed to by the CPM and BLM Authorized Officer.

In the event of an unplanned permanent closure, the project owner shall notify the CPM and BLM Authorized Officer, as well as other responsible agencies, by telephone, fax, or e-mail, within 24 hours and shall take all necessary steps to implement the on-site contingency plan (see **Compliance** Conditions of Certification).

Upon facility closure, the project owner shall implement measures in the Biological Resources Element and provide written status updates on all closure activities to the CPM and BLM Wildlife Biologist at a frequency determined by the CPM and BLM Authorized Officer.

C.2.14 CONCLUSIONS

With implementation of staff's proposed conditions of certification, construction and operation of the Calico Solar Project would comply with all federal, State, and local laws, ordinances, regulations, and standards relating to biological resources.

Many of staff's proposed Conditions of Certification require the submittal of draft plans, proposals, or survey results prior to the start of construction. These reports are necessary for staff to ensure impacts will be minimized, as the proposed project would be located in an area with a rich diversity of sensitive biological resources. **Biological Resources Table 19** summarizes these pre-construction plan requirements.

Biological Resources Table 19
Summary of Pre-Construction Plans and Proposals

Condition of Certification	Plan/Report to be Submitted	Timing
BIO-6	Worker Environmental Awareness Program (WEAP)	Within 7 days of publication of the Energy Commission's License Decision, or the Record of Decision/ROW Issuance, whichever comes first
BIO-7	Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP)	At least 30 days prior to start of any preconstruction site mobilization and construction-related ground disturbance, grading, boring, and trenching.

Condition of Certification	Plan/Report to be Submitted	Timing
BIO-10	Revegetation Plan	No less than 30 days following the publication of the Energy Commission License Decision or the Record of Decision/ROW Issuance, whichever comes first
BIO-11	Weed Management Plan	At least 30 days prior to start of any project-related ground disturbance activities
BIO-12	a. Report describing results of floristic surveys, including maps and design drawings depicting the location of Special-Status Plant Protection Areas within and Environmentally Sensitive Areas adjacent to the project site b. Draft Special-Status Plant Protection and Monitoring Plan c. Final Special-Status Plant Protection and Monitoring Plan d. Draft Special-Status Plant Remedial Action Plan e. Final Special-Status Plant Remedial Action Plan f. Draft Seed Collection Plan g. Final Seed Collection Plan h. Draft Protected Plant Salvage Plan i. Final Protected Plant Salvage Plan	a. No more than 30 days following the publication of the Energy Commission Decision b. No more than 30 days following the publication of the Energy Commission Decision c. Within 90 days of the publication of the Commission Decision d. No more than 30 days following the publication of the Energy Commission Decision e. Within 90 days of the publication of the Commission Decision f. No more than 30 days following the publication of the Energy Commission Decision g. Within 90 days of the publication of the Commission Decision h. No more than 30 days following the publication of the Energy Commission Decision i. Within 90 days of the publication of the Commission Decision
BIO-13	a. Formal acquisition proposal for sand dune/Mojave fringe-toed lizard compensation lands describing the parcel(s) intended for purchase b. Written verification that the compensation lands or conservation easements have been acquired c. As an alternative to (b) above, written verification of Security in accordance with this condition of certification. d. If Security is provided, the project owner, or an approved third party, shall complete and provide written verification of the proposed compensation lands acquisition e. Management plan for the compensation lands and associated funds	a. A minimum of 30 days prior to acquisition of the property b. No later than 18 months following the publication of the Energy Commission License Decision or the Record of Decision/ROW Issuance, whichever comes first c. No later than 30 days prior to beginning project ground-disturbing activities d. Within 18 months of the start of project ground-disturbing activities e. Within 6 months of the land or easement purchase, as determined by the date on the title

Condition of Certification	Plan/Report to be Submitted	Timing
BIO-14	Report describing the number of Gila monsters moved, their state of health, including wounds or visible signs of illness, and the location of relocation (to be completed only if Gila monsters are encountered during clearance surveys or construction)	Within 30 days of relocation of Gila monsters
BIO-15	Report describing how each of the mitigation measures described in BIO-15 has been satisfied, including the desert tortoise survey results, capture and release locations of any relocated desert tortoises, and any other information needed to demonstrate compliance with the measures	Within 30 days of completion of desert tortoise clearance surveys
BIO-16	a. Desert Tortoise Relocation/Translocation Plan b. Report identifying which items of the Relocation/Translocation Plan have been completed, and a summary of all modifications to measures made during implementation	a. Within 7 days of publication of the Energy Commission's License Decision, or the Record of Decision/ ROW Issuance, whichever comes first b. Within 30 days after initiation of relocation/translocation activities
BIO-17	a. Formal acquisition proposal for desert tortoise compensation lands describing the parcel(s) intended for purchase b. Written verification that the compensation lands or conservation easements have been acquired and recorded in favor of the approved recipient(s) c. As an alternative to (b) above, written verification of Security in accordance with this condition of certification. d. If Security is provided, the project owner, or an approved third party, shall complete and provide written verification of the proposed compensation lands acquisition e. Management plan for the compensation lands and associated funds	a. No less than 90 days prior to acquisition of the compensation lands b. No later than 18 months following the publication of the Energy Commission License Decision c. No later than 30 days prior to beginning project ground-disturbing activities d. Within 18 months of the start of project ground-disturbing activities e. Within 180 days of the land or easement purchase, as determined by the date on the title
BIO-18	Final Raven Monitoring, Management, and Control Plan	At least 60 days prior to start of any project-related ground disturbance activities
BIO-19	Letter-report describing the results of the pre-construction nesting bird surveys.	At least 10 days prior to the start of any project-related ground disturbance activities
BIO-20	Letter-report describing the results of the pre-construction golden eagle nest surveys.	At least 10 days prior to the start of any project-related ground disturbance activities

Condition of Certification	Plan/Report to be Submitted	Timing
BIO-21	Documentation that the project is in compliance with the Bald and Golden Eagle Protection Act (Title 16, United States Code, sections 668-668c)	No more than 60 days following the publication of the Energy Commission License Decision or the Record of Decision/ROW Issuance, whichever comes first
BIO-22	a. Report describing results of pre-construction burrowing owl surveys b. Draft Burrowing Owl Relocation Area Management Plan (if burrowing owls will be relocated) c. Final Burrowing Owl Relocation Area Management Plan (if burrowing owls will be relocated) d. Burrowing Owl Monitoring and Mitigation Plan (if pre-construction surveys detect burrowing owls within 500 feet of proposed construction activities)	a. At least 10 days prior to the start of any project-related ground disturbance activities b. Within 30 days of publication of the Energy Commission Decision c. Prior to any ground-disturbing activities on the project site d. At least 30 days prior to the start of any project-related site disturbance activities
BIO-23	Bird Monitoring Study	No more than 30 days following the publication of the Energy Commission License Decision or the Record of Decision/ROW Issuance, whichever comes first
BIO-24	a. Draft Bighorn Sheep Mitigation Plan b. Final Bighorn Sheep Mitigation Plan c. Written that the construction of the artificial water source has been completed d. Evidence of an agreement (Memorandum of Understanding) and a funding mechanism to provide ongoing maintenance of the water source	a. Within 60 days of publication of the Energy Commission Decision b. At least 30 days prior to start of any project-related ground disturbance activities c. No later than 18 months following the publication of the Energy Commission Decision d. No later than 18 months following the publication of the Energy Commission Decision
BIO-25	Report describing results of badger and kit fox surveys and compliance with mitigation measures	Within 30 days of completion of badger and kit fox surveys
BIO-26	Report describing results of roosting bat surveys and compliance with mitigation measures	Within 30 days of completion of roosting bat surveys and any subsequent mitigation
BIO-27	Written verification (i.e., through incorporation into the BRMIMP) that the best management practices outlined in BIO-27 will be implemented	No fewer than 30 days prior to the start of work potentially affecting waters of the State
BIO-28	Evaporation Pond Design, Monitoring, and Management Plan	At least 30 days prior to the start of any project-related ground disturbance activities

Condition of Certification	Plan/Report to be Submitted	Timing
BIO-29	a. Channel Decommissioning and Reclamation Plan b. Financial assurances to guarantee that an adequate level of funding would be available to implement measures described in the Channel Decommissioning and Reclamation Plan	a. No less than 90 days from publication of the Energy Commission Decision or the Record of Decision, whichever comes first b. No more that 10 days prior to initiating project-related ground disturbance activities
BIO-30	Financial Assurances to guarantee adequate level of funding to implement decommissioning and closure	Prior to initiating ground disturbing activities.

C.2.15 REFERENCES

The tn: 00000 in the references below indicates the transaction number under which the item is catalogued in the Energy Commission's Docket Unit. The transaction number allows for quicker search and retrieval of individual items docketed for a case or used for ease of reference and retrieval of exhibits cited in briefs and used at Evidentiary Hearings.

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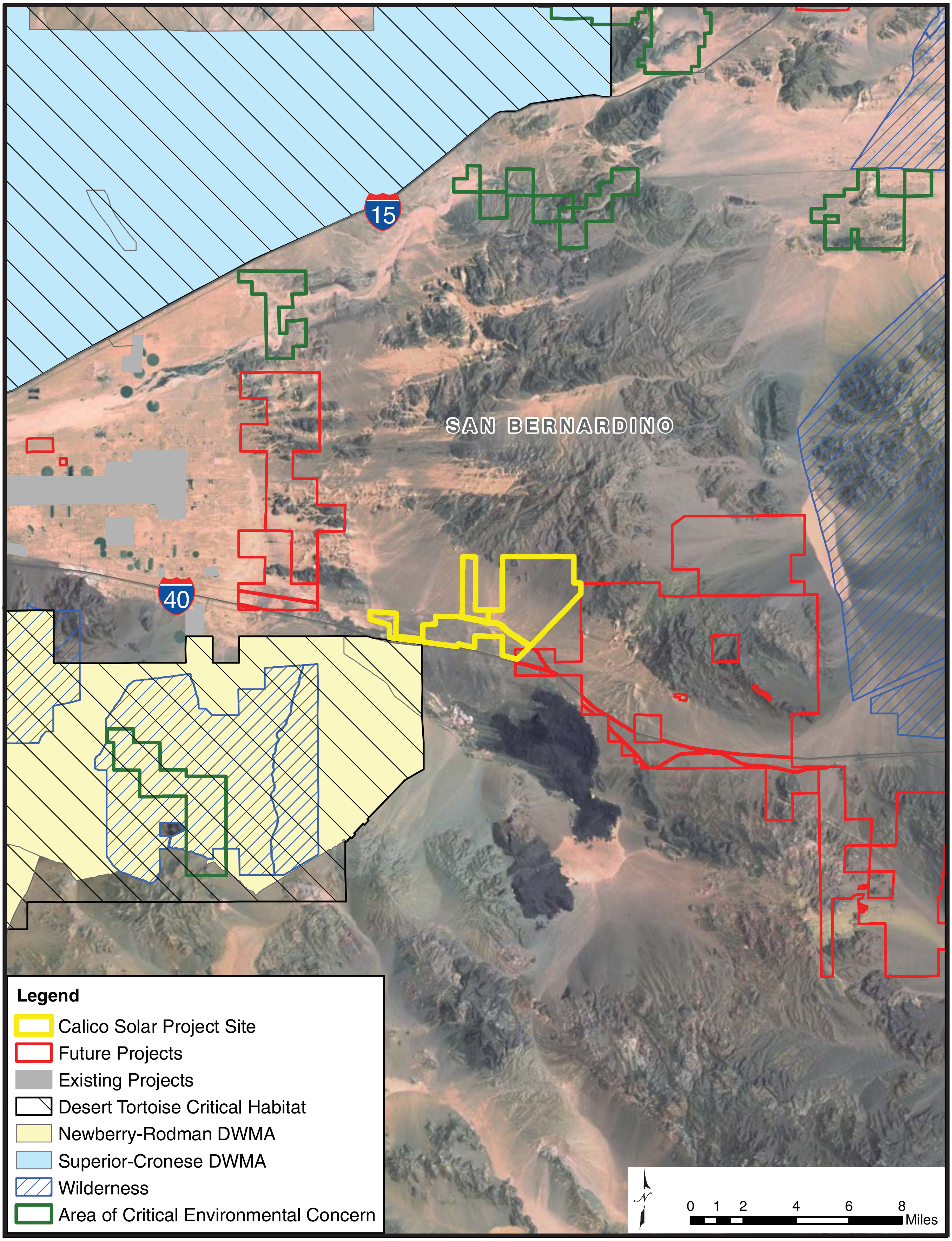
BIOLOGICAL RESOURCES - FIGURE 1

Calico Solar Project - Existing Projects - Forseeable Future Projects

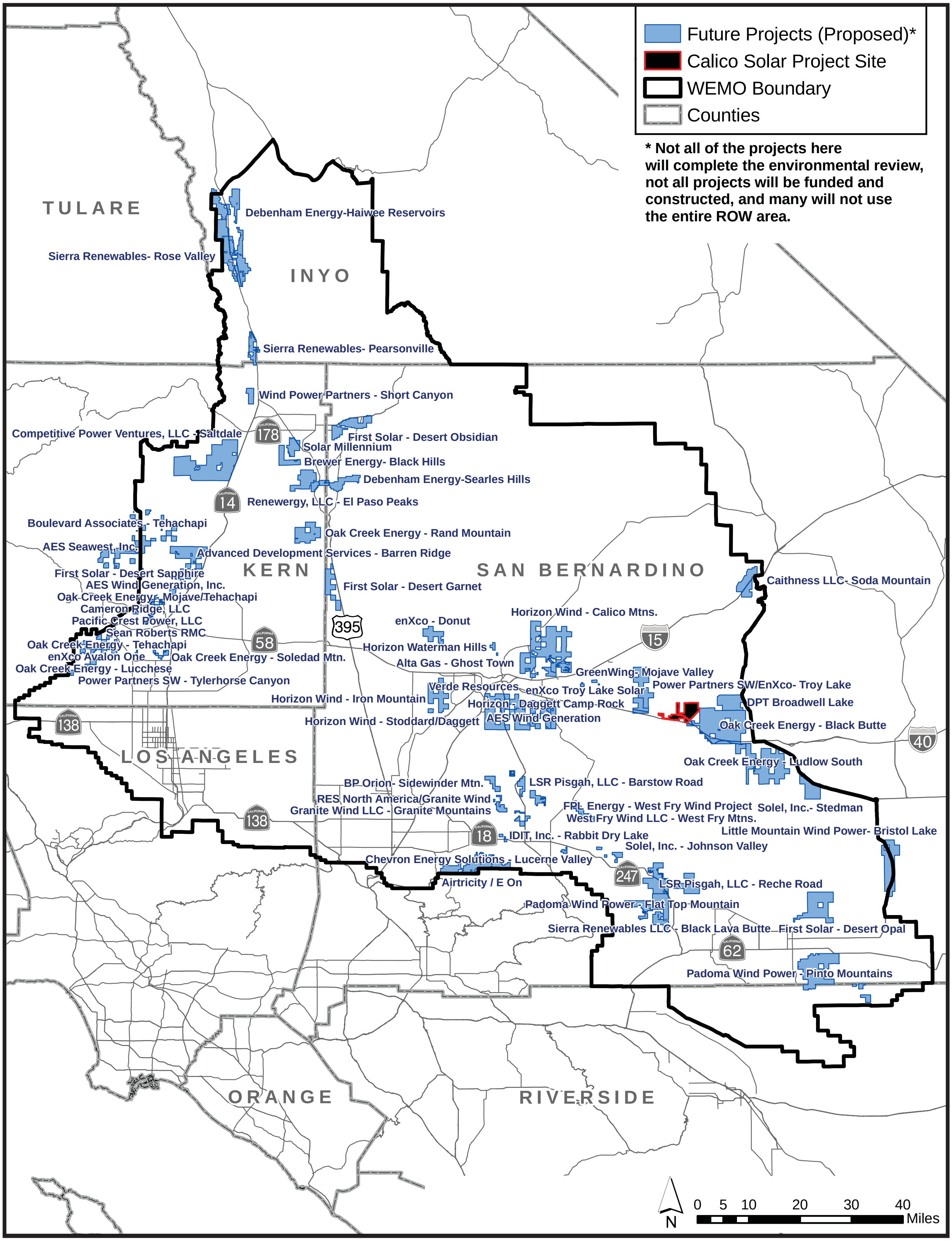


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 2

Calico Solar Project - Existing Projects - Forseeable Future Projects (Proposed)

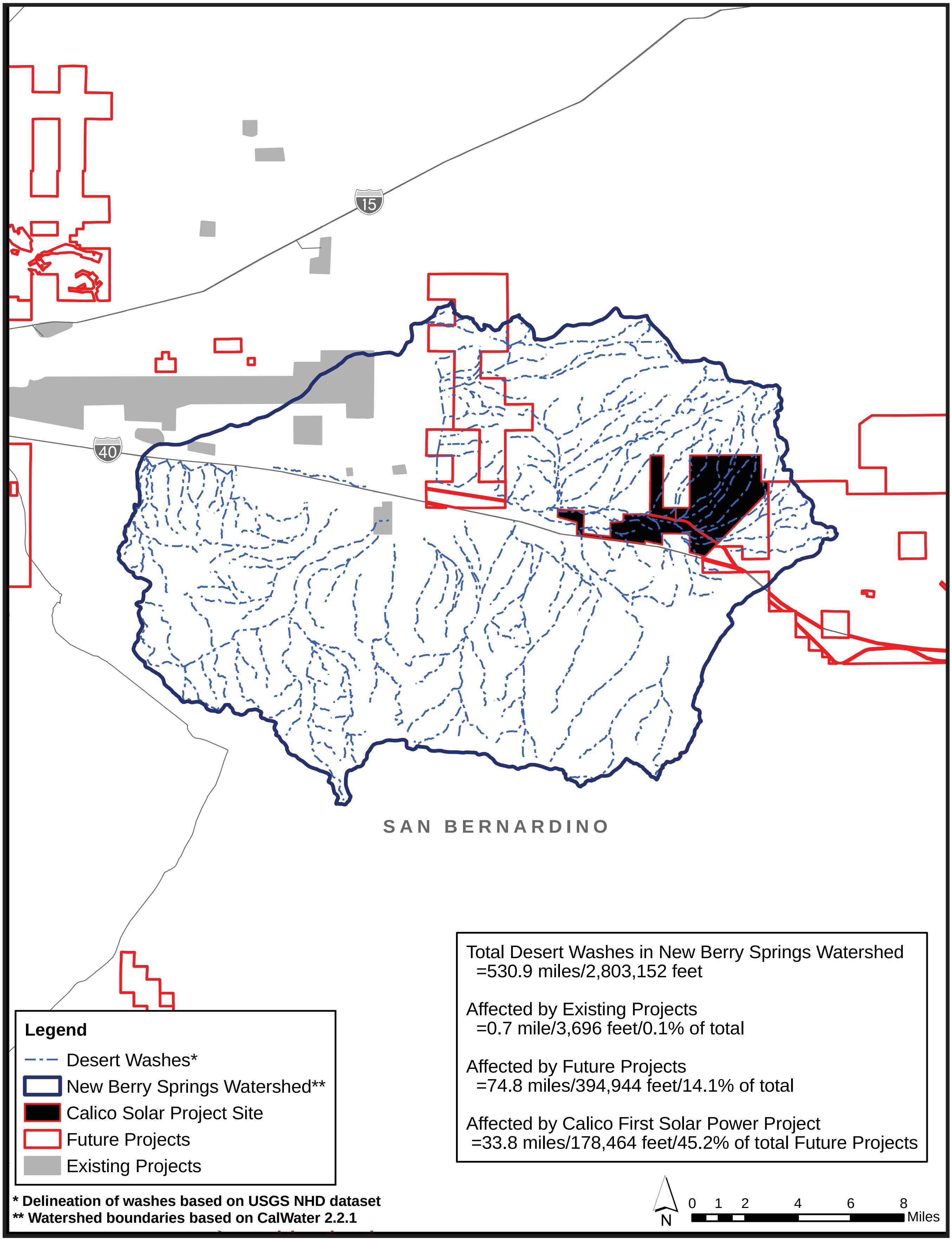


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 3

Calico Solar Project - Desert Washes - New Berry Springs Watershed

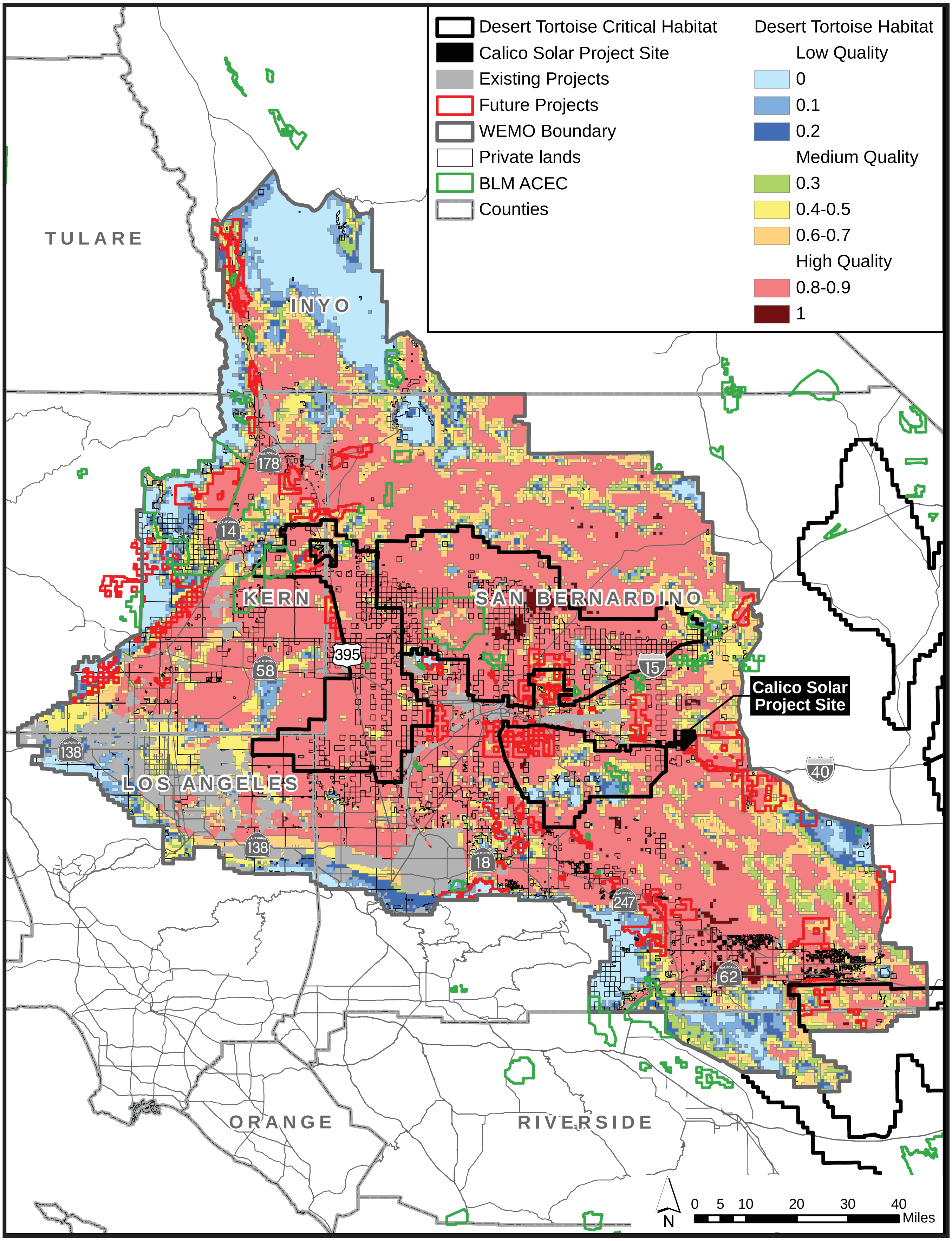


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 4

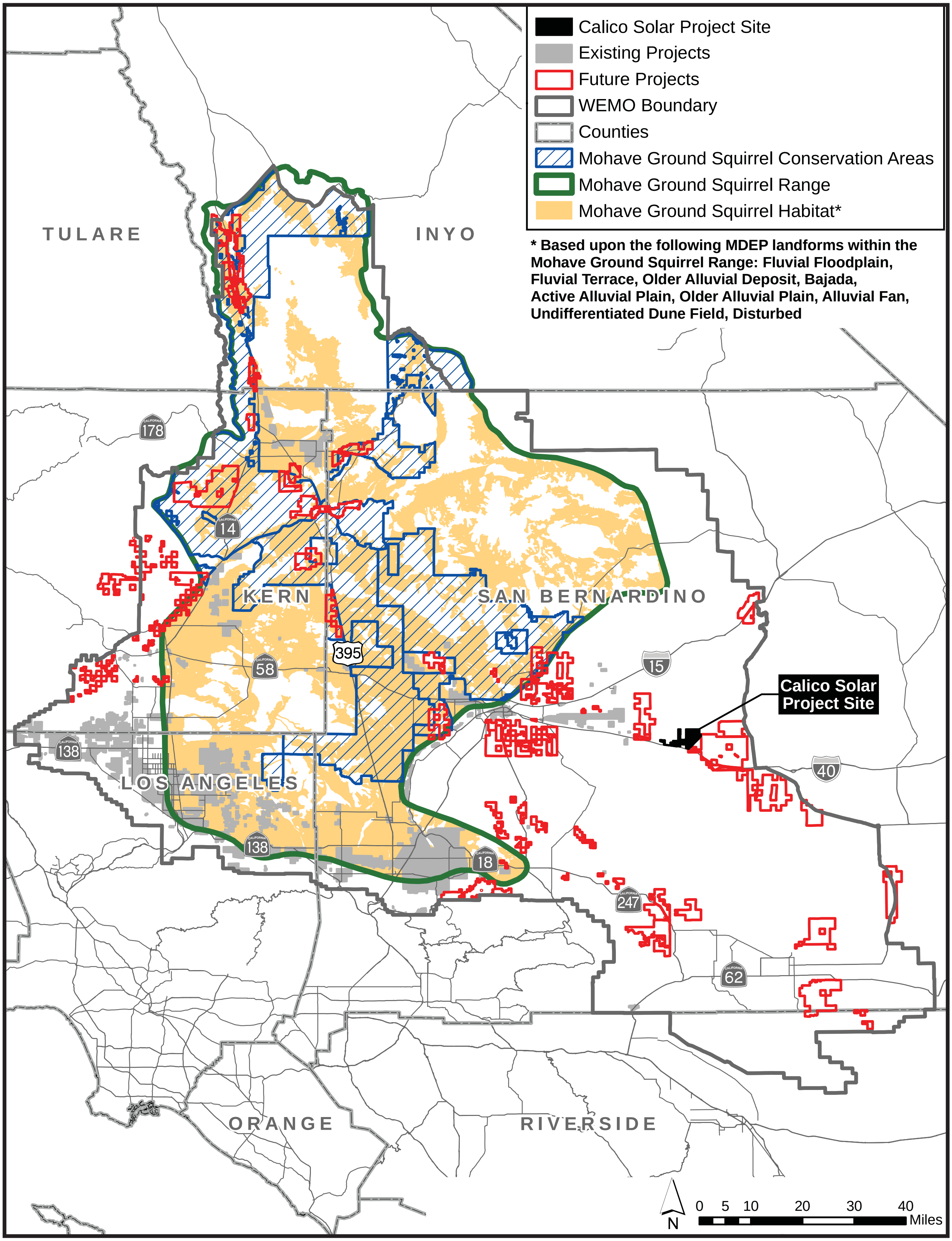
Calico Solar Project - Desert Tortoise - Habitat Quality and Critical Habitat



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: SOURCE: BLM, CEC

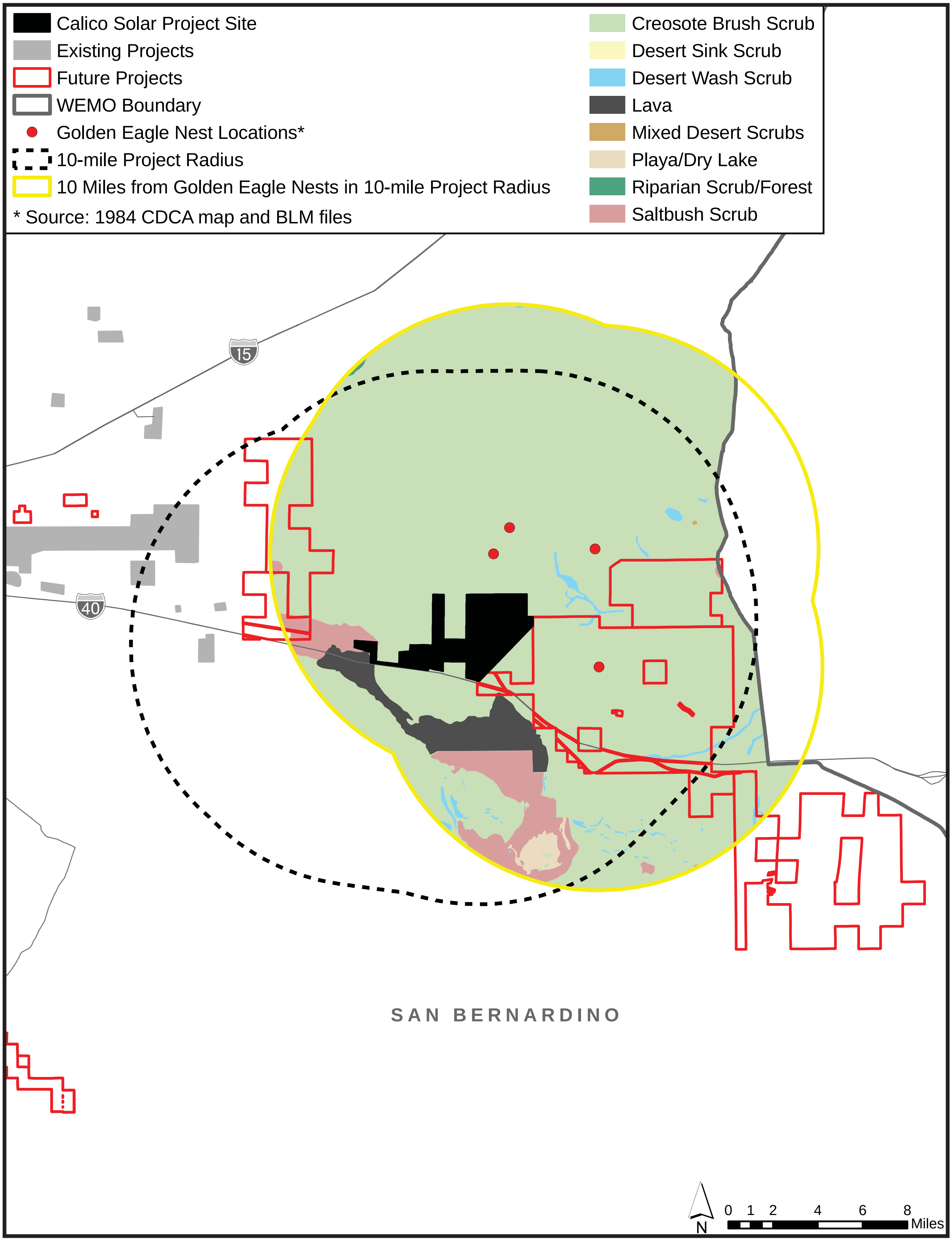
BIOLOGICAL RESOURCES - FIGURE 5
Calico Solar Project - Mohave Ground Squirrel Habitat



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010
SOURCE: SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 6

Calico Solar Project - Golden Eagle Foraging Habitat Within 10 Miles of Nests

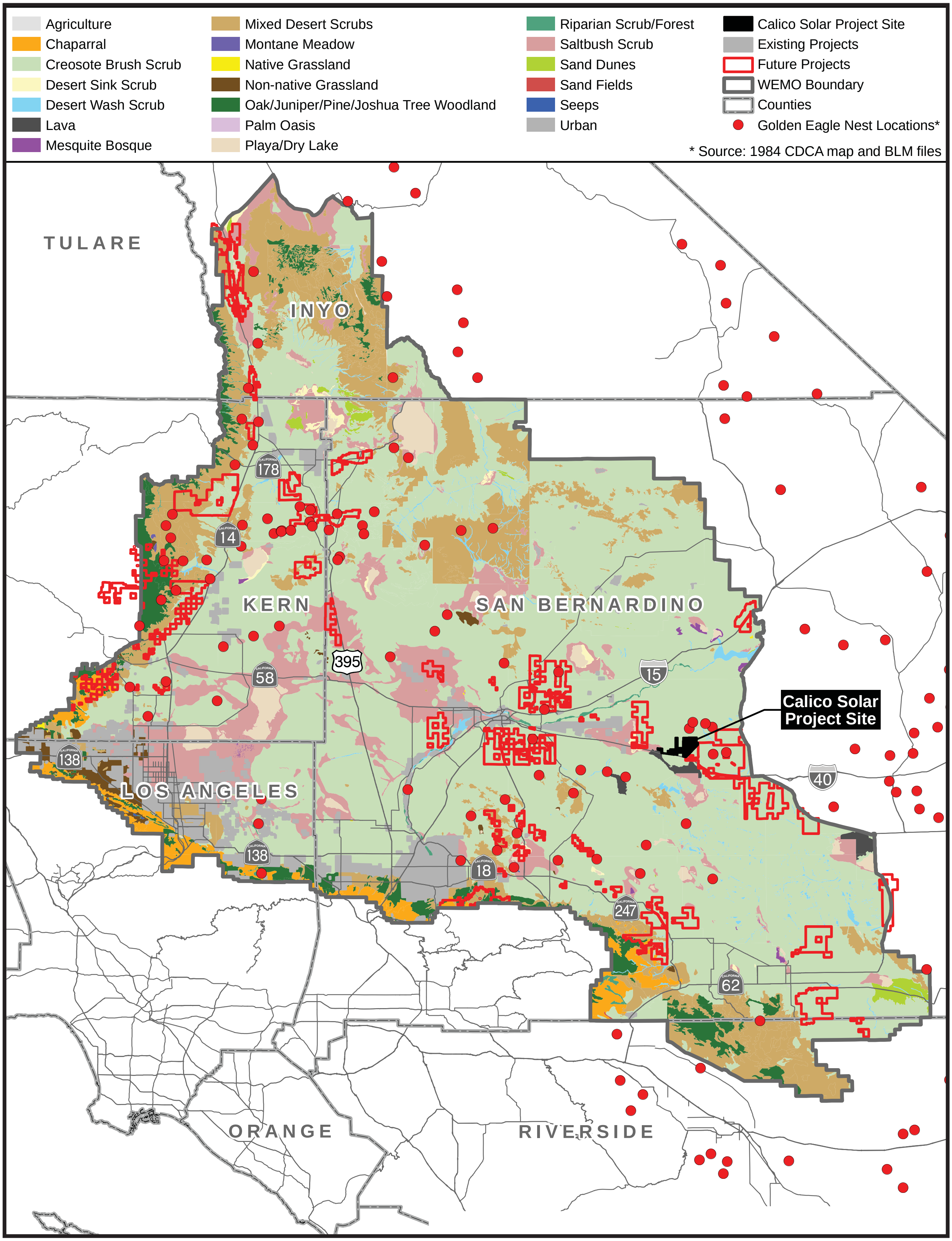


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 7

Calico Solar Project - Golden Eagle Nest Locations

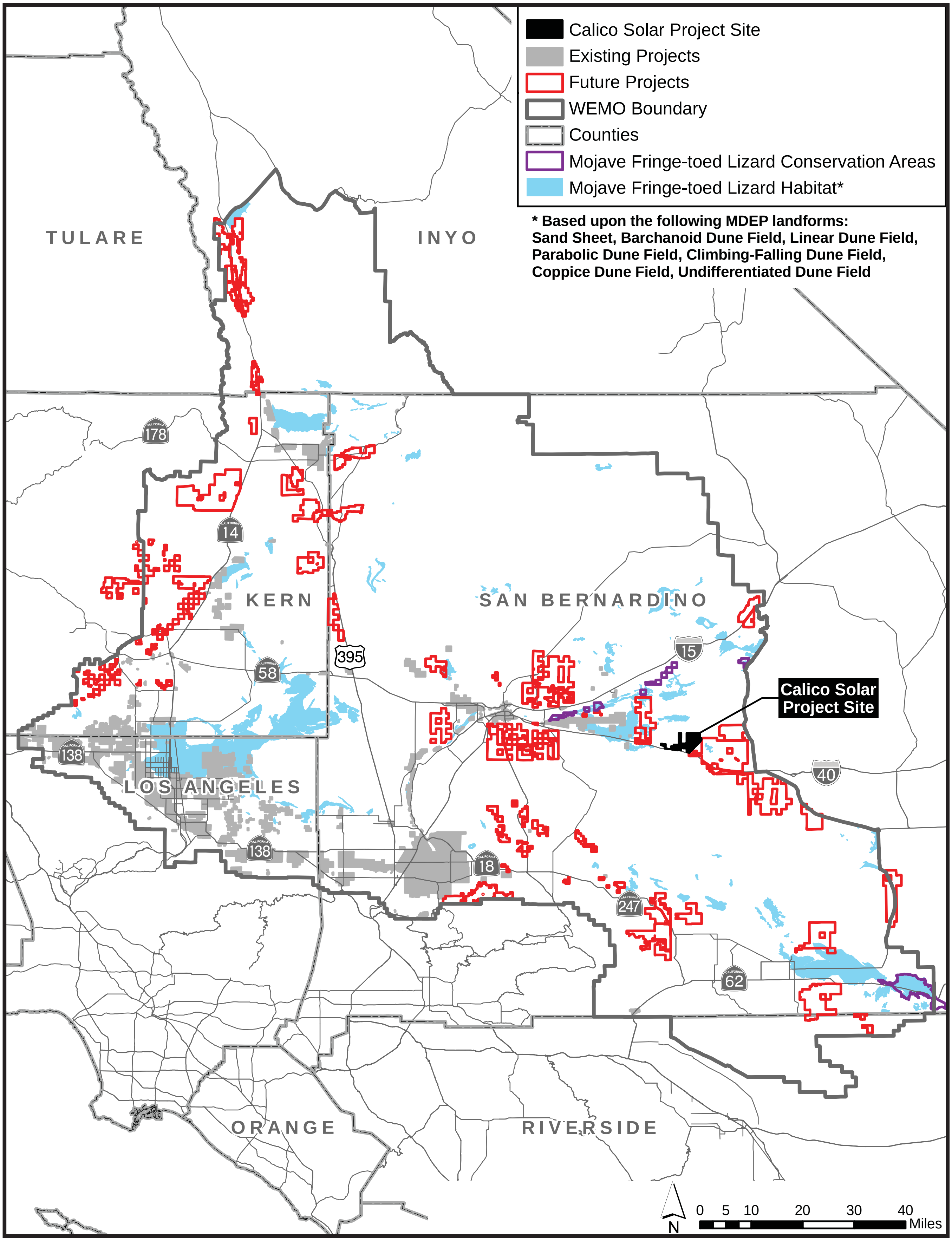


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 8

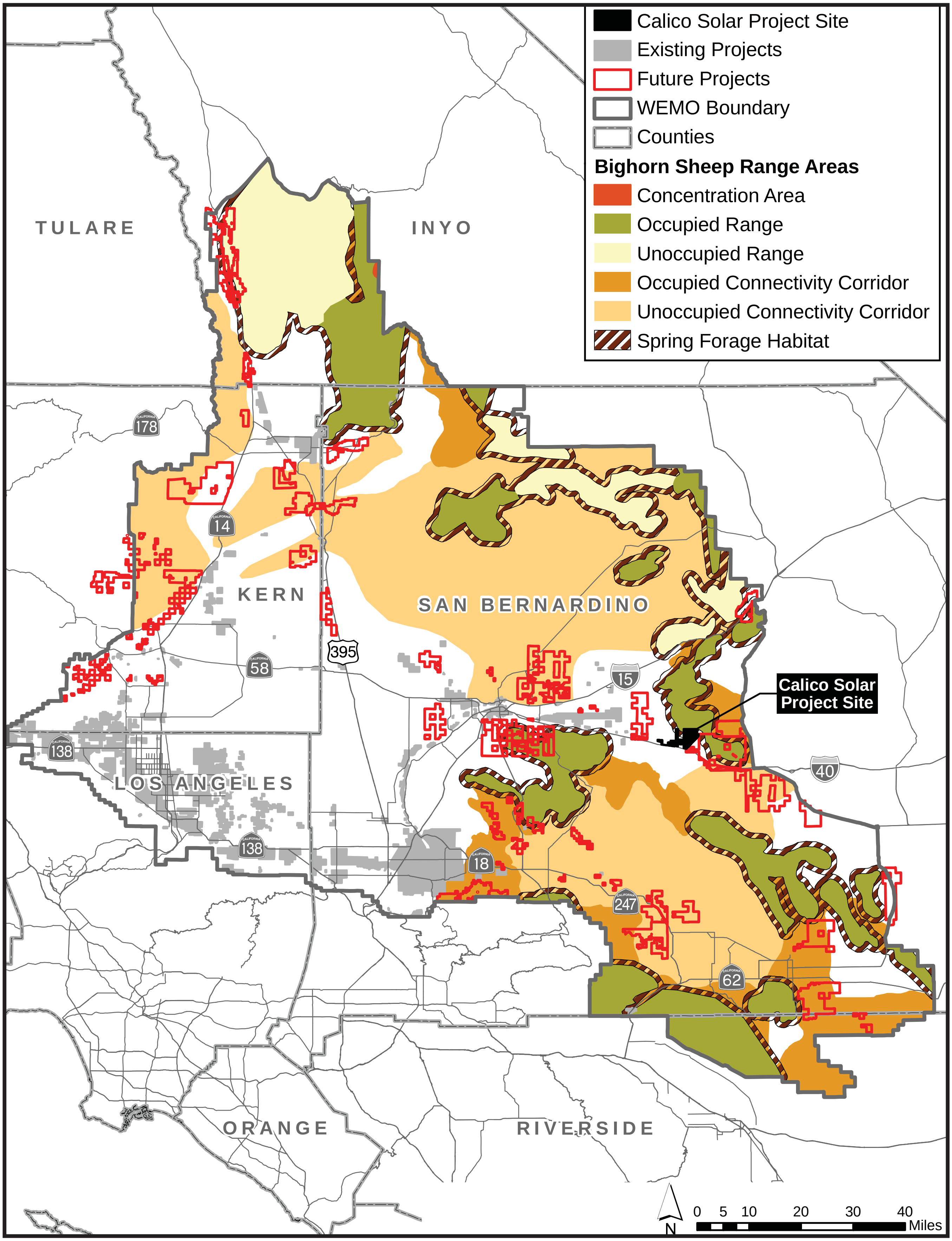
Calico Solar Project - Mojave Fringe-Toed Lizard Habitat



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: SOURCE: BLM, CEC

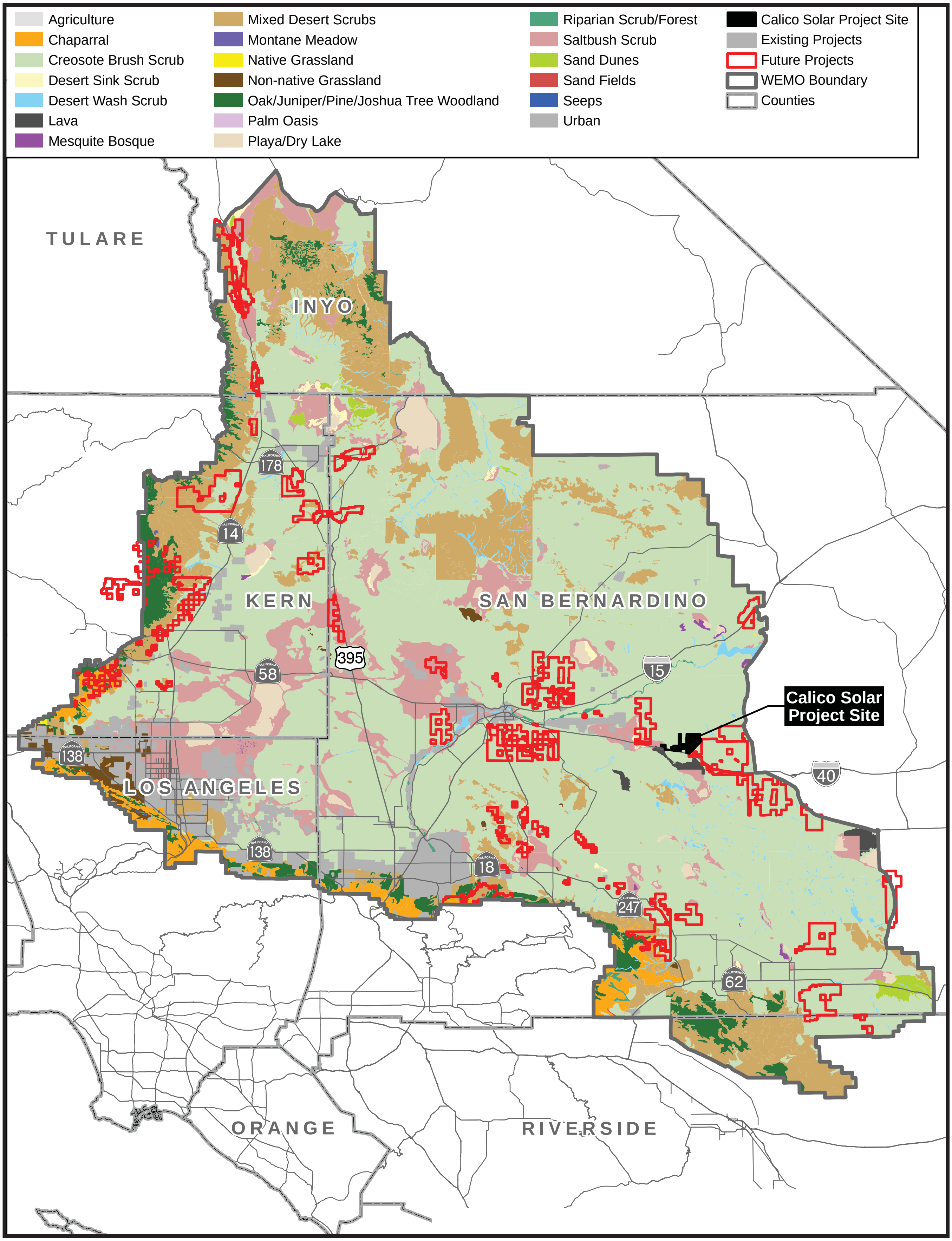
BIOLOGICAL RESOURCES - FIGURE 9
Calico Solar Project - Bighorn Sheep Habitat



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010
SOURCE: SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 10

Calico Solar Project - Plant Communities

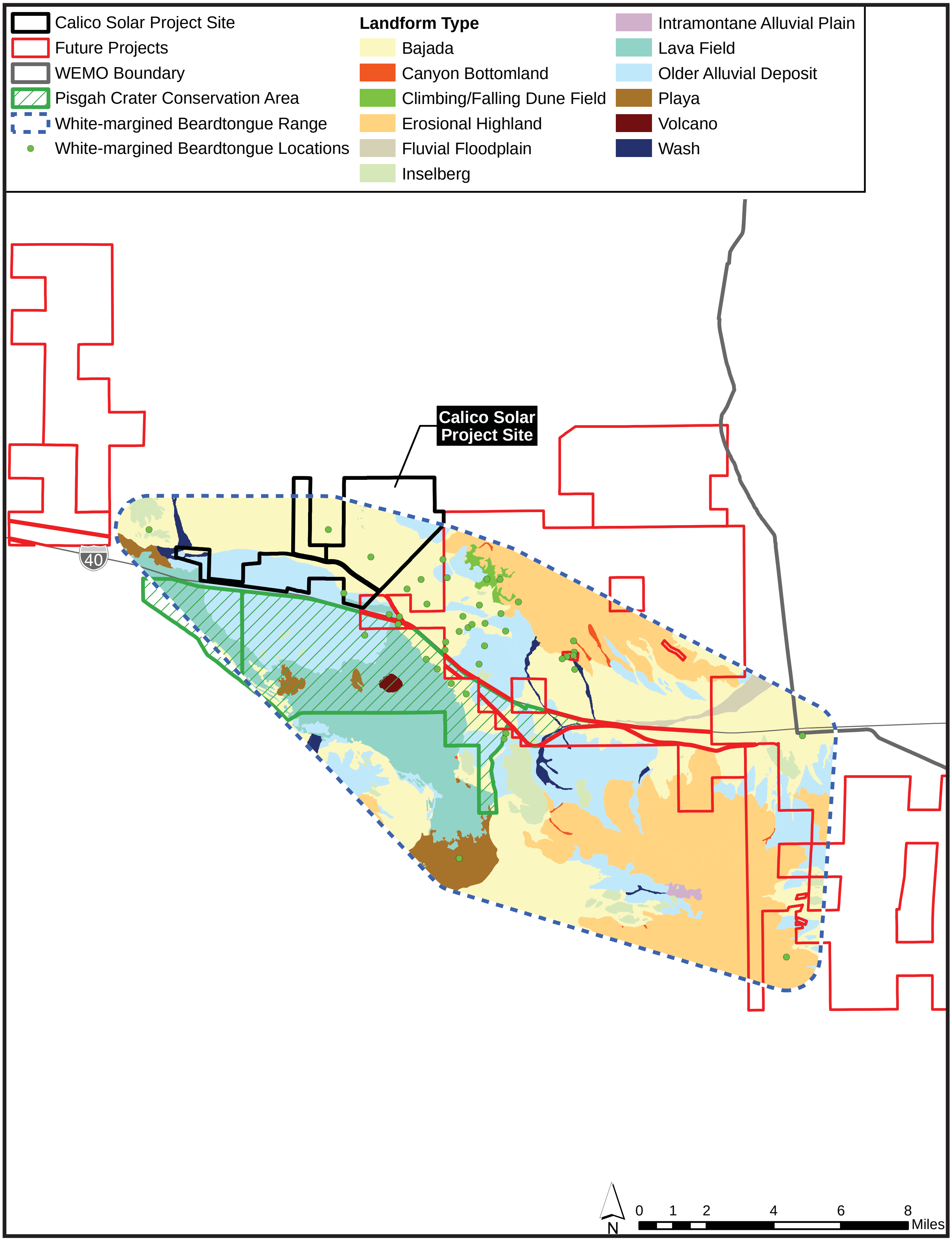


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 11

Calico Solar Project - White-Margined Beardtongue Range in California



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: SOURCE: BLM, CEC

C.3 – CULTURAL RESOURCES AND NATIVE AMERICAN VALUES

C.3.1 SUMMARY OF CONCLUSIONS

On the basis of a 25% sample of the cultural resources inventory of the project area of analysis, staff concludes that the Calico Solar Project (formerly known as the Stirling Energy Systems Solar One Project) would have significant impacts/effects on both prehistoric and historical surface archaeological resources. Furthermore, although the likelihood of encountering buried archaeological deposits is considered to be low, there is some potential that the project could also have significant impacts/effects on potentially historically significant buried archaeological deposits. As both the Bureau of Land Management (BLM) and the California Energy Commission (Energy Commission) have regulatory authority over the proposed project, the present analysis seeks to resolve the potentially significant effects of proposed and alternative actions on significant cultural resources through the development of measures that satisfy the common conceptual threads of effects resolution in the California Environmental Quality Act (CEQA), the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act. Energy Commission staff here proposes that the Energy Commission fulfill the bulk of its obligation under CEQA to resolve any potentially significant effects that the project may have on cultural resources by requiring the applicant to comply with the terms of the BLM's programmatic agreement (PA) under Section 106 a condition of certification (**CUL-1**). The BLM proposes to use this cultural resources analysis and its consultation efforts under Section 106, which includes the negotiation and drafting of the PA, to comply with NEPA. The applicant's implementation of the terms of the PA would ensure compliance with applicable laws, ordinances, regulations, and standards (LORS), in addition to compliance with CEQA, NEPA, and Section 106.

C.3.2 INTRODUCTION

This cultural resources assessment identifies the potential impacts of the Calico Solar Project on cultural resources. Cultural resources are defined under federal and state law as including archaeological sites, buildings, structures, objects, and districts. Three kinds of cultural resources, classified by their origins, are considered in this assessment: prehistoric, ethnographic, and historic.

Prehistoric archaeological resources are associated with the human occupation and use of California prior to enforced European contact. These resources may include sites and deposits, structures, artifacts, rock art, trails, and other traces of Native American human behavior. In California, the prehistoric period began over 12,000 years ago and extended through the eighteenth century until 1769, when the first Europeans settled in California.

Ethnographic resources represent the heritage of a particular ethnic or cultural group, such as Native Americans or African, European, or Asian immigrants. Ethnographic resources may include traditional resource collecting areas, ceremonial sites, topographic features, cemeteries, shrines, or ethnic neighborhoods and structures.

Historic-period resources, both archaeological and architectural, are associated with Euro-American exploration and settlement of an area and the beginning of a written historical record. They may include archaeological deposits, sites, structures, traveled ways, artifacts, or other evidence of human activity. Under federal and state historic preservation law, historic-period cultural resources must, under most circumstances, be at least 50 years old to have the potential to be of sufficient historical importance to merit eligibility for the National Register of Historic Places and the California Register of Historical Resources. A resource less than 50 years of age must be of exceptional historical importance to be considered for the National Register of Historic Places.

Groupings of historic-period resources are also recognized as historic districts and as historic vernacular landscapes. Under federal and state laws, historic cultural resources must be greater than fifty years old to be considered of potential historic importance. A resource less than fifty years of age may be historically important if the resource is of exceptional importance in history.

For the Calico Solar Project, staff provides an overview of the environmental setting and history of the project area, a representative sample of the inventory of the cultural resources identified in the project area for the proposed action and the nearby vicinity, and an analysis of the potential impacts to cultural resources from the proposed project using criteria from the National Environmental Policy Act (NEPA), Section 106 and the California Environmental Quality Act (CEQA).

C.3.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The purpose of the present cultural resources analysis is to provide evidence of the ongoing public process by which the Energy Commission and the Bureau of Land Management (BLM) are jointly complying with local, State, and Federal regulations to which each agency is variously subject. The Energy Commission, pursuant to subdivision (c) of section 25519 of the Warren-Alquist Act (Pub. Resources Code section 25000 et seq.) of 1974 (Act), is the lead agency under CEQA in certifying the proposed facility and the site on which the facility would operate, and is further responsible, pursuant to section 25525 of the Act, for making findings regarding the facility's would conformity with applicable State, local, or regional standards, ordinances, or laws. The BLM is the lead agency for the purpose of complying with NEPA, as the Federal government considers the environmental implications of the proposed action, and has further obligations to comply with Section 106 of the National Historic Preservation Act of 1966, as amended (16 USC 470(f)) (NHPA), and other Federal historic preservation programs.

The structure of the cultural resources analysis for the proposed action accommodates both the primary need of the Energy Commission to evaluate potential impacts to cultural resources under CEQA and the primary needs of the BLM to conduct similar analyses under NEPA and Section 106. (Each of these three regulatory programs uses slightly different terminology to refer to the proposed action. Clarifications on the use of "proposed action," "proposed project," and "undertaking" may be found in the "Cultural Resources Glossary" subsection, below.) This analysis fulfills the goals of the three regulatory programs by executing five basic analytic phases. The initial phase is the determination of the appropriate geographic extent of the analysis for the proposed action and for each alternative action under consideration. The second phase is to produce an inventory of the cultural resources in each such geographic area. The third phase is to determine whether particular cultural resources in an inventory are historically significant, unless resources can be avoided by construction. The fourth phase is to assess the character and the severity of the effects of the proposed or alternative actions on the historically significant cultural resources that cannot be avoided in each respective inventory. The final phase is to propose measures that would resolve significant effects. The details of each of these phases follow below and provide the parameters of the present analysis.

C.3.3.1 THE PROJECT AREA OF ANALYSIS AND THE AREA OF POTENTIAL EFFECTS (APE)

A useful precursor to a cultural resources analysis under CEQA and NEPA and a requisite part of the Section 106 process (36 CFR Part 800) is to define the appropriate geographic limits for an analysis. The area that Energy Commission staff typically considers when identifying and assessing impacts to cultural resources under CEQA is referred to here as the "project area of analysis." Energy Commission staff defines the project area of analysis as the area within and surrounding a project site and associated linear facility corridors. The area reflects the minimum standards set out in the Energy Commission Power Plant Site Certification Regulations (Cal. Code Regs., tit. 20, § 1701 et seq., appen. B, subd. (g)(2)) and is sufficiently large and comprehensive in geographic area to facilitate and encompass considerations of archaeological, ethnographic, and built-environment resources. The project area of analysis is a composite, though not necessarily contiguous geographic area that accommodates the analysis of each of these resource types:

- For archaeological resources, the project area of analysis is minimally defined as the project site footprint, plus a buffer of 200 feet, and the project linear facilities routes, plus a buffer of 50 feet to either side of the rights-of way for these routes.
- For ethnographic resources, the project area of analysis is expanded to take into account traditional use areas and traditional cultural properties which may be far-ranging, including views that contribute to the significance of the property. These resources are often identified in consultation with Native Americans and other ethnic groups, and issues that are raised by these groups may define the area of analysis.
- For built-environment resources, the project area of analysis is confined to one parcel deep from the project site footprint in urban areas, but in rural areas is expanded to include a half-mile buffer from the project site and above-ground linear facilities to encompass resources whose setting could be adversely affected by industrial development.
- For a historic district or a cultural landscape, staff defines the project area of analysis based on the particulars of each siting case (i.e., specific to that project).

The BLM concludes here that the project area of analysis concept provides an appropriate areal scope for the consideration of cultural resources under NEPA and is consistent with the definition of the area of potential effects (APE) in the Section 106 process (36

CFR § 800.16(d)). The project area of analysis will, therefore, be equivalent to the APE for the purpose of the present discussion and analysis.

C.3.3.2 INVENTORY OF CULTURAL RESOURCES IN PROJECT AREA OF ANALYSIS

A cultural resources inventory specific to each proposed or alternative action under consideration is a necessary step in the staff effort to determine whether each such action may cause, under CEQA, a substantial adverse change in the significance of any cultural resources that are on or would qualify for the California Register of Historical Resources (CRHR), may, under NEPA, significantly affect important historic and cultural aspects of our national heritage, or may, under Section 106, adversely affect any cultural resources that are on or would qualify for the National Register of Historic Places (NRHP).

The development of a cultural resources inventory entails working through a sequence of investigatory phases to establish the universe of cultural resources that will be the focus of the analyses of each proposed or alternative action. Generally the research process proceeds from the known to the unknown. These phases typically involve doing background research to identify known cultural resources, conducting fieldwork to collect requisite primary data on not-yet-identified cultural resources in the vicinity of an action, and assessing the results of any geotechnical studies or environmental assessments completed for a project site. The results of this research then support the development of determinations of historical significance for the cultural resources that are found.

C.3.3.3 DETERMINING THE HISTORICAL SIGNIFICANCE OF CULTURAL RESOURCES

A key part of a cultural resources analysis under CEQA, NEPA, or Section 106 is to determine which of the cultural resources that a proposed or alternative action may affect, are important or historically significant (each of these three regulatory programs uses slightly different terminology to refer to historically significant cultural resources; clarifications on the use of the terms "*historical resource*," "*important historic and cultural aspects of our national heritage*," and "*historic property*" may be found in the "Cultural Resources Glossary" subsection, of this report). Subsequent effects assessments are only made for those cultural resources that are determined to be historically significant. Cultural resources that can be avoided by construction may remain unevaluated. Unevaluated cultural resources that cannot be avoided are treated as eligible when determining effects. The criteria for evaluation and the requisite thresholds of resource integrity that are, taken together, the measures of historical significance, vary among the three regulatory programs.

Evaluation of Historical Significance under CEQA

CEQA requires the Energy Commission, as a lead agency, to evaluate the historical significance of cultural resources by determining whether or not they meet several sets of specified criteria. Under CEQA, the definition of a historically significant cultural resource is that it is eligible for listing in the CRHR, and such a cultural resource is referred to as a "historical resource," which is a "resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR", or "a resource listed in a local register of historical resources or identified as significant in a historical resource survey meeting the requirements of section 5024.1(g) of the Public Resources Code," or "any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the agency's determination is supported by substantial evidence in light of the whole record" (Cal. Code Regs., tit. 14, § 15064.5(a)). The term, "historical resource," therefore, indicates a cultural resource that is historically significant and eligible for listing in the CRHR.

Consequently, under the CEQA Guidelines, to be historically significant, a cultural resource must meet the criteria for listing in the CRHR. These criteria are essentially the same as the eligibility criteria for the NRHP. In addition to being at least 50 years old,[1] a resource must meet at least one (and may meet more than one) of the following four criteria (Pub. Resources Code, § 5024.1):

- Criterion 1, is associated with events that have made a significant contribution to the broad patterns of our history;
- Criterion 2, is associated with the lives of persons significant in our past;
- Criterion 3, embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values; or
- Criterion 4, has yielded, or may be likely to yield, information important to history or prehistory.

In addition, historical resources must also possess integrity of location, design, setting, materials, workmanship, feeling, and association (Cal. Code Regs., tit. 14, § 4852(c)).

Additionally, cultural resources listed in or formally determined eligible for the National Register of Historical Places (NRHP) and California Registered Historical Landmarks numbered No. 770 and up are automatically listed in the CRHR and are therefore also historical resources (Pub. Resources Code, § 5024.1(d)). Even if a cultural resource is not listed or determined to be eligible for listing in the CRHR, CEQA allows a lead agency to make a determination as to whether it is a historical resource (Pub. Resources Code, § 21084.1).

Evaluation of Historical Significance under NEPA

NEPA establishes national policy for the protection and enhancement of the environment. Part of the function of the Federal Government in protecting the environment is to "preserve important historic, cultural, and natural aspects of our national heritage." Cultural resources need not be determined eligible for the National Register of Historic Places as in the National Historic Preservation Act (NHPA) of 1966 (as amended) to receive consideration under NEPA. NEPA is implemented by regulations of the Council

[1] The Office of Historic Preservation's Instructions for Recording Historical Resources (1995) endorses recording and evaluating resources over 45 years of age to accommodate a potential five-year lag in the planning process.

on Environmental Quality, 40 CFR 1500-1508. NEPA provides for public participation in the consideration of cultural resources issues, among others, during agency decision-making.

Evaluation of Historical Significance under Section 106 (Eligibility of Cultural Resources for Inclusion in the NRHP)

The federal government has developed laws and regulations designed to protect cultural resources that may be affected by actions undertaken, regulated, or funded by federal agencies. Cultural resources are considered during federal undertakings chiefly under Section 106 of NHPA of 1966 (as amended) through one of its implementing regulations, 36 Code of Federal Regulations (CFR) CFR 800 (Protection of Historic Properties). Properties of traditional religious and cultural importance to Native Americans are considered under Section 101(d)(6)(A) of NHPA.

Section 106 of NHPA (16 United States Code [USC] 470f) requires federal agencies to consider the effects of their undertakings on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places (NRHP) and to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings (36 CFR Part 800.1). Under Section 106, the significance of any adversely affected cultural resource is assessed and mitigation measures are proposed resolve effects. Significant cultural resources (historic properties) are those resources that are listed in or are eligible for listing on the NRHP per the criteria listed at 36 CFR 60.4 (Advisory Council on Historic Preservation 2000) and are presented in the next subsection below.

NHPA of 1966 established the ACHP and State Historic Preservation Officers (SHPO) to assist federal and State officials regarding matters related to historic preservation. As previously mentioned above, the administering agency, the ACHP, has authored regulations implementing Section 106 that are located in 36 CFR Part 800, *Protection of Historic Properties* (recently revised, effective January 11, 2001). 36 CFR Part 800 provides detailed procedures, called the Section 106 process, by which the assessment of impacts on archaeological and historical resources, as required by the Act, is implemented.

Given that the proposed Calico Solar Project is located on lands managed by BLM and requires authorization by the BLM, the proposed action is considered an undertaking, and therefore must comply with the NHPA and implementing regulations. NEPA addresses compliance with the NHPA, and the required environmental documentation, whether it is an Environmental Assessment (EA) or an Environmental Impact Statement (EIS), must discuss cultural resources. It is important to recognize, however, that project compliance with NEPA does not mean the project is in compliance with the NHPA.

According to the NHPA (36 CFR Part 800), three steps are required for compliance: (1) identification of significant resources that may be affected by an undertaking; (2) assessment of project impacts on those resources; and (3) development and implementation of mitigation measures to offset or eliminate adverse impacts. All three steps require consultation with interested Native American tribes, local governments, and other interested parties.

Identification and National Register of Historic Places Evaluation

36 CFR Part 800.3 discusses the consultation process. Section 800.4 sets out the steps the ACHP must follow to identify historic properties. 36 CFR Part 800.4(c)(1) outlines the process for National Register of Historic Places (NRHP) eligibility determinations.

The Historic Sites, Buildings and Antiquities Act of 1935 required the survey, documentation, and maintenance of historic and archaeological sites in an effort to determine which resources commemorate and illustrate the history and prehistory of the United States. The NHPA expanded on this legislation and assigned the responsibility for carrying out this policy to the United States Department of the Interior, National Park Service (NPS). Per NPS regulations, 36 CFR Part 60.4, and guidance published by the NPS, *National Register Bulletin, Number 15, How to Apply the National Register Criteria for Evaluation*, different types of values embodied in districts, sites, buildings, structures, and objects are recognized. These values fall into the following categories:

1. Associate Value (Criteria A and B): Properties significant for their association with or linkage to events (Criterion A) or persons (Criterion B) important in the past.

2. Design or Construction Value (Criterion C): Properties significant as representatives of the man-made expression of culture or technology.

3. Information Value (Criterion D): Properties significant for their ability to yield important information about prehistory or history.

The quality of *significance* in American history, architecture, archaeology, engineering and culture is present in districts, sites, buildings, structures, and objects that possess *integrity* of location, design, setting, materials, workmanship, feeling and association. Cultural resources that are determined eligible for listing in the NRHP, along with SHPO concurrence, are termed “historic properties” under Section 106, and are afforded the same protection as sites listed in the NRHP.

C.3.3.4 ASSESSING ACTION EFFECTS

The core of a cultural resources analysis under CEQA, NEPA, or Section 106 is to assess the character of the effects that a proposed or alternative action may have on historically significant cultural resources. The analysis takes into account three primary types of potential effects which each of the three above regulatory programs defines and handles in slightly different ways. The three types of potential effects include direct, indirect, and cumulative effects. Once the character of each potential effect of a proposed or alternative action has been assessed, a further assessment is made as to whether each such effect is significant, relative to specific regulatory criteria under CEQA, NEPA, and Section 106.

Direct and Indirect Effects

Direct and indirect effects are those that are more clearly and immediately attributable to the implementation of proposed or alternative actions. Direct and indirect effects are conceptually similar under CEQA and NEPA. The uses of the concepts vary under Section 106 relative to their uses under CEQA and NEPA as discussed below.

Direct and Indirect Impacts under CEQA

In the abstract, direct impacts to cultural resources are those associated with project development, construction, and co-existence. Construction usually entails surface and subsurface disturbance of the ground, and direct impacts to archaeological resources may result from the immediate disturbance of the deposits, whether from vegetation removal, vehicle travel over the surface, earth-moving activities, excavation, or demolition of overlying structures. Construction can have direct impacts on historic built-environment resources when those structures must be removed to make way for new structures or when the vibrations of construction impair the stability of historic structures nearby. New structures can have direct impacts on historic structures when the new structures are stylistically incompatible with their neighbors and the setting, and when the new structures produce something harmful to the materials or structural integrity of the historic structures, such as emissions or vibrations.

Generally speaking, indirect impacts to archaeological resources are those which may result from increased erosion due to site clearance and preparation, or from inadvertent damage or outright vandalism to exposed resource components due to improved accessibility. Similarly, historic structures can suffer indirect impacts when project construction creates improved accessibility and vandalism or greater weather exposure becomes possible.

Ground disturbance accompanying construction at a proposed Calico Solar Project site, along proposed linear facilities, and at a proposed laydown area has the potential to directly impact archaeological resources, unidentified at this time. The potential direct, physical impacts of the proposed construction on unknown archaeological resources are commensurate with the extent of ground disturbance entailed in the particular mode of construction. This varies with each component of the proposed project. Placing the proposed plant into this particular setting could have a direct impact on the integrity of association, setting, and feeling of nearby standing historic structures.

Direct and Indirect Effects under NEPA

The concepts of direct and indirect effects under NEPA are almost equivalent to those under CEQA. Direct effects under NEPA are those “which are caused by the [proposed or alternative] action and [which] occur at the same time and place” (40 CFR § 1508.8(a)). Indirect effects are those “which are caused by the [proposed or alternative] action and are later in time or farther removed in distance, but are still reasonably foreseeable” (40 CFR § 1508.8(b)).

Direct and Indirect Effects under Section 106

The Section 106 regulation narrows the range of direct effects and broadens the range of indirect effects relative to the definitions of the same terms under CEQA and NEPA. The regulatory definition of “effect,” pursuant to 36 CFR § 800.16(i), is that the term “means alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register.” In practice, a “direct effect” under Section 106 is limited to the direct physical disturbance of a historic property. Effects that are immediate but not physical in character, such as visual intrusion, and reasonably foreseeable effects that may occur at some point subsequent to the implementation of the proposed undertaking are referred to in the Section 106 process as “indirect effects.”

Cumulative Impacts

Cumulative Impacts are slightly different concepts under CEQA and NEPA, and are, under Section 106, undifferentiated as an aspect of the potential effects of an undertaking, of a proposed or alternative action. The consideration of cumulative impacts reaches beyond the project area of analysis or the area of potential effects. It is a consideration of how the effects of a proposed or alternative action in those areas contributes or does not contribute to the degradation of a resource group or groups that is or are common to the project area of analysis and the surrounding area or vicinity.

Cumulative Impacts under CEQA

A cumulative impact under CEQA refers to a proposed project's incremental effects considered over time and taken together with those of other, nearby, past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Pub. Resources Code sec. 21083; Cal. Code Regs., tit. 14, secs. 15064(h), 15065(a)(3), 15130, and 15355). Cumulative impacts to cultural resources in a project vicinity could occur if any other existing or proposed projects, in conjunction with the proposed project, had or would have impacts on cultural resources that, considered together, would be significant. The previous ground disturbance from prior projects and the ground disturbance related to the future construction of a proposed project and other proposed projects in the vicinity could have a cumulatively considerable effect on archaeological deposits, both prehistoric and historic. The alteration of the natural or cultural setting which could be caused by the construction and operation of a proposed project and other proposed projects in the vicinity could be cumulatively considerable, but may or may not be a significant impact to cultural resources.

Cumulative Impacts under NEPA

Under NEPA, a cumulative is the “impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR § 1508.7). Cumulatively significant impacts are taken into consideration as an aspect of the intensity of a significant effect (40 CFR § 1508.27(b)(7).

Cumulative Effects under Section 106

The Section 106 regulation makes explicit reference to cumulative effects only in the context of a discussion of the criteria of adverse effect (36 CFR § 800.5(a)(1)). Cumulative effects are largely undifferentiated as an aspect of the potential effects of an undertaking. Such effects are enumerated and resolved in conjunction with the consideration of direct and indirect effects.

Assessing the Significance of Action Effects

Once the character of the effects that proposed or alternative actions may have on historically significant cultural resources has been determined, the severity of those effects needs to be assessed. CEQA, NEPA, and Section 106 each have different definitions and tests that factor into decisions about how severe, how significant the effects of particular actions may be.

Significant Impacts under CEQA

Under CEQA, "a project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment" (Pub. Resourced Code, § 21084.1). Thus, staff analyzes whether a proposed project would cause a substantial adverse change in the significance, that is, the CRHR eligibility, of the subset of the historical resources in the cultural resources inventory for a project area that the proposed project demonstrably has the potential to effect. The degree of significance of an impact depends on:

- The cultural resource impacted;
- The nature of the resource's historical significance;
- How the resource's historical significance is manifested physically and perceptually;
- Appraisals of those aspects of the resource's integrity that figure importantly in the manifestation of the resource's historical significance; and how much the impact will change those integrity appraisals.

Significant Effects under NEPA

Significant effects under NEPA require considerations of both context and intensity (40 CFR § 1508.27), and the considerations are presented below:

(a) *Context.* This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

(b) *Intensity.* This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:

> (1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.
>
> (2) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
>
> (3) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
>
> (4) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

(5) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

(6) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

Adverse Effects under Section 106

In accordance with 36 CFR Part 800.5 of the ACHP's implementing regulations, which describes criteria for adverse effects, impacts on cultural resources are considered significant if one or more of the following conditions would result from implementation of the proposed action:

An undertaking has an effect on a historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the NRHP. For the purpose of determining the type of effect, alteration to features of a property's location, setting, or use may be relevant, depending on the property's significant characteristics, and should be considered.

An undertaking is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic properties include, but are not limited to:

1. Physical destruction, damage, or alteration of all or part of the property
2. Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for the NRHP
3. Introduction of visual, audible, or atmospheric elements that are out of character with the property or that alter its setting
4. Neglect of the property, resulting in its deterioration or destruction
5. Transfer, lease, or sale of the property

Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative. A formal effect finding under Section 106 relates to the proposed or alternative action as a whole rather than relating to individual resources.

C.3.3.5 RESOLVING SIGNIFICANT EFFECTS

The concluding phase in a cultural resources analysis, whether under CEQA, NEPA, or Section 106, is to resolve those effects of a proposed or alternative action that have been found to be significant or adverse. The terminology used to describe the process of effects resolution differs among the three regulatory programs. The resolution of significant effects under CEQA involves the development of mitigation measures or project alternatives the implementation of which would minimize any such effects (14 CCR § 15126.4). Mitigation under NEPA includes proposals that avoid or minimize any potential significant effects of a proposed or alternative action on the quality of the human environment (40 CFR § 1502.4). The definition of mitigation in the NEPA regulation includes the development of measures that would avoid, minimize, or rectify significant effects, progressively reduce or eliminate such effects over time, or provide compensation for such effects (40 CFR § 1508.20). The Section 106 process directs the resolution of adverse effects through the development of proposals to avoid, minimize, or otherwise mitigate such effects (36 CFR § 800.6(a)).

The present analysis seeks to resolve the potentially significant effects of proposed and alternative actions on significant cultural resources (i.e., historical resources/historic properties) through the development of measures that satisfy the common conceptual threads of effects resolution in CEQA, NEPA, and Section 106. Energy Commission staff here proposes that the Energy Commission fulfill the bulk of its obligation under CEQA to resolve any potentially significant effects by requiring the applicant to comply with the terms of the BLM's programmatic agreement (PA) under Section 106 (**CUL-1**). The BLM proposes to use this cultural resources analysis and its consultation efforts under Section 106, which includes the negotiation and drafting of the PA, to comply with NEPA. The applicant's implementation of the terms of the PA would ensure compliance with applicable laws, ordinances, regulations, and standards (LORS), in addition to compliance with CEQA, NEPA, and Section 106.

Programmatic Agreement (PA)

In accordance with 36 CFR Part 800.14(b), PAs are used for the resolution of adverse effects for complex project situations and when effects on historic properties (resources eligible for or listed in the NRHP) cannot be fully determined prior to approval of an undertaking.

As a result of the anticipated impacts of the Calico Solar Project on cultural resources and the large geographic area comprising the APE, the BLM will prepare a PA in consultation with the Advisory Council on Historic Preservation (ACHP), State Historic preservation Officer (SHPO), the Energy Commission, and interested Native American tribes. The PA will govern the continued identification and evaluation of historic properties (eligible for the NRHP) and historical resources (eligible for the California Register), as well as the resolution of any adverse effects that may result from this proposed undertaking. When the PA is fully executed, the project will have fulfilled the requirements of the NHPA, NEPA, and CEQA.

The BLM initiated formal consultation with the SHPO and notified and initiated formal consultation with the Advisory Council on Historic Preservation (ACHP) by letter on February 16, 2010, including the development of a PA for the Calico Solar Project. A draft PA is currently in development and will be sent out to the Consulting Parties for their review and comment. Treatment plans regarding historic properties and historical resources that cannot be avoided by project construction will be developed in consultation with the Energy Commission, the SHPO, and interested Native American tribes, as stipulated in the PA. When the PA is fully executed the project will have fulfilled the requirements of the NHPA. The PA will be included in the Final EIS, and the Record of Decision will include the final signed PA.

C.3.3.6 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Projects licensed by the Energy Commission are reviewed to ensure compliance with all applicable laws. Although the Energy Commission has pre-emptive authority over local laws, it typically ensures compliance with local laws, ordinances, regulations, standards, plans, and policies. The BLM is responsible for compliance with NEPA and Section 106 of the NHPA.

LORS applicable to the Calico Solar Project are in Cultural Resources Table 1 below.

Cultural Resources Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
National Historic Preservation Act of 1966, as amended, 16 USC 470(f)	Section 106 of the Act requires Federal agencies to take into account the effects of a proposed action on cultural resources (historic properties) and afford the Advisory Council on Historic Preservation the opportunity to comment.
36 CFR Part 800 (as amended August 5, 2004),	Implementing regulations of Section 106 of the National Historic Preservation Act
National Environmental Policy Act (NEPA): Title 42, USC, section 4321-et seq.	This statute requires Federal agencies to consider potential environmental impacts of projects with Federal involvement and to consider appropriate mitigation measures.
Federal Land Policy and Management Act (FLPMA): Title 43, USC, section 1701 et seq.	This statute requires the Secretary of the Interior to retain and maintain public lands in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric water resource, and archaeological values [Section 1701(a)(8)]; the Secretary, with respect to the public lands, shall promulgate rules and regulations to carry out the purposes of this Act and of other laws applicable to public lands [Section 1740].
Federal Guidelines for Historic Preservation Projects, Federal Register 44739-44738, 190 (September 30, 1983)	The Secretary of the Interior has published a set of Standards and Guidelines for Archaeology and Historic Preservation. These are considered to be the appropriate professional methods and techniques for the preservation of archaeological and historic properties. The Secretary's standards and guidelines are used by Federal agencies, such as the Forest Service, the Bureau of Land Management, and the National Park Service. The California Office of Historic Preservation refers to these standards in its requirements for selection of qualified personnel and in the mitigation of potential impacts to cultural resources on public lands in California.
Executive Order 11593 May 13, 1971 (36 Federal Register 8921)	This order mandates the protection and enhancement of the cultural environment through providing leadership, establishing state offices of historic preservation, and developing criteria for assessing resource values.
American Indian Religious Freedom Act; Title 42, USC, Section 1996	Protects Native American religious practices, ethnic heritage sites, and land uses.

Applicable Law	Description
Native American Graves Protection and Repatriation Act (1990); Title 25, USC Section 3001, et seq.,	The stature defines “cultural items,” “sacred objects,” and “objects of cultural patrimony;” establishes an ownership hierarchy; provides for review; allows excavation of human remains, but stipulates return of the remains according to ownership; sets penalties; calls for inventories; and provides for the return of specified cultural items.
U.S. Dept. of the Interior, Bureau of Land Management (BLM), the California Desert Conservation Area (CDCA) Plan 1980 as amended – Cultural Resources Element Goals	1. Broaden the archaeological and historical knowledge of the CDCA through continuing efforts and the use of existing data. Continue the effort to identify the full array of the CDCA's cultural resources.
	2. Preserve and protect representative sample of the full array of the CDCA's cultural resources.
	3. Ensure that cultural resources are given full consideration in land use planning and management decisions, and ensure that BLM-authorized actions avoid inadvertent impacts.
	4. Ensure proper data recovery of significant (National Register of Historic Places-quality) cultural resources where adverse impacts can be avoided.
State	
California Environmental Quality Act (CEQA), Sections 21000 et seq. of the Public Resources Code (PRC) with Guidelines for implementation codified in the California Code of Regulations (CCR), Title 14, Chapter 3, Sections 15000 et seq.	CEQA requires that state and local public agencies to identify the environmental impacts of the proposed discretionary activities or projects, determine if the impacts will be significant, and identify alternatives and mitigation measures that will substantially reduce or eliminate significant impacts to the environment. Historical resources are considered a part of the environment and a project that may cause a substantial adverse effect on the significance of a historical resource is a project that may have a significant effect on the environment. The definition of “historical resources” is contained in Section 15064.5 of the CEQA Guidelines.
AB 4239, 1976	Established the Native American Heritage Commission (NAHC) as the primary government agency responsible for identifying and cataloging Native American cultural resources. The bill authorized the Commission to act in order to prevent damage to and insure Native American access to sacred sites and authorized the commission to prepare an inventory of Native American sacred sites located on public lands.
Public Resources Code 5097.97	No public agency, and no private party using or occupying public property, or operating on public property, under a public license, permit, grant, lease, or contract made on or after July 1, 1977, shall in any manner whatsoever interfere with the free expression or exercise of Native American religion as provided in the United States Constitution and the California Constitution; nor shall any such agency or party cause severe or irreparable damage to any Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine located on public property, except on a clear and convincing showing that the public interest and necessity so require.

Applicable Law	Description
Public Resources Code 5097.98 (b) and (e)	Requires a landowner on whose property Native American human remains are found to limit further development activity in the vicinity until he/she confers with the Native American Heritage Commission-identified Most Likely Descendents (MLDs) to consider treatment options. In the absence of MLDs or of a treatment acceptable to all parties, the landowner is required to reinter the remains elsewhere on the property in a location not subject to further disturbance.
California Health and Safety Code, Section 7050.5	This code makes it a misdemeanor to disturb or remove human remains found outside a cemetery. This code also requires a project owner to halt construction if human remains are discovered and to contact the county coroner.
Local	
County of San Bernardino 2007 General Plan, C. Countywide Goals and Policies of the Conservation Element	GOAL CO 1. The County will maintain to the greatest extent possible natural resources that contribute to the quality of life within the County. GOAL CO 3. The County will preserve and promote its historic and prehistoric cultural heritage. POLICIES CO 3.1 Identify and protect important archaeological and historic cultural resources in areas of the County that have been determined to have known cultural resource sensitivity. CO 3.2 Identify and protect important archaeological and historic cultural resources in all lands that involves disturbance of previously undisturbed ground. CO 3.3 Establish programs to preserve the information and heritage value of cultural and historical resources. CO 3.4 The County will comply with Government Code Section 65352.2 (SB18) by consulting with tribes as identified by the California Native American Heritage Commission on all General Plan and specific plan actions. CO 3.5 Ensure that important cultural resources are avoided or minimized to protect Native American beliefs and traditions.
County of San Bernardino 2007 Development Code	82.12.010 Purpose (a) Many of the resources are unique and non-renewable; and (b) The preservation of cultural resources provides a greater knowledge of County history, thus promoting County identity and conserving historic and scientific amenities for the benefit of future generations. 82.12.040 Development Standards Archaeological and historical resources determined by qualified professionals to be extremely important should be preserved as open space or dedicated to a public institution when possible.

C.3.4 PROPOSED PROJECT

C.3.4.1 SETTING AND EXISTING CONDITIONS

Information provided regarding the setting of the proposed project places it in its geographical and geological context and specifies the technical description of the project. Additionally, the prehistoric, ethnographic, and historical background provides the context for the evaluation of the historical significance of any identified cultural resources within staff's area of analysis for this project.

Regional Setting

With minimal updates and editorial contributions, the following subsections entitled "Regional Setting," "Flora and Fauna," "Climate," and "Hydrology" were adapted from URS (2008: Section 2.1) and emphasize the non-archaeological aspects of these themes.

The proposed project is located in an undeveloped area of the Mojave Desert approximately 115 miles east of Los Angeles and 37 miles east of Barstow, California along Interstate Highway 40 (I-40). The Cady Mountains border the Calico Solar Project area of potential effect's (APE's) northern and eastern boundaries. Cady Peak is approximately 4 miles northeast and Sleeping Beauty Mountain is 5 miles to the east. Nearby urban communities include Newberry Springs and Ludlow, both approximately 12 miles to the west and east, respectively, of the Calico Solar Project APE. The Calico Solar Project APE is located within the Mojave Valley-Granite Mountains ecological subsection (Subsection 322Ah) of the broader Mojave Desert (Miles and Goudey 1997). The general environmental setting is that of a wide valley within arid desert, along which is an expansive alluvial fan that is dissected by numerous unnamed south-southwest trending washes and ephemeral drainages.

No springs are indicated on the USGS quad maps for the Calico Solar Project APE, although three well sites do occur on the USGS quad maps and were observed during the pedestrian survey. Of these, the well located in southwestern quarter of Section 1 of Township 8 North, Range 5 West (Hector – 1982 Provisional 7.5 minute series quad) has water present. The nearest reliable water source existing outside the Calico Solar Project APE occurs approximately 12 miles to the west, in the Mojave Valley; numerous springs and wells surround the dry lake bed of ancient Troy Lake, which is just west of the Calico Solar Project APE. Water is seasonally available in the form of rain swollen drainages, as indicated by the existence of numerous washes originating in the Cady Mountains and off-site to the east. A substantial east to west drainage crosses the southern portion of the Calico Solar Project APE, eventually emptying into Troy Lake (AFC Figure 2.1-1). The presence of water in drainages and lakes was certainly greater during the terminal Pleistocene and early Holocene periods. Numerous dry stream drainages and lake remnants (*i.e.,* Troy Lake, Lavic Lake, and Broadwell Lake) are located in the vicinity of the Calico Solar Project APE and attest to this increased presence of water. Based on paleoenvironmental data, the general climatic pattern in the Mojave Desert seems to be that of cool and wet periods, followed by warmer and drier conditions, from the Late Pleistocene through the Late Holocene periods, as reflected in the numerous dry lake beds that are interspersed throughout the area (Sutton, *et al.,* 2007; S. Hall 1985; Spaulding 1991).

Geology

The Mojave Desert Geomorphic Province is a wedge shaped area largely bound by major faults and structurally referred to as the Mojave Block. The Mojave Desert Geomorphic Province is characterized by broad expanses of desert with localized mountains and dry lakebeds and is bound by the San Bernardino Mountains and the Pinto fault to the south, the San Andreas fault to the west, the Garlock fault to the north and the Basin and Range Province to the east. The block itself is cut by a series of northwest to southeast striking faults including the Helendale, Lenwood, Johnson Valley, Camp Rock, Emerson, Calico, Pisgah, Bullion and Lavic Lake faults. Collectively, the strike slip faults in the Mojave Block are referred to as the Eastern California Shear Zone (ECSZ).The Project APE is within a broad valley between the Southwestern and Southeastern Cady mountains, in the central portion of the Mojave Desert Geomorphic Province.

The Calico Solar Project area is characterized by Holocene-age and Pleistocene-age alluvial deposition. Alluvial deposits from the adjacent highlands are composed of silty sands and gravels with localized gravel and cobble channels. These sandy alluvial deposits may be locally intertwined with finer-grained basin deposits. The bounding highlands, which include a small portion along the northern Calico Solar Project boundary, are underlain by granitic and metamorphic terrain and along the southern edge by younger volcanic deposits (Dibble and Bassett 1966).

Geomorphology

The deposition history is dominated by older (Pleistocene) and younger (Holocene) fanglomerates consisting of sands and gravels flowing in a generally southern direction, derived from the uplifted granitic and andesitic Cady Mountains (Dibblee and Bassett 1966). The older alluvium dominates the upper reaches of the fanglomerate, whereas the younger deposits dominate the lower reaches of the slope. This younger alluvium includes materials associated with a substantial east to west drainage that crosses the southern portion of the project. Although limited data is available, field observations indicate a substantial depth to the fanglomerate deposits. Older fanglomerates and alluvium form low hills in the southern-most extent of the project APE and are separated from the remainder of the Calico Solar Project APE by the drainage noted above. These hills, and a northward extension of the Pisgah lava flow, channel the drainage towards Troy Lake to the west.

A major factor affecting the geomorphology of the Mojave, and specifically the Calico Solar Project APE and its environs, is the Mojave River itself. This river and its drainage system represent the largest present-day hydrological system in the Mojave Desert (Enzel 2003:62). Fluctuations in the paleoclimate between wet and dry periods, coupled with the changing path of the sizable Mojave River, resulted in the formation of several freshwater lakes, the most notable of which are Lake Manix and Lake Mojave. As the river changed its course, the overabundance of freshwater would be transported and deposited into naturally occurring basins along or at the terminus of the Mojave River. Marith Reheis and co-authors (2007) note that Lake Manix consists of several subbasins, which are referred to as Coyote Lake, Troy Lake, Manix, and Afton. As the lake developed, "fluvial and deltaic sediments were deposited progressively eastward into the lake" and that studies have hypothesized that there were at least four major lake cycles (2007:5). Based on geological and geomorphological studies the Lake Manix shoreline reached an elevation of 557 meters (m). At this level, the southern extent of the lake itself would have pushed east, potentially abutting the westernmost Calico Solar project APE (Enzel 2003; Reheis *et al.,* 2007: Figure 3).

The occurrence of desert pavements within the Calico Solar Project APE reflects the context as described above. In particular, the pavements on the slopes of the Cady Mountains are broader and better developed atop the older, up-slope Pleistocene fanglomerates rather than on the younger surfaces at lower elevations. The older surfaces, and likely the younger ones as well, predate the accepted presence of man in the new world. The most stable pavements, and likely the oldest, lie atop Quaternary alluvium woven among the fanglomerate hills and lava flows within the southern portion of the project APE. Buried cultural deposits would not be found beneath these stable surfaces. The cryptocrystalline silicate nodules that occur as part of the desert pavement matrix may be secondarily sourced to the fanglomerate deposits, though their original matrix remains unknown. Holocene alluvial deposits within and adjacent to the east-west drainage are the most likely source for buried deposits. The loose sandy matrix and the seasonal rain and flood events are likely to have obscured portions of cultural deposits.

Biology

California's diverse environment is separated into 10 different bioregions. The Calico Solar Project APE lies within the Mojave Bioregion. The Mojave Bioregion is an arid desert environment which covers over 25 million acres of Southern California, Southern Nevada and the Southwestern Utah and is characterized by desert washes, high plateaus, mountain peaks, palm oases, and large dry prehistoric lake beds called playas. These playas usually consist of sand and gravel basins surrounding central salt flats and were formed by pluvial lakes which once dominated the Mojave Bioregion. The Mojave is bordered on the north by the Sierra Nevada Bioregion, on the west by the Transverse and Peninsular ranges and is separated from the Great Basin, on the east, by the Garlock Fault (Moratto 1984:16, 17). Elevations in the bioregion average between 2,000 to 3,000 feet above sea level and contain isolated peaks of 6,000 to 7,000 feet above sea level.

Although the desert appears barren and remote, it contains a large variety of plant and animal life. Vegetation in the Mojave Bioregion includes Mojave creosote bush, scattered desert saltbush, Joshua tree scrub, alkali scrub, juniper pinyon woodland, numerous varieties of cacti, and hardwood and conifer forests in the higher elevations. Rare plants in the bioregion include white bear poppy, Barstow woolly sunflower, alkali mariposa lily, Red Rock poppy, Mojave monkey flower, and Stephen's beartongue. (Ceres, n.d.). The Mojave Bioregion is characterized by hot dry summers followed by cool winters with occasional rainstorms that often develop into flash floods. Much of the land within the Mojave Bioregion is owned and managed by the BLM or contained in one of the three National Parks: Death Valley, Eastern Mojave, and Joshua Tree and several other recreational areas (Ceres, n.d.).

Current Physical Setting

The Calico Solar Project APE is located north of I-40 at Hector Road with the BNSF Railway tracks bisect the northern and southern portions of the project APE. Historic U.S. Route 66 roughly follows a similar route as I-40 though both are discrete features within the Project APE. A series of underground pipelines are also present within the Calico Solar Project (Phase 2) APE, situated south of the BNSF railroad tracks and north of I-40. Four series of transmission towers also occur along the eastern-southeastern project APE. These towers include a pair of historic steel towers, a wooden transmission tower line, and a modern transmission tower. The Pisgah Substation is included in the Calico Solar Project APE, and is located within a triangular shaped parcel to the north of an I-40 temporary access route. Two radio facilities are located within the vicinity of the Calico Solar Project APE; one is situated to the southwest and the other to the east-northeast of the Calico Solar Project APE.

The Calico Solar Project APE is distinctively rural in nature and the landscape's environs are characterized by cattle ranching activities (*e.g.,* grazing, rangeland), historic mining, and historic and modern railroad activities. Historic mines occur throughout the region, and include the Black Butte Mine to the east and the Logan Mine to the north. Both the Logan and Black Butte Mines were used for the extraction of the mineral manganese and both are located within 1 mile of the Calico Solar Project APE. The historic mines consist of borrow pits and open pit mines. The Pisgah Crater, a volcanic cinder cone, is approximately 4.5 miles south-southeast of the Pisgah substation, beyond the southeast corner of the project APE. The Pisgah Crater is on private land and has been mined for landscape rock, which has reduced much of the cinder cone from its original state.

The majority of the Calico Solar Project APE is relatively undisturbed and the landscape/topography generally resembles its natural environment. There are no standing, intact structures within the Calico Solar Project APE, only dilapidated mining related structures, mining processing equipment, corrals, water tanks, barbed wire fencing, and historic transmission poles, transmission line corridors and power facilities (*e.g.,* the Pisgah substation). Those of historic-age were recorded and/or updated and evaluation recommendations are provided in Sections 6 and 8. The primary sources of the previous surface and subsurface disturbance in and adjacent to the project APE are, in no specific order, related to cattle grazing, off-road vehicle use, mining, pipeline construction, railroad construction and use, dirt access road grading, maintenance, and use, National Old Trails Road construction and use, U.S. Route 66 construction and use, I-40 construction and use, and the construction and use of the transmission lines and the Pisgah Substation. The project area lands are currently administered by the Bureau of Land Management (BLM) on behalf of the public and are used for off-road vehicle and other outdoor activities. (end of cited and slightly edited material taken from URS technical documents).

Project Construction

Project Construction Schedule

The Calico Solar Project would be developed in two phases. The schedule would be approximately 58 months in duration. Construction would require approximately 40 months.

Site Mobilization

Project facilities and amenities would be established during the first month of the build-out. The majority of these facilities would be located in the construction laydown area adjacent to the Main Services Complex. Project amenities would consist of site offices, restroom facilities, meal rooms, limited parking areas, vehicle marshalling areas/traffic staging, and construction material/equipment storage areas. Construction power to the project site facilities would be provided by mobile diesel-driven generator sets and/or temporary service(s) from SCE.

Project Site Preparation

Site preparation would be based on avoiding major washes and minimizing surface-disturbing activities. Also, areas of sensitive habitat and cultural resources would be avoided wherever possible.

Brush trimming would be conducted between alternating rows of SunCatchers™. Brush trimming consists of cutting the top of the existing brush while leaving the existing native plant root system in place to minimize soil erosion. After brush has been trimmed, blading for roadways and foundations will be conducted between alternating rows of SunCatchers™ to provide access to individual SunCatchers™. Blading would consist of removing terrain undulations and would be limited to 3 feet in cut and 3 feet in fill. The blading operations would keep native soils within 100 feet of the pre-development location, with no hauling of soils across the site. Paved roadways would be constructed as close to the existing topography as possible, with limited cut-and-fill operations to maintain roadway design slope to within a maximum of 10%. Minor grading would also be required for building foundations and pads and parking areas in the Main Services Complex and substation areas.

The clearing, blading, and grading operations would be undertaken using standard contractor heavy equipment. This equipment would consist of, but not be limited to, motorgraders, bulldozers, elevating scrapers, hydraulic excavators, tired loaders, compacting rollers, and dump trucks.

Foundations

From the preliminary geotechnical investigations, it is expected that lightly loaded equipment and structures, including some of the equipment foundations in the substation yard, small equipment such as the fire water pump and standby generator, the support structures for the water treatment plant and the hydrogen storage area, and the transmission line lattice steel towers would be supported on shallow footings. Shallow footings would be continuous strip and isolated spread footings.

The majority of each SunCatcher™ would be supported by a single metal pipe foundation that is hydraulically driven into the ground. These foundations are expected to be approximately 20 feet long and 24 inches in diameter. Shallow drilled pier concrete foundations of approximately 36 inches in diameter and an embedment depth with a minimum socketed depth into rock of 6 feet would be used for hard and rock-like ground conditions.

The buildings and major structures such as yard tanks would be supported on shallow spread and continuous footings or mat-type foundations.

Deep foundations would be required for heavy items, such as the power transformers at the electrical substation.

Operation Impacts

It is expected that the Calico Solar Project would be operated with a staff of approximately 164 full-time employees. The project would operate 7 days per week, generating electricity during normal daylight hours when the solar energy is available. Maintenance activities would occur 7 days a week, 24 hours a day to ensure SunCatcher^{TM} availability when solar energy is available.

Project Operations

Operation of the Project would generate wastes resulting from processes, routine maintenance, and office activities typical of solar electric generation operations. Non-hazardous wastes generated during operation of the project would be recycled to the greatest extent practical and the remainder of the wastes would be removed on a regular basis by a certified waste-handling contractor.

Inert solid wastes generated at the project site during operation would be predominantly office wastes and routine maintenance wastes, such as scrap metal, wood and plastic from surplus and deactivated equipment and parts. Scrap materials such as paper, packing materials, glass, metals, and plastics would be segregated and managed for recycling. Non-recyclable inert wastes would be stored in covered trash bins in accordance with local ordinances and picked up by an authorized local trash hauler on a regular basis for transport to and disposal in a suitable landfill.

Project operations would consist of few inputs, most of which would be associated with the day-to-day operations and maintenance of the facilities, and the resulting energy production would decrease the area's reliance on imported non-renewable electricity. The existing transmission lines which run through the project site are convenient to this project, and adhere to the goals and policies of the Geothermal/Alternative Energy and Transmission Element. There are no recently proposed zone changes that affect this Calico Solar Project site, and no changes to the general provisions for development of solar energy are in the planning area.

Project Closure and Decommissioning

Project Closure

Project closure can be temporary or permanent. Temporary closure is defined as a shutdown for a period exceeding the time required for normal maintenance, including closure for overhaul or replacement of the major components, such as major transformers, switchgear, etc. Causes for temporary closure include inclement weather and/or natural hazards (e.g., winds in excess of 35 mph, or cloudy conditions limiting solar insolation values to below the minimum solar insolation required for positive power generation, etc.), or damage to the Calico Solar Project from earthquake, fire, storm, or other natural acts. Permanent closure is defined as a cessation in operations with no intent to restart operations owing to project age, damage to the project that is beyond repair, adverse economic conditions, or other significant reasons.

Temporary Closure

In the unforeseen event that the project is temporarily closed, a contingency plan for the temporary cessation of operations would be implemented. The contingency plan would be followed to ensure conformance with applicable LORS and to protect public health, safety, and the environment. The plan, depending on the expected duration of the shutdown, may include the draining of chemicals from storage tanks and other equipment and the safe shutdown of equipment. Wastes would be disposed of according to applicable LORS.

Permanent Closure

The planned life of the Calico Solar Project is 40 years; however, if the project is still economically viable, it could be operated longer. It is also possible that the project could become economically noncompetitive before 40 years have passed, forcing early decommissioning. Whenever the project is permanently closed, the closure procedure would follow a plan that would be developed as described below.

The removal of the project from service, or decommissioning, may range from “mothballing” to the removal of equipment and appurtenant facilities, depending on conditions at the time. Because the conditions that would affect the decommissioning decision are largely unknown at this time, these conditions would be presented to the Energy Commission, the BLM, and other applicable agencies.

To ensure that public health, safety, and the environment are protected during decommissioning, a decommissioning plan would be submitted to the Energy Commission for approval before decommissioning. The plan would discuss the following:

- Proposed decommissioning activities for the project and appurtenant facilities constructed as part of the project,
- Conformance of the proposed decommissioning activities with applicable LORS and local/regional plans,
- Activities necessary to restore the project site if the plan requires removal of equipment and appurtenant facilities,
- Decommissioning alternatives other than complete restoration to the original condition, and
- Associated costs of the proposed decommissioning and the source of funds to pay for the decommissioning.

In general, the decommissioning plan for the project would attempt to maximize the recycling of project components. Calico Solar would attempt to sell unused chemicals back to the suppliers or other purchasers or users. Equipment containing chemicals would be drained and shut down to ensure public health and safety and to protect the environment. Nonhazardous wastes would be collected and disposed of in appropriate landfills or waste collection facilities. Hazardous wastes would be disposed of according to applicable LORS. The site would be secured 24 hours per day during the decommissioning activities, and Calico Solar would provide periodic update reports to the Energy Commission, the BLM, and other appropriate parties.

Premature closure or unexpected cessation of project operations would be outlined in the Project Closure Plan. The plan would outline steps to secure hazardous and non-hazardous materials and wastes. Such steps would be consistent with Best Management Practices, the HMBP, the RMP, and according to applicable LORS. The plan would include monitoring of vessels and receptacles of hazardous material and wastes, safe cessation of processes using hazardous materials or hazardous wastes, and inspection of secondary containment structures.

Planned permanent closure effects would be incorporated into the Project Closure Plan and evaluated at the end of the project's economic operation. The Project Closure Plan would document non-hazardous and hazardous waste management practices including the inventory, management, and disposal of hazardous materials and wastes and the permanent closure of permitted hazardous materials and waste storage units.

Environmental Setting

Geology

With minimal updates and editorial contributions, the following subsection was adapted from URS (2008: Section 2.1) and emphasize the archaeological aspects of the Geology of the project area.

The Mojave Desert Geomorphic Province is a wedge shaped area largely bound by major faults and structurally referred to as the Mojave Block. The Mojave Desert Geomorphic Province is characterized by broad expanses of desert with localized mountains and dry lakebeds and is bound by the San Bernardino Mountains and the Pinto fault to the south, the San Andreas fault to the west, the Garlock fault to the north and the Basin and Range Province to the east. The block itself is cut by a series of northwest to southeast striking faults including the Helendale, Lenwood, Johnson Valley, Camp Rock, Emerson, Calico, Pisgah, Bullion and Lavic Lake faults. Collectively, the strike slip faults in the Mojave Block are referred to as the Eastern California Shear Zone (ECSZ).The Project APE is within a broad valley between the Southwestern and Southeastern Cady mountains, in the central portion of the Mojave Desert Geomorphic Province.

The project area is characterized by Holocene-age and Pleistocene-age alluvial deposition. Alluvial deposits from the adjacent highlands are composed of silty sands and gravels with localized gravel and cobble channels. These sandy alluvial deposits may be locally intertwined with finer-grained basin deposits. The bounding highlands, which include a small portion along the northern project boundary, are underlain by granitic and metamorphic terrain and along the southern edge by younger volcanic deposits (Dibble and Bassett 1966). This area was home to numerous small bands, tribes, and "tribelets" during the prehistoric and protohistoric periods.

Geomorphology

Present Process Geomorphology. Note: With minimal updates and editorial contributions, the following subsection was adapted from URS (2008: Section 2.1).

The deposition history is dominated by older (Pleistocene) and younger (Holocene) fanglomerates consisting of sands and gravels flowing in a generally southern direction, derived from the uplifted granitic and andesitic Cady Mountains (Dibblee and Bassett 1966). The older alluvium dominates the upper reaches of the fanglomerate, whereas the younger deposits dominate the lower reaches of the slope. This younger alluvium includes materials associated with a substantial east to west drainage that crosses the southern portion of the project. Although limited data is available, field observations indicate a substantial depth to the fanglomerate deposits. Older fanglomerates and alluvium form low hills in the southern-most extent of the Calico Solar Project APE and are separated from the remainder of the Calico Solar Project APE by the drainage noted above. These hills, and a northward extension of the Pisgah lava flow, channel the drainage towards Troy Lake to the west.

A major factor affecting the geomorphology of the Mojave, and specifically the Calico Solar Project APE and its environs, is the Mojave River itself. This river and its drainage system represent the largest present-day hydrological system in the Mojave Desert (Enzel 2003:62). Fluctuations in the paleoclimate between wet and dry periods, coupled with the changing path of the sizable Mojave River, resulted in the formation of several freshwater lakes, the most notable of which are Lake Manix and Lake Mojave. As the river changed its course, the overabundance of freshwater would be transported and deposited into naturally occurring basins along or at the terminus of the Mojave River. Marith Reheis and co-authors (2007) note that Lake Manix consists of several subbasins, which are referred to as Coyote Lake, Troy Lake, Manix, and Afton. As the lake developed, “fluvial and deltaic sediments were deposited progressively eastward into the lake” and that studies have hypothesized that there were at least four major lake cycles (2007:5). Based on geological and geomorphological studies the Lake Manix shoreline reached an elevation of 557 meters (m). At this level, the southern extent of the lake itself would have pushed east, potentially abutting the westernmost Calico Solar Project APE (Enzel 2003; Reheis *et al.,* 2007: Figure 3). Extensive prehistoric remains are found along the shores of the lake and it is thought to have been a major element in a regional network involving the inhabitants of the project and the project area of analysis.

The occurrence of desert pavements within the Calico Solar Project APE reflects the context as described above. In particular, the pavements on the slopes of the Cady Mountains are broader and better developed atop the older, up-slope Pleistocene fanglomerates rather than on the younger surfaces at lower elevations. The older surfaces, and likely the younger ones as well, predate the accepted presence of man in the new world. The most stable pavements, and likely the oldest, lie atop Quaternary alluvium woven among the fanglomerate hills and lava flows within the southern portion of the project APE. Buried cultural deposits would not be found beneath these stable surfaces. The cryptocrystalline silicate nodules that occur as part of the desert pavement matrix may be secondarily sourced to the fanglomerate deposits, though their original matrix remains unknown. Holocene alluvial deposits within and adjacent to the east-west drainage are the most likely source for buried deposits. The loose sandy matrix and the seasonal rain and flood events are likely to have obscured portions of cultural deposits.

Paleoecology

With minimal updates and editorial contributions, the following sections were adapted from URS (2008: Section 2.1).

The project area of analysis is composed of multiple Life Zones whose animal and plant communities attracted and tempered the settlement and adaptations of a long sequence of prehistoric and historic populations. The Life Zones are (from the highest altitude to the lowest): Arctic/Alpine (10,000 feet and above), Canadian/Hudsonian (7,000 to 10,000 feet), Transition (5,000 to 7,000 feet), Upper Sonoran (3,300 to 5,000 feet), and Lower Sonoran (3,300 feet and below). Although some prehistoric and historic inhabitants of the project visited one of more of these Life Zones at one time or another, most settlement and subsistence activities were concentrated in the Transition, Upper Sonoran, and Lower Sonoran Zones, that is, between 5,000 feet and -227 feet in altitude (approximately a mile vertical distance).

The inhabitants of the project area of analysis lived primarily in the Lower Sonoran Life Zone, where acorns and piñon nuts were gathered by groups in the foothills; honey mesquite, piñon nuts, yucca roots, mesquite and cacti fruits were gathered by groups in or near the desert (Bean and Smith 1978) when Troy Lake, Lavic Lake, and Broadwell Lake were wet During times when the lakes were dry, settlement and subsistence were focused on the Upper Sonoran Life Zone in the Cady Mountains and even father distant. Edible varieties of agave cactus grow naturally on the rocky slopes of the Cady Mountains. Acorns and pinyon nuts were traded from Cahuilla bands of the mountains and passes of the Upper Sonoran Life Zone and Transition Life Zone, and mesquite beans were often received in return. There is no archaeological evidence that dried fish from the lakes or the Colorado River were traded beyond the immediate area.

C.3.4.4 CULTURAL SETTING

Prehistoric Background

Regional Prehistoric Context. With minimal updates and editorial contributions, the following sections were adapted from URS (2008: Section 2.1).

The chronological sequence of the cultural complexes for the Mojave Desert initially proposed by Warren (1980, 1984) and Warren and Crabtree (1986), divides the prehistoric era into five temporal periods: Lake Mojave, Pinto, Gypsum, Saratoga Springs, and Shoshonean. The four earlier periods encompass what is called the Archaic Period of the Great Basin and, in the Saratoga Springs period, formative influences from the Southwest (Lyneis 1982), while the Shoshonean period includes the ethnographic era. Claims have been made for archaeological assemblages dating to periods earlier than Lake Mojave, but as Warren and Crabtree (1986) note, all are controversial and, even if valid, have little or no relationship to later cultural developments in the region.

The Mojave Desert sequence has recently been expanded by Sutton *et al.,* (2007) to include elements more closely aligned to prehistoric cultural complexes in the Central Mojave Desert. Similar to Warren and Crabtree (1986), Sutton *et al.,* (2007) notes little evidence of a “Pre-Clovis” occupation of the Mojave Desert during the Pleistocene, but does not discount the possibility of such evidence existing in the region. In contrast to the earlier sequence, Pleistocene era occupation is identified and termed the hypothetical “Pre-Clovis” and “Paleo-Indian” Complexes. Other elements of the Sutton *et al.,* (2007) Mojave Desert chronology for the Holocene period include the Lake Mojave complex, Pinto complex, Dead Man Lake complex, Gypsum complex, Rose

Spring complex, and Late Prehistoric complex, as described below. As used herein, “climactic periods (*e.g.,* Early Holocene) [refers] to specific spans of calendric time and cultural complexes (*e.g.,* Lake Mojave Complex) to denote specific archaeological manifestations that existed during (and across) those periods” (Sutton *et al.,* 2007:233).

Additionally, Sutton *et al.,* (2007: Table 15.1 and 15.2) provide good summaries of major archaeological research conducted in the Mojave Desert since 1982. Due to the advent of cultural resource management projects, primarily on military bases and on federal land in the Mojave, more than 3 million acres have been surveyed with more than 20,000 sites identified in the last 27 years. These include surveys at China Lake Naval Weapons Center, Edwards Air Force Base, Fort Irwin, Twenty-Nine Palms Marine Corps Center, and federal Bureau of Land Management Land (Basgall and Glambastiani 2000; Basgall 2004; Hall 1993; Warren 1991). In terms of excavation projects in the Mojave, work has been conducted on a wide range of site types, from Paleo-Indian sites to Late Prehistoric sites, several of which have provided radiocarbon dates that support the cultural chronology that has evolved with these more recent investigations (Sutton *et al.,* 2007: Table 15.3). The chronological sequence presented below is based on both the earlier and more recent archaeological survey and excavation projects in the Mojave.

Paleo-Indian Complex (10,000 to 8000 cal B.C.)

The Paleo-Indian Complex was an era of environmental transition between the late Pleistocene and early Holocene. The beginning of the Paleo-Indian Complex was characterized by increased rainfall and cooler temperatures, which formed deep lakes and marshes, even in the interior desert regions of California. As temperatures warmed at the start of the Holocene, glaciers slowly retreated, sea levels rose, and the interior lakes and marshes gradually evaporated over the millennia (Moratto 1984:78).

The earliest, clear evidence for human occupation of the Mojave Desert begins at about 12,000 years ago, while claims for earlier, pre-Holocene era occupations such as those made for the Calico Early Man site (Duvall and Venner 1979), Tule Springs (Harrington and Simpson 1961), Lake China (Davis 1978), and Lake Manix (Simpson 1958, 1960, 1961) remain unsubstantiated.

In 1926, a fluted point found in Folsom, New Mexico transformed the debate about the antiquity of the earliest inhabitants of the New World, pushing the date back to approximately 15,000 B.P. Since that time, many other sites containing this type of point have been identified throughout the United States. The Paleo-Indian Complex within the Mojave Desert is, thus far, represented exclusively by the Clovis Complex, though the relationship with the later Great Basin stemmed series points is also a consideration. The Paleo-Indian Complex experienced profound environmental changes, as cool, moist conditions of the terminal Wisconsin glacial age gave way to a warmer, drier climate of the Holocene (Spaulding 1990).

The China Lake site remains the only presumed occupation of the Paleo-Indian complex in the Mojave Desert for the late Pleistocene Period. China Lake is located near an ancient Pleistocene lake. Excavations at this site began in 1968 and lasted through the end of the 1970s (Moratto 1984:66-70). China Lake has a well-sealed stratigraphic context with prehistoric tools intermixed with the fossilized remains of extinct mammals. The tool sequence from the site suggests that China Lake was inhabited from as early as 9,200 cal. B.C. (Sutton *et al.,* 2007: 234). The earliest calibrated dates for China Lake are from habitation debris at the Pleistocene lakeshore that continued through 10,000 B.C., where Proto-Clovis and Clovis cultures were identified. Nearly all of the tools identified at this site were produced from obsidian and fine-grained cryptocrystalline silicates (cherts and jaspers).

One common theme among nearly all Paleo-Indian sites in North America is the tool assemblage: projectile points, hafted to the end of a spear and launched using a throwing tool (atlatl), made from fine-grained lithic material and fluted. Fluted points, defined as a component of the Clovis culture in California, have been found nearly throughout the entire state from coastal estuary environments to ancient Pleistocene lakeshores, which are now in desert areas. At least five sites near Cajon Pass have been identified containing fluted projectile points, suggesting an early occupation of approximately 12,000 BP, which corresponds to the “hypothetical Pre-Clovis” complex (pre-10,000 cal B.P) for San Bernardino County (Sutton *et al.,* 2007:236). In addition to fluted points, the Paleo-Indian tool assemblage was composed mainly of scrapers, burins, awls, and choppers, all used for the processing of animal remains and foodstuffs.

The late Pleistocene to early Holocene geological period of transition, approximately 14,000 to 8,000 BP, was a period of global climatic change and in the California interior, pluvial lakes formed from glacial melt (Roberts 1989). Some early researchers pose the theory of two different traditions relating to interior and coastal adaptation during this transition. Based on work in the Panamint Valley, Davis (1969) posited the theory of “Paleo-Desert,” a geographic distinction from Paleo-Indian sites of the “Paleo-Coastal” tradition. In the Paleo-Desert geographic region, Paleo-Indian sites are generally located along the shorelines of these ancient pluvial lakes (Davis 1969). No sites dating to this period have been recorded to date in the project area of analysis.

Lake Mojave Complex (ca. 8000 – 6500 cal B.C.)

The temporal period 8000 to 6500 cal B.C. is referred to as the Altithermal Climatic Phase in which there was a dramatic shift towards a much warmer environment in the desert regions, and which appears to have witnessed a near hiatus in the occupation of the Mojave Desert. During this time it seems that people living in the desert regions migrated towards the coastal region. The change in the climate affected the distribution of floral and faunal communities and correspondingly people migrated toward the coast to exploit littoral resources. A small frequency of ground stone implements is present during this time, from which infers limited hard seed grinding activities (Sutton *et al.,* 2007:237). The high incidence of extra-local materials and marine shell is interpreted as wider spheres of interaction than witnessed previously. Sutton *et al.,* (2007: 237) interprets these and other data as indicators of “a forager-like strategy organized around relatively small social units.”

Cultural materials dating from this Complex encompass the Playa cultures (Rogers 1939), the San Dieguito Complex (Warren 1967), and the Lake Mojave Complex (Warren and Crabtree 1986). This phase is considered ancestral to the Early Archaic cultures of the Pinto Complex, representing a shift toward a more diversified and generalized economy (Sutton 1996:228). The Lake Mojave assemblages, first identified at Lake Mojave (Campbell *et al.,* 1937), include Lake Mojave series projectile points (leaf-shaped, long stemmed points with narrow shoulders) and Silver Lake points (short bladed, stemmed point with distinct shoulders). Other diagnostic items include flaked stone crescents; abundant bifaces; and a variety of large, well-made scrapers, gravers, perforators, heavy core tools, and ground stone implements (Sutton *et al.,* 2007:234).

Millingstones generally occur in small numbers during this time. In the Mojave Desert and southern Great Basin, this assemblage is typically (but not exclusively) found around the margins of ancient lakes, although the role of the lakes in the overall adaptation remains unclear. According to Sutton (1996:229), Lake Mojave Complex sites occur more commonly in the eastern and central Mojave Desert, while rare occurrences have been noted within the western Mojave in the Lake China, Coso, and Owens Lake areas

The Lake Mojave cultural pattern seems to represent relatively small nomadic social units centered on foraging strategies with undefined hunting and lacustrine resource exploitation patterns. Studies conducted at Fort Irwin show a reliance on smaller taxa with less reliance on large game based on protein residue analysis; however, these data are contradictory to the cultural constituents recorded for this complex that suggest large game exploitation (Sutton *et al.,* 2007:237). There is an overlap in time between the Lake Mojave Complex and the Pinto Complex of approximately 1,000 years, in which continuity of technology occurs with a steady introduction of technologies referred to as the Pinto Complex. No sites dating to this period have been recorded to date in the project area of analysis.

The Pinto Complex (ca. 6500 – 4000 cal B.C.)

The Pinto Complex represents a broad continuity in the use of flaked stone technology, including less reliance on obsidian and cryptocrystalline silicates, as well as the prevalence of ground stone implements in the material culture (Sutton *et al.,* 2007:238), which distinguishes it from the Lake Mojave Complex. Climatic changes occur between the Early and Middle Holocene periods about 7500 B.P and 5000 B.P. appears to have been more arid across the Mojave region (S. Hall 1985; Spaulding 1991). It is during this time that woodland attained its approximate modern elevation range, and the modernization of desert scrub communities was completed with the migration of plant species such as creosote bush into the area (Byers and Broughton 2004). Warren (1984) sees this period as marking the beginning of cultural adaptation to the desert, as materials characteristic of the Pinto Complex gradually replace those of the preceding Lake Mojave Complex. Sites associated with this era are usually found in open settings, in relatively well-watered locales representing isolated oases of high productivity.

From the period 5000 B.C. to 3500 B.C., there was increased occupation of the desert regions during the Medithermal Climatic Period, a period of moister and cooler temperatures allowing for the intensive re-occupation of the desert region. In the desert region, the occupation is referred to as the Pinto Basin Complex. However, Sutton *et al.,* (2007:238) cite recent work conducted on Fort Irwin and Twenty-Nine Palms that produced radiocarbon dates as 6870 cal B.C., thus pushing the back the inception of the complex coincidental with the Lake Mojave Complex.

The Pinto Complex is marked by the appearance of Pinto series projectile points, characterized as thick, shouldered, expanding stem points with concave bases, as well as, bifacial and unifacial core tools, and an increase in millingstones. Pinto points were typically produced by percussion reduction, with limited pressure retouch. Named for the Pinto Basin site (Campbell and Campbell 1935), the points were presumably used on atlatl darts. Large numbers of such artifacts were also recovered from the Stahl site near Little Lake (Harrington 1957; Schroth 1994).

Major technological shifts for this Complex include a significant increase in the use of millingstones (Warren and Crabtree 1986; Sutton *et al.,* 2007:238)). Warren (1990) attributes the latter development to the exploitation of hard seeds, part of a process of subsistence diversification brought on by increased aridity and reduced ecosystem carrying capacity. Big game hunting probably continued as an important focus during this time, but the economic return of this activity likely decreased as mountain sheep and deer (artiodactyls) populations declined in response to increased aridity (Warren and Crabtree 1986). During this transitional period there is faunal evidence that indicates exploitation of rabbit, rodent, reptile, and freshwater mussel resources.

The majority of Pinto Complex archaeological sites have been found near pluvial lakes, adjacent to fossil stream channels, near springs, and in upland regions. Many of these sites contain substantial midden deposition and cultural debris, which indicates larger groups and prolonged occupation for this time period (Sutton *et al.,* 2007:238).

A new complex has been proposed by Sutton *et al.,* (2007) that appears to be a variation of the Pinto Complex: the Dead Man Lake Complex (7000-3000 cal. B.C.), based on archaeological findings from the Twenty-Nine Palms area. The primary variation between Pinto and the Dead Man Complex is the presence of small to medium sized contracting stemmed or lozenge shaped points, battered cobbles, bifaces, simple flaked tools, milling implements, and shell beads (Sutton *et al.,* 2007:239).

Based on the current archaeological data there appears to have been a gap between the Middle and Late Holocene period, since few sites have been found that date between 3000 and 2000 cal B.C. It is believed that climatic changes during this period resulted in hotter and drier conditions, which may have led to the abandonment this region for approximately 1,000 years (Sutton *et al.,* 2007:241).

No sites dating to this period have been recorded to date in the project area of analysis.

Gypsum Complex (ca. 2000 cal B.C. – cal A.D. 200)

Gradual amelioration of the climate began by around 5000 B.P, culminating in the Neoglaciation at about 3600 B.P., with a period of increased moisture dating to the latter part of the Middle Holocene (Spaulding 1995). This increase in moisture would have presumably resulted in favorable conditions in the desert, and may have influenced changes in cultural adaptations, including increasing population, trade, and social complexity (Sutton 1996: 232; Sutton *et al.,* 2007:241).

Gypsum Complex sites are characterized by medium to large stemmed and corner notched projectile points, including Elko series, Humboldt Concave Base, and Gypsum. In addition, rectangular-based knives, flake scrapers, occasional large scraper planes, choppers and hammerstones; handstones and milling tools become relatively commonplace and the mortar and pestle appear for the first time. One site with an Elko series projectile point was recorded in the project; no similar projectile points have been found in the project area of analysis.

This Complex is marked by population increases and broadening economic activities as technological adaptation to the desert environment evolved. Hunting continued to be an important subsistence focus, but the processing of plant foods took on greater importance as evidenced by an increase in the frequency and diversity of ground stone artifacts. Later, the bow and arrow were introduced, increasing hunting efficiency. Perhaps due to these new adaptive mechanisms, the increase in aridity during the late Gypsum Complex (after ca. 2500 B.P.) seems to have had relatively little consequence on the distribution and increase in human populations (Warren 1984; Warren and Crabtree 1986). In addition to open sites, the use of rock shelters appears to have increased at this time. Base camps with extensive midden development are a prominent site type in well-watered valleys and near concentrated subsistence resources (Warren and Crabtree 1986). Additionally, evidence of ritualistic behavior during this time exists through the presence of rock art, quartz crystals, and paint (Sutton *et al.,* 2007:241).

A shift in subsistence orientation and mobility near the end of the Gypsum Complex is suggested, with increased emphasis on the hunting of smaller mammals (Basgall *et al.,* 1986; Sutton 1996:234). Rock art suggests that the hunting of mountain sheep was important during the Gypsum Complex (Grant *et al.,* 1968); mountain sheep and deer, rabbits and hares, rodents, and reptiles remains are reported from Gypsum Complex sites in the central Mojave Desert (Hall and Basgall 1994). Evidence from the western Mojave Desert suggests that there was a major population increase ca. 3000 to 2300 B.P (Gilreath and Hildebrandt 1991; Sutton 1988).

Rose Spring Complex (ca. cal A.D. 200 – 1100)

The climate during the Rose Spring Complex remains relatively stable and consistent during the middle of the Late Holocene period. In the western Mojave Desert, some regions show an increase in lake stands, such as at Koehn Lake during this time (Sutton *et al.,* 2007:241). At the beginning of this period lakes were at high points; as the environment began to shift towards the end of this period, lakes began to desiccate and recede, which marked the end of the Rose Spring Complex around AD 1100.

The Rose Spring Complex is characterized by small projectile points, such as the Eastgate and Rose Spring series, stone knives, drills, pipes, bone awls, various milling implements, marine shell ornaments; the use of obsidian is prevalent during this time (Sutton *et. al.,* 2007:241). Smaller projectile points appear to mark the introduction of a bow and arrow technology and the decline of the atlatl and spear weaponry (Sutton 1996: 235). Sutton (1996: 235; 2007:241) notes that Rose Spring Complex sites are common in the Mojave Desert and are often found near springs, washes, and lakeshores.

Subsistence practices during the Rose Spring Complex appear to have shifted to the exploitation of medium and small game, including rabbits/hares and rodents, with a decreased emphasis on large game. At the Rose Spring archaeological site, numerous bedrock milling features, including mortar cups and slicks, are associated with rich midden deposits, indicating that milling of plant foods had become an important activity. In addition, evidence of permanent living structures are found during this time and include wickiups, pit houses, and other types of structures (Sutton *et al.,* 2007:241). In the eastern Mojave Desert, agricultural people appear to have been present, as Anasazi populations from Arizona controlled or influenced a large portion of the northeastern Mojave Desert by cal A.D. 700 (Sutton *et al.,* 2007:242).

No sites dating to this period have been recorded to date in the project area of analysis.

<u>Late Prehistoric Complexes (cal A.D. 1100–Contact)</u>

Paleoenvironmental studies conducted within the western Mojave Desert point to increased effective moisture beginning just after 2000 B.P., as evidenced by a shoreline bench feature at Koehn Lake (Sutton 1996:238). The Koehn Lake site appears to have been abandoned by 1,000 years ago, as Koehn Lake desiccated during a major “medieval drought.” This drought may have influenced the movement of people from this area north and east across the Great Basin (Sutton 1996:239). Population began to decrease, due in part to a drier climate, and later as a result of European contact.

Characteristic artifacts of this Complex include Desert series projectile points (Desert Side-notched and Cottonwood Triangular), Brownware ceramics, Lower Colorado Buff Ware, unshaped handstones and millingstones, incised stones, mortars, pestles, and shell beads (Warren and Crabtree 1986). The faunal assemblages typically contain deer, rabbits/hares, reptile, and rodents. The use of obsidian dropped off during this time with the increased use of cryptocrystalline silicates.

Between 1,000 and 750 years ago, ethnic and linguistic patterns within the Mojave Desert increased in complexity. One of the most important regional developments during the Late Prehistoric Period was the apparent expansion of Numic-speakers (Shoshonean groups) throughout most of the Great Basin. Many researchers accept the idea that sometime around A.D. 1,000, the Numa spread eastward from a homeland in the southwestern Great Basin, possibly from Death Valley (Lamb 1958) or Owens Valley (Bettinger and Baumhoff 1982). While there is little dispute that the Numic spread occurred, there is much disagreement over its mechanics and timing (see Madsen and Rhode 1995).

The Late Prehistoric Complexes mark the first recorded historical documentation of Native American inhabitants at European contact. The ethnohistoric record provides valuable data for understanding Late Prehistoric archaeology. The Late Prehistoric Complexes reveal a significantly different suite of material culture than that seen in earlier Complex assemblages. Manos and millingstones became more frequent, as did mortar and pestles. In addition, bow and arrow technology with the use of Desert Side-notched and Cottonwood points, both emerge during the Late Prehistoric Complexes. Large occupation sites, representing semi-permanent and permanent villages, emerge during this time as well.

During this time the first locally produced pottery is seen in the Mojave Desert Region, likely coming from the Anasazi in the southwest. Also, smaller projectile points, Cottonwood and later Desert Side- Notched points were introduced to use with bow and arrow technology. Plant food processing is indicated by the presence of manos and metates.

Ethnography

Prehistorically, there was a large movement of people across the Mojave Desert and ethnographically several groups are associated with the Project APE and surrounding Mojave Desert region. The Kawaiisu, Kitanemuk, Southern Piute, Serrano, Chemhuevi, Tabtulabal, and Panamint occupied the Mojave Desert region, north, south, west, and east of the Project. In this region there were four major linguistic groups originating from northern Uto-Aztecan groups; Tubatulabalic, Hopic, Numic, and Takic (Sutton *et al.,* 2007:243). The Mojave River appears to have been a major boundary between Takic and Numic speaking groups during prehistoric times. Groups occupying the Central Mojave Desert were of the Takic and Numic linguistic groups. Takic speaking groups originated in the southwestern Mojave Desert, expanding south and east sometime around 500 cal. B.P, and include the Serrano and Kitanemuk (Sutton *et al.,* 2007:243). At time of contact, groups south of the Mojave River and much of southern California were part of the Takic linguistic group. The groups north and east of the Project were of the Numic linguistic group, which included the Kawaiisu, Chemhuevi, and Southern Piute.

During the ethnographic period, the Serrano, Vanyume (Beñeme) and the Chemehuevi occupied the region in which the Project is located. The Vanyume were a small division of the Serrano, about whom little ethnographic information is known. The Chemehuevi entered the Mojave Desert much later in time. Other groups that could have entered the Project area were the Kawaiisu, the Kitanemuk, the Southern Piute, the Mohave, and the Ancestral Pueblo. Eerkens (1999:301) states that the area around Fort Irwin, northeast of the Project Site, was inhabited by the Kawaiisu, Chemehuevi, Las Vegas Paiute, and the Vanyume, although he acknowledges that all groups in the area maintained flexible settlement patterns based on availability of resources (1999:302). The Project APE and surrounding valleys were not conducive for large scale inhabitation based on the fluctuating environmental conditions and overall arid nature of the region; therefore groups occupying/utilizing the area would have been small and nomadic (Zigmond 1986:398).

Serrano. The Project APE is situated within the traditional boundaries associated with Mission San Gabriel during the Spanish Period (1769–1821) (Bean and Vane 1979). The natives in this area were known as the Yucaipaiem clan of the Serrano (Altschul, Rose and Lerch 1984; Kroeber 1925; Strong 1929; Bean and Smith 1978). They spoke a language that falls within the Takic family of the Uto-Aztecan language group. This language family is extremely large and includes the Shoshonean groups of the Great Basin. Due to the proximity of the Serrano and Gabrieliño bands in the area and their linguistic similarities, ethnographers have suggested that these two bands shared the same ethnic origins (Kroeber 1925; Bean and Smith 1978). For this reason, they will be referred to as the Serrano.

According to Kroeber (1976:611), the Serrano comprised five groups or bands: Kitanemuk, Alliklik, Vanyume, Kawaiisu and Serrano. They inhabited lands from the San Bernardino Mountains, part of the Transverse Mountains east of the Cajon Pass, across the Mojave Desert east as far as Twenty-Nine Palms, and from the Tehachapi

Mountains to the northern Colorado Desert. They occupied most of modern day San Bernardino County (Bean and Smith 1978). Relatives of the Serrano included the Gabrieliño and Luiseño to the west at the Pacific Coast, and the Cahuilla inhabiting the Colorado Desert. For much of the Late Prehistoric Complex, the Serrano band of the much larger Serrano tribe were the likely inhabitants of the western Mojave Desert, what is today the Cajon Pass and Barstow area. Most of what is known about the Serrano has been based upon the work done by Hicks (1958) and by later researchers working on a site known as CA-SBR-1000, located near Yucaipa, San Bernardino County, California. Studies indicate that the village had been occupied for thousands of years and that it was a major trading center both prehistorically and historically. Little is known about early Serrano social organization because the band was not studied until the 1920s (Kroeber 1925) and enculturation had seriously compromised their native lifeway. Kroeber (1925) indicates that the Serrano were a hierarchically ordered society with a chief who oversaw social and political interactions both within their own culture and with other groups. The Serrano had multiple villages ranging from seasonal satellite villages to larger, more permanent villages.

Resource exploitation was focused on village-centered territories and ranged from gathering and hunting with occasional fishing. The primary staple varied depending on locality. Acorns and piñon nuts were gathered by groups in the foothills; honey mesquite, piñon nuts, yucca roots, mesquite, and cacti fruits were gathered by groups in or near the desert (Bean and Smith 1978). Hunting activities consisted of deer, mountain sheep, antelope, rabbits, other small rodents, birds, with the most desired game bird quail (Bean and Smith 1978).

Serrano structures were situated near water sources and consisted of large, circular thatched and domed structures of willow and covered with tule thatching. These living structures were often sufficient to house a large family. In addition to the living structure, a ramada, an open air structure for outdoor cooking, was located adjacent to the home (Benedict 1924; Kroeber 1925; Drucker 1937; Bean and Smith 1978). A large ceremonial structure was often present and was used as the religious center where the lineage leader resided. Additional structures, such as granaries for food storage and sweathouses for ritual activities, were often located adjacent to pools or streams (Strong 1929; Bean 1962-1972; Bean and Smith 1978).

The Serrano, like the neighboring groups, were primarily semi-nomadic, hunter-gatherers. Because of their inland location, Serrano society was left relatively intact during the period of initial Spanish colonialization, unlike the Gabrielino, who inhabited the coastal area. In 1772, Spanish explorer Pedro Fagès traveled through the Cajon Pass to the Mojave Desert in an attempt to identify the native groups in this region. Fages' ultimate goal was to place the Serrano under supervision of a mission. By 1819, the Serrano were relocated to the Estancia of the Mission San Gabriel in Redlands (Bean and Smith 1978:573). At the time of relocation, there were likely on the order of 3,500 Serrano inhabiting the Mojave Basin. Between 1840 and 1860 a smallpox epidemic decimated the population. By 1885, there were only "390 Serranos [sic] remaining in all of southern California" (AccessGenealogy.com 2005) and the census of 1910 recorded only 100 Serrano (Kroeber 1976:616).

Vanyume (Beñeme). Limited information is available on the Vanyume during the historic period. What information exists describes the Vanyume as a small division of the Serrano living in the Mojave Desert, north of Serrano territory. They were referred to as the “Serrano of the Mohave River” (Kroeber 1925:614). The name Vanyume is a Mohave word; the name Beñeme was given to the entire Serrano cultural group by Father Garcés. The Vanyume spoke a Takic language related to the Kitanemuk to the west and the Serrano to the South. Kroeber reported that the Vanyume were occasionally friendly with the Mohave and Chemehuevi, but hostile to the Serrano (Kroeber 1925:614). Kroeber also stated that the population of the Vanyume was very small at the time of historic contact. The “chief” of the Vanyume reportedly lived in one of the villages at the upper reaches of the Mojave River near Victorville. The Vanyume were hunters and gatherers, and shell beads and millingstones were known to have been used. The Vanyume are generally associated with similar life ways as the Serrano to the south (Yohe II and Sutton 1991).

Chemehuevi. The Chemehuevi were a band of the Southern Paiute that possibly entered the eastern Mojave Desert area from the north in fairly recent prehistoric times. The Chemehuevi, also called the Pah-Utes, were closely related to the Southern Paiute in Death Valley and the Southern Nevada region. At the time of ethnographic contact, the Chemehuevi claimed a large portion of the eastern and central Mojave Desert, perhaps as far west as Afton Canyon on the Mojave River (Kelly and Fowler 1986:368). Although the Chemehuevi territory boundaries are unclear, it is certain that they inhabited the Providence Mountains. Based on archaeological data, the Chemehuevi entered the Mojave Desert sometime in the 17th century (Yohe II and Sutton 1991).

The Chemehuevi were strongly influenced by the Mohave. It is possible that they displaced the Desert Mohave, a Yuman speaking group (Kelly and Fowler 1986:368). Many Chemehuevi words are related to Mohave vocabulary, along with agricultural practices, house construction, warfare, and other cultural elements such as religious practices. Like the Mohave, the Chemehuevi used square metates, paddle and anvil pottery techniques, and hair dye (Kelly and Fowler 1986:369). In addition to their close association with the Mohave, the Chemehuevi traded widely with the Shoshone, Kawaiisu, Serrano, Vanyume, Cahuilla, and Diegueno (Kelly and Fowler 1986:369).

Influence from the Pueblo area to the east is seen in the form of agricultural practices of many of the Southern Paiute groups. The Chemehuevi, in more well watered areas and flood plains, grew yellow maize, gourds, beans, and winter wheat, combining Mohave and Pueblo practices (Kelly and Fowler 1986:371). Kroeber reported that the Chemehuevi occasionally farmed small areas of corn, beans, melon and pumpkins and wheat. In more arid areas the Chemehuevi were hunter-gatherers. They hunted large game, such as deer and mountain sheep, along with rabbits, rodents, lizards, and other small game (Kroeber 1925:597). Plant foods were of great importance and included a variety of grass seeds, pinyon, and mescal (yucca).

The Chemehuevi had a large range associated with seasonal food practices and traveled through most of the Mojave Desert as far as the Tehachapi area and the San Bernardino Mountains. Occasionally they traveled to the Pacific coast to collect haliotis shells (Kelly and Fowler 1986:377). It was also reported that they would travel as far east as the Hopi’s territory, about a two-month round trip (Kelly and Fowler 1986:377).

Little is known about the Chemehuevi material culture. However, in historic times they used basketry, primarily willow, to a great extent both for storage and for carrying possessions (Kroeber 1925:97). They also made basketry hats. The Chemehuevi used some pottery but relied more on basketry.

Spanish colonization had little effect on the Chemehuevi until the early 1800s. Although other Southern Paiute groups were enculturated earlier by the Spanish, the Chemehuevi's isolated territory protected from being assimilated into the mission system. With the opening of the Old Spanish Trail, the Chemehuevi became more affected by the Spanish, and were brought to the missions to work (Kelly and Fowler 1986:386).

In 1874, the United States government established the Colorado River Reservation in an effort to move the remaining Chemehuevi onto the reservation. However, the reservation was shared with the Mohave band, with whom the Chemehuevi had differences from 1865 to 1871, the Chemehuevi were at war with the Mohave. They were therefore, reluctant to move to the reservation (Kelly and Fowler 1986:388). Some of them were either forced to move to the reservation, while some of them would not move. Many stayed in their historic locations, finding work on farms and ranches and in mines. In 1901, the Chemehuevi received their own reservation in the Chemehuevi Valley.

Other Native American Groups Associated With the Region. In addition to those groups affiliated with the Project area, many other groups occupied and utilized the Mojave Desert in a variety of ways. For example, it appears that the Anasazi of southern Nevada greatly influenced the cultures within the region. By 1450 B.P., the Anasazi were exploiting turquoise deposits at Halloran Springs, approximately 25 miles northeast of the Calico Solar APE. The Anasazi Pueblo was 150 miles across the desert; therefore Anasazi miners must have spent a considerable amount of time in the area based on the amount of turquoise mined and the abundance of "Basketmaker III" pottery found near the springs (Fagan 2003: 310). Turquoise was mined up to 12 feet below the ground and for centuries Mojave turquoise was traded to the east of its source, throughout the Southwest; however, it does not appear that turquoise was traded to the west as evidence of it does not appear in the material cultural of California tribes.

About 1450 B.P., the use of bow and arrow technology spread throughout California's eastern deserts, eventually becoming the dominant hunting technology throughout California. The bow and arrow has many advantages over spears and atlatls and made hunting much more efficient. Bow and arrow technology could have been introduced to California by the Anasazi or by another Great Basin group, during this time. In addition, by 1200 B.P., buff, gray, and brownware pottery, made by Ancestral Pueblo groups and other surrounding tribes of the Lower Colorado River region, entered the Mojave Desert. The trade of technology along with items such as sea shells and steatite objects probably took place along the Mojave Trail (Fagan 2003:311) (Figure 2.8-1). Bow and arrow technology is appropriate, however, only if larger animals that can be hunted that way are available for the taking. Such game was usually unavailable in the valley of the project, but would have been more useful in the project area of analysis as there were larger game in the Cady Mountains and around the pluvial lakes or short term water holes in the old lake beds.

Other tribes in the region include the Mohave. The Mohave lived along both the east and west banks of the Colorado River. During the winter, they inhabited semi-subterranean houses and depended upon maize agriculture for subsistence (Kroeber 1902; 1925). Throughout the rest of the year they were a hunting and gathering group, often traveling west far into the Mojave Desert. The Mohave traveled throughout southern California and northern Arizona utilizing a large network of trails (King and Casebier 1976:281). Two major geographical features influenced the Mohave's trade routes: the location of their villages along the Colorado River, and the waterless portions of the desert, also known as the Mojave Sink or Mojave Trough. Two major trade routes were used which started at villages along the Colorado River. The first route was the Pah-Ute Creek to Soda Springs route, which later became known as the Mojave Road wagon train. The other route ran south of the Mojave Road route through Poshay Pass and the Mojave River flood plain to the southeast corner of Soda Lake. The more northern route, the Mojave Road, was more heavily used, both prehistorically and in more recent historic times by Native Americans and European and American settlers alike (King and Casebier 1976:282).

Although the Mohave lived southeast of the project area, they potentially exercised a great amount of influence over the Mojave Desert region. They were skilled traders and traveled long distances to either fight or trade with other groups (Fagan 2003:297). Their movement across the southwest promoted the spread of new technologies, beliefs and ideas throughout the desert and southwestern regions. These Mojave transhumant patterns may have may have facilitated the knowledge, introduction, and sharing of arid lands water management techniques in the form of fields of rock piles to the project area of analysis and the broader desert region.

C.3.4.5 REGIONAL HISTORIC CONTEXT

With minimal updates and editorial contributions, the following sections were adapted from URS (2008: Section 2.1).

Spanish Period (1540 to 1821)

The Spanish had explored much of the California coast and San Francisco and Monterey bays by 1769, but paid little attention to the California interior. Several factors were detrimental to European exploration in the Project area: travel and communication were slow; there were few roads, trails and maps; and no supply stations existed in California's interior deserts (King and Casebier 1976).

Between 1775 and 1776, Father Francisco Garcés, a Franciscan missionary originally stationed near present-day Tucson, Arizona, explored the Mojave Desert as part of Spain's effort to forge an overland route to its settlements in Alta California. Garcés traveled with the 1775 Anza expedition until it crossed the Colorado River near present-day Yuma, Arizona (King and Casebier 1976:283). Garcés left the expedition at the Colorado River crossing and traveled north to the Mohave Villages near present-day Needles, California, while Anza continued west. Garces, in the company of Mohave guides, proceeded west to Mission San Gabriel in Los Angeles along the Mohave Trail, in the approximate location of the Mojave Road wagon route. The corridors of the Mojave Trail and the later Mojave Road are approximately 15 miles north of the Burlington Northern Santa Fe Railroad, north of the Cady Mountains near I-15. On his return trip he visited several Mohave villages on the banks of the Colorado River. The journal Garcés kept during this expedition is the earliest written record of the eastern Mojave Desert (King and Casebier 1976; Robinson 2005). Spanish contact with the Mohave and Colorado Desert peoples likely came from both the east and west during this time (Vane and Bean 1994:1-8), as evidenced by the Anza/Garces expeditions, as well as known contacts made on the California coast.

The closest Spanish mission, Mission San Gabriel in Los Angeles, was too far away to have an every day effect on the Native Americans in the Mojave Desert. Native Americans who fled the missions often escaped into the Mojave Desert and exposed the Mohave tribe to Spanish influences, including the use of horses, which led to raids on the missions and horse thievery. In 1819, Lieutenant Gabriel Moraga led an expedition of fifty soldiers into the Mojave Desert in an attempt to retrieve stolen horses, to exact revenge against the Mohave for their raids on the coastal Spanish settlements, and for their ability to spread unrest against the Spanish and other Native American groups (King and Casebier 1976:284). Moraga's expedition was only the second Spanish-sponsored trip into the Mojave Desert. Lack of water in the arid Mojave Desert forced Moraga and his soldiers to turn back.

During the Spanish period, no permanent European settlements were established in the project vicinity, although there were reports that the Spanish had active mines in the Barstow area. It is unknown if the mines were being worked by the Spanish, Native Americans, or later Mexican or American prospectors because only mine shafts remained and no written records have been discovered (King and Casebier 1976:300).

Mexican Period (1821 to 1848)

In 1810, an independence movement began as many rancheros sought to split Mexico (and California) from Spain. In 1821, this desire came to fruition when New Spain (Mexico) became independent. Following Mexico's independence, the Alta and Baja California missions received less financial support from Spain and Mexico, and ultimately, independence from Spain was a catalyst for Mexico to secularize all California missions. Secularization would free vast amounts of land that had been under mission control and the land would become civilian pueblos or large land grants awarded to Mexican, American, or European settlers. In 1831, Governor Jose Maria Echeandia announced the secularization of a number of missions, and by 1834, all the missions were secularized, including Mission San Gabriel in Los Angeles, the nearest mission to the Project. Within 10 years, the mission system had failed, the neophytes had left, and the buildings were in disrepair. Following secularization, San Gabriel mission became a parish for the City of San Gabriel and had little further effect on the Native Americans in the Project vicinity (Rolle 2003).

During Mexican control of Alta California, Americans started to enter California through the Mojave Desert, many of them using the Mojave Trail located north of the Project Area. Jedediah Smith, mountain man and fur trapper, was the first American to reach California using an overland route. Smith followed a route from the Great Salt Lake in Utah south to the Virgin and Colorado rivers and across the Mojave Desert to Spanish southern California. Smith arrived at the Mohave Villages in October 1826, then proceeded west on the Mojave Trail. After Smith's initial visit other American mountain men and trappers ventured into the desert, including William Wolfskill, George C. Yount, Christopher "Kit" Carson, James Ohio Pattie, and Ewing Young (Brooks and others 1981; King and Casebier 1976:285; Robinson 2005).

Jedediah Smith's ventures down the Virgin and Colorado rivers, combined with Garcés' route across the Mojave Desert, linked the Spanish settlements in New Mexico and California, stimulating trade between these regions (Wright 1982). In 1829, New Mexico merchant Antonio Armijo reached the Las Vegas Valley via the Virgin River, pioneering a route that became known as the Old Spanish Trail. Armijo's route followed the Mojave Trail in the project vicinity, but later routes of the Old Spanish Trail turned southwest out of Utah and headed toward the Mojave River through the San Bernardino Mountains. This route became known as the Northern Route of the Old Spanish Trail. The Mohave Indians had become increasingly hostile to travelers through their territories, and blazers of the northern route most likely took this path to avoid conflicts. The junction of the Northern Route of the Old Spanish Trail and the Mojave Trail was approximately 18 miles east of present-day Barstow, at a location historically called Fork of the Roads, northwest of the project area. Trade along the trail ended in 1848 with the Mexican-American War (Nystrom 2003; Robinson 2005; Rogge 2008).

No Mexican period artifacts have been found thus far in the project area of analysis.

American Period (1848 to Present)

Transportation

Mojave Road. The term "Manifest Destiny" was one of the likely causes for the Mexican-American War, which took place between 1846 and 1848. Jacksonian Democrats coined the phrase in the 1840s as a political philosophy whereby the United States would control all of the land between the Atlantic and Pacific oceans. The focus for expansion was on the northwest coast in Oregon territory and on the Texas territory. In 1845, during the Presidency of James K. Polk, the United States annexed Texas; the following year, the U.S. invaded Mexico. In 1848, the United States, victorious over the Mexican Army, signed the Treaty of Guadalupe Hidalgo, and acquired all Mexican territory north and west of the Rio Grande and Gila Rivers, which included Texas, New Mexico territory, and Alta California. American settlers began to migrate to the newly acquired territory, and the discovery of gold in 1848 and the ensuing Gold Rush in 1849 brought numerous settlers to California. Most of these travelers likely used the northern route of the Old Spanish Trail to enter California from New Mexico, Utah, and Nevada, although some likely followed the Mojave Trail as well (Robinson 2005).

Soon after California was granted statehood in 1850, the government wanted to recognize all of the trails running through California to promote immigration to the state, facilitate trade and communication, and develop routes of defense. A year after the Treaty of Guadalupe Hidalgo was signed, Lieutenant James H. Simpson of the Army Corps Topographical Engineers attempted to follow Father Graces' direct route across the Mojave Desert (Mohave Trail), and in 1851, the U.S. Army Corps of Engineers sent another expedition to explore the area. During the 1840s and 1850s, the Union Pacific Railroad also contemplated using Gracés' route in an attempt to find the most practical course for a railroad line across the desert. Several explorers, hired by railroad companies, traveled throughout the Mojave Desert during the 1840s and 1850s. Eventually, a more northern route was selected for the transcontinental railroad line. In the late 1850s the General Land Office in California began the process of mapping the Mojave Desert area, and at that time several groups of surveyors mapped the desert (King and Casebier 1976:288-289).

Beale’s Wagon Road was built in 1857 north of the Calico Solar Project APE, along the 35th Parallel, and was in use between 1857 and 1861. Edward Fitzgerald Beale was a famous American Frontiersmen and was superintendent of the wagon road development. Beale, along with his party and 25 camels, crossed the Colorado River into California 15 miles north of present-day Needles, California, and followed the Mojave Trail west. In 1859, the U.S. Army established Fort Mojave near the location of Beale’s river crossing in an effort to protect travelers from Mohave Indian attacks. As a result, the Mojave Trail developed into a wagon road, which allowed supplies to be brought to Fort Mojave overland from Los Angeles. The wagon road was called the Mojave Road or the Government Road and was actively used until the beginning of the Civil War in 1861.

During the Civil War, troops stationed at Fort Mojave were ordered to abandon the fort and report for duty in Los Angeles. The fort remained abandoned until the middle of 1863, when California Volunteers occupied it to protect travelers on the Mojave Road. Traffic had increased along the road as a result of gold discoveries about 100 miles south of Fort Mohave in the La Paz Mining District. Other travelers along the Mojave Road in the 1860s were members of the military on their way to Arizona to fight in the Apache Wars or merchants and ranchers hauling supplies and livestock to Prescott, the capital of the Arizona Territory. The Mojave Road also was used as a mail route between 1866 and 1868 (King and Casebier 1976; Nystrom 2003; Robinson 2005).

Although there was considerable traffic through the Mojave Desert into Southern California, most followed the Old Spanish Trail to the west of the Project APE or the Mojave Road to the north, and any settlements associated with these routes would have been located adjacent to the trails. Except for miners, most other settlers did not stay in the desert until a railroad was constructed. Only a few early homestead claims were filed. These early homesteads consisted mainly of ranches raising sheep and cattle. The arid environment prohibited large scale agriculture except on the banks of the Mojave or Colorado Rivers (Walthall and Keeling 1986).

Atlantic & Pacific Railroad. Plans for a transcontinental railroad had been delayed due to the Civil War, but once the war ended, interest in the construction of transcontinental railroads resumed. In 1866, Congress contracted the Atlanta & Pacific Railroad (A&P) to construct a railway from the east to the California border. In 1879, the A&P partnered with the St. Louis & San Francisco Railroad and the Atchison, Topeka, & Santa Fe Railroad to facilitate construction of the transcontinental railroad. The A&P began construction of their track in Albuquerque, New Mexico in 1880 and reached Needles, California in May 1883. The A&P constructed a bridge over the Colorado River at Needles in August 1883 (Gustafson and Serpico 1992; Myrick 1992; Robinson 2005).

As the A&P tracks were being laid, the Southern Pacific Railroad was constructing a new railroad line between Mojave and Needles to intercept the A&P tracks at the

Arizona border and protect its California interests. The Southern Pacific constructed the Mojave to Needles branch between 1882 and 1883, working east from their Mojave station (Gustafson and Serpico 1992; Myrick 1992). When surveyors initially explored the project vicinity for a viable railroad route, they assessed the Mojave Road corridor, and found that the terrain was too steep and unsuitable for railroad construction. In the arid Mojave, the trail through the mountain range was preferred to the flatter terrain because more sources of water could be found in the mountainous areas. In 1868, General William J. Palmer of the Union Pacific Railroad eastern division surveyed a railroad route to the south of the Cady Mountains, where the terrain was more favorable for railroad construction. Although the Union Pacific never constructed the railroad through the Mojave Desert, it was largely Palmer's route that the Southern Pacific used to construct the Mojave to Needles branch (Nystrom 2003; Robinson 2005).

For more than a year, the A&P and the Southern Pacific lines continued to operate independently. The Southern Pacific Railroad instituted tri-weekly service to Needles in 1883, but the trip through the Mojave Desert was long and desolate. The railroad had constructed only one station and turntable in the 124-mile stretch between Mojave and Ludlow. The Southern Pacific Railroad was reluctant to join rails with the A&P fearing that the completed line would compete with their newly constructed Sunset Route, which crossed into California further south on the Arizona border at Yuma. Passengers heading east on the Southern Pacific Railroad's line to Needles were inconveniently required to disembark from the train with their belongings and transfer to the A&P cars. Although each of the railroads developed local business, the volume of passenger travel was not large enough to support operations. The Southern Pacific Railroad's route through the Mojave Desert did facilitate mining operations in the area. Anticipating large future revenues from hauling bulk ore, the railroad provided water for miners at 2 cents per gallon anywhere on the route, putting an end to the water scarcity problem for mine development in the area (Myrick 1992).

By the end of 1883, the A&P began making plans to construct their own line parallel to the Southern Pacific's line across the Mojave Desert to San Francisco. The Southern Pacific Railroad realized that if the A&P constructed a parallel line across the desolate Mojave Desert, its line would essentially become useless. In October 1884, an agreement was signed in which the Southern Pacific Railroad would sell its Needles to Mojave section to the A&P for $30,000 per mile. Until the debt was paid, the A&P would lease the line. In addition, the A&P also received an option for trackage rights between Mojave and San Francisco. The A&P received full title to the Mojave to Needles branch in 1911 (Gustafson and Serpico 1992; Myrick 1992). The construction of the railroad changed the course of travel across the Mojave Desert in the project vicinity. The railroad provided travelers with water sources across the vast desert and travel was much easier along the flat railroad corridor than along the mountainous Mojave Road to the north. A wagon road was constructed adjacent to the railroad alignment and use of the Mojave Road decreased.

The California Southern Railroad joined with the A&P in 1885 to provide service from Kansas City to San Diego. The junction of the two lines was initially called Waterman Junction, but in 1886 it was renamed Barstow. Barstow is located approximately 40 miles west of the project APE and is the closest city. The construction of the railroad brought numerous settlers to the area and although other railroad lines were eventually constructed throughout southern California, the route passing through Barstow remained a popular line for both freight and passenger service. In addition, the railroad acted as a lifeline connecting Barstow, alone in the desert, to the rest of Southern California. Barstow was a sizable railroad hub, and the railroad was the main employer in the city for many years.

In 1897, the A&P was redesignated as the Santa Fe Pacific Railroad and later became the Atchison, Topeka, & Santa Fe Railroad. When the A&P took over the Mojave to Needles branch in 1884, there were depots at Daggett, Fenner, and Needles (Figure 2.8-1). During the 1880s, 1890s, and the first decade of the twentieth century, Santa Fe Pacific constructed facilities at various locations along the line. All of the structures were wood frame, with the exception of brick and reinforced concrete structures in Needles. Santa Fe Pacific railroad sidings in the project vicinity include Troy, Hector, Pisgah, and Lavic. The Hector siding is the closest to the Calico Solar Project APE. Neither the Pisgah or Troy sidings had any depot facilities. The building of the grade for the laying of the track through the Calico Solar Project APE may, however, have contributed to the burying of any cultural resources that were beneath, or immediately north of the track in its present location. Hector had a 12-by-14-foot wood frame telegraph and train-order office that was constructed in 1906, which was closed in 1923 and moved to Earp in 1934. The Lavic siding was the largest of the four with a 24-by-34-foot frame combination passenger and freight depot that was constructed in 1901. The depot was closed in 1923 and removed (Gustafson and Serpico 1992; Myrick 1992).

The lack of water along the Mojave to Needles branch required the railroad to haul water in large tanks to the stations and construction camps. In 1897, a station was constructed at Newberry Springs, approximately 6 miles west of Troy, and this station became the railroad's primary source of water in the region. Although freight trains typically carried surplus water cars, engineers often had to go back to Newberry Springs for additional water supply (Gustafson and Serpico 1992; Myrick 1992).

The A&P Railroad/Santa Fe Pacific Railroad/Atchison, Topeka & Santa Fe Railroad is located between the Calico Solar Project Phase 1 and Phase 2 APEs and within the Pisgah triangle area. The railroad is now operated as the Burlington Northern Santa Fe Railway.

National Old Trails Road and U.S. Route 66. Prior to the construction of the railroad between Needles and Barstow in 1883, travel across the Mojave Desert in the project vicinity was limited to the Mojave Road corridor, which evolved from a network of prehistoric trails, early trails developed by mountain men, early explorers, and gold seekers; and routes developed during the railroad surveys of the 1850s. After the railroad was completed, the travel corridor shifted south of the Cady Mountains, new roads were constructed between local mines and railroad sidings, and a wagon road was constructed adjacent to the railroad tracks from Barstow to the Arizona border (Hatheway 2001). In the first decade of the 1900s, this wagon road would be converted to an auto route, as the use and ownership of the automobile became more prevalent.

The automobile first made its appearance to the American public in the late 1890s, and by 1900 automobiles were still the toys of the wealthy, with only one for every one thousand Americans. Although Henry Ford introduced his Model T in 1907, widespread use of the automobile did not occur until after World War I. In 1914, Ford perfected full assembly line production and two years later more than half a million automobiles were sold. As the use of the automobile rose, the demand for good roads increased. Most rural roads in the 1900s had been constructed for wagon traffic and were not suited to automobile traffic (Fischer and Carroll 1988; Keane and Bruder 2004; Lyman 1999; Paxson 1946).

By 1910, national and local organizations promoted good roads in the United States, including the National Old Trails Road in the APE. A precursor to U.S. Route 66, in spirit but not always in location, the National Old Trails Road was part of the 2,448-mile ocean-to-ocean highway from Baltimore, Maryland to the California coast. The National Old Trails Road also was part of the National Auto Trail System, an informal network of automobile routes marked by local organizations in the early twentieth century. The National Old Trails Road, where it traverses the Project APE, was located along and in the vicinity of the alignment of the old wagon road that was constructed adjacent to the Santa Fe Railroad tracks in the 1880s. The highway was designated by booster organizations in 1912, and by 1914 the Auto Club of Southern California had provided signage for much of the highway (Keane and Bruder 2004; Robinson 2005; Wikipedia contributors 2008).

In 1916, the Federal Highway Aid Act was passed to help fund rural roads, using a 50/50 funding match for states with a highway department. Route planning, however, remained a local matter, which usually did not include engineering surveys. In 1919, Congress liberalized the funding match requirements, and by late 1921, Congress passed the Federal Highway Act that further reduced the state match to about 26% (Lyman 1999) and required federal aid to be concentrated upon “such projects as will expedite the completion of an adequate and connected system of highways, interstate in character” (Paxson 1946:245). Up to 7% of a state’s roads could be listed for reconstruction to create the national highway system. By 1923 a tentative plan had been developed linking every city with a population of 50,000 or more, with construction planned over a 10-year period (Paxson 1946).

During the early 1920s, automobile travel was an adventure for many Americans and was subsequently heavily promoted. By the late 1920s, much of the National Old Trails Road in the project vicinity had been widened and oiled or surfaced with gravelly sand. The segment of the highway across the Mojave Desert was notorious for its poor condition, and by 1925 the highway was full of ruts and chuck holes. The highway was narrow with no road shoulders or striping, tended to follow the natural topography of the area, and was vulnerable to the effects of erosion. The State of California had designated the highway as a public highway in 1919, but did not take any responsibility for the segment between Barstow and Needles until 1923, leaving the burden of maintenance to San Bernardino County. Despite the poor conditions, motorists were never more than 4 miles from the railroad, where they could find help in the form of stations and section crews, and water was available every 5 to 10 miles (Bischoff 2005; Hatheway 2001; Scott and Kelly 1988). Aggregate mining for sand and gravel became prevalent in the area (King and Casebier 1976) and the scraping scars for the aggregate for the pavement of the Hector section of the National Old Trails Road can still be observed in the APE.

In 1926, the American Association of State Highway and Transportation Officials designated the National Old Trails Road in the Mojave Desert as U.S. Route 66. U.S. Route 66 was one of the main arteries of the National Highway System and was one of the first great highways in the United States, running from Chicago to the Pacific Ocean. Federal funding allowed for improvements, such as the construction of road shoulders. In the 1930s, the original alignment of the National Old Trails Road in the Project Area was abandoned in favor of a route to the south, which is the current alignment of historical U.S. Route 66 (Bischoff 2005; Scott and Kelly 1988; Wikipedia contributors 2008).

The new U.S. Route 66 alignment eliminated sharp turns, reduced steep grades, and straightened the roadway to accommodate higher speeds. The use of heavy machinery allowed for large road cuts that had not been possible in the early days of road building. The section of U.S. Route 66 from Needles to Los Angeles was the most heavily traveled section of the highway, and in 1934 this segment was paved. Much of the paving of U.S. Route 66 was completed by the Works Progress Administration during the Great Depression of the 1930s. By 1938 all of U.S. Route 66 was paved (Bischoff 2005; Scott and Kelly 1988).

U.S. Route 66 was an important transportation route during the Great Depression. In his book, *The Grapes of Wrath*, John Steinbeck wrote about migration of Midwestern farmers to the Pacific coast along this roadway. World War II caused further migration to the west coast along U.S. Route 66 as millions of Americans went to work in war related jobs in California. U.S. Route 66 became so famous that it was memorialized in Bobby Troup's popular song "Get Your Kicks on U.S. Route 66" (Scott and Kelly 1988) and was featured in many Hollywood movies.

While accommodations in the Calico Solar Project APE were limited to road-site camping in the wilds, as a subsequent consequence of the heavy use of U.S. Route 66, thousands of businesses opened, mostly serving cross-country travelers. Businesses varied from grocery stores, service stations, restaurants, and motels to dance halls and tourist attractions. One of these tourist attractions in the project vicinity may have been the Pisgah Crater, a young volcanic cinder cone located south of the Project APE. A road was constructed from U.S. Route 66 to the Pisgah Crater between the late 1930s and early 1950s from U.S. Route 66 either to provide access for travelers along the highway or for local aggregate miners (Scott and Kelly 1988).

Barstow was the last stop from Los Angeles before crossing the desert or the first stop after the desert, and was a popular rest area along the highway even during the Depression. During that time, business from U.S. Route 66 was an important part of the economies of many towns and small cities. By World War II, many businesses along U.S. Route 66 competed for travelers' money. Native American crafts sales became an important industry along the route. During the war, military use of the road increased in conjunction with development of military training bases in the Mojave Desert (Scott and Kelly 1988).

The Golden Age of U.S. Route 66 was the era after World War II and before the opening of other major east-west interstate highways, such as Interstate 40 (I-40). The increased traffic along U.S. Route 66 also led to its demise. Although the highway was an important east-west thoroughfare, it could no longer handle the volume of traffic and heavy military equipment using the road. After World War II, a new national interstate highway system was planned, and eventually replaced much of U.S. Route 66 (Scott and Kelly 1988).

There are no historic buildings associated with U.S. Route 66 along the segment of the road that is within 0.5 miles of the Project APE. There are historical buildings associated with U.S. Route 66 in the town of Ludlow, located about 12 miles east of Pisgah and about 11 miles east of the Project, and in Newberry Springs, about 15 miles west of the Interstate 40 Hector exit and about 13 miles west of the Project.

Interstate Highways. Throughout the 1950s and 1960s, U.S. Route 66 remained the main road between the Midwest and the West Coast. Increased traffic and the narrowness of the roadway eventually led to the downfall of the road. On August 2, 1956, President Dwight D. Eisenhower signed the Federal Aid Highway Act which provided funding to upgrade America's roads. Eisenhower based his vision of a more connected America on Germany's Reichsautobahnen rural super highways. Eisenhower and his advisors originally envisioned creating a 40,000 mile interstate system costing approximately $27 billion. Construction began almost immediately throughout the United States (Weingroff 2008).

On December 13, 1958, Interstate 15 opened between Victorville and Barstow. This marked the beginning of the modern highway era in the Barstow area. The entire length of Interstate 15 from Los Angeles to Las Vegas was opened by July 1961. At that time, the stretch between Baker and Las Vegas was used by more than 500 vehicles an hour in one direction (Swisher 1997).

Interstate 40 begins at its junction with Interstate 15 in Barstow, then runs through the Mojave Desert to Needles and into Arizona. Interstate 40 is located along the southern edge of the Calico Solar Project APE. Although the Interstate 40 is now a cross-country highway, its last sections were not built until 1980. In the southwest, much of present day Interstate 40 absorbed U.S. Route 66. Many of the western portions of Interstate 40 also follow the Beale Wagon Road. The segment of Interstate 40 in the project vicinity was not constructed until 1968.

Mining in the Mojave Desert

Since the 1860s, mining has been the most important commercial industry near the Calico Solar Project APE. Silver was discovered in 1863, although it is possible the Spanish had mined in the area almost a century before. Prospectors attempted to establish mines to sell to investors with sufficient capital. In the following decade, smaller operators attempted to compete with larger corporations, but without railroad transportation, very little money was made until the early 1880s with the coming of railroad through the eastern Mojave Desert (Brooks and others 1980; King and Casebier 1976:300-305).

The period between 1900 and 1919 was known as the "the Great Years" for mining in northeastern San Bernardino County (King and Casebier 1976:305) as it was more profitable than any other time. Copper, lead, zinc, and other base metals, as well as gold and silver, were mined throughout the Mojave Desert and San Bernardino County.

Also, during World War I, chromium, manganese, tungsten, and vanadium were mined. Several large mining districts were developed, including Copper World, near Valley Wells; gold mines at Hart; lead, zinc, and copper in the Mohawk mines near Mountain Pass; copper mines near Von Trigger Spring; and gold mines at the north end of Old Dad Mountain (King and Casebier 1976).

During the Great Depression, a resurgence of gold mining took place, but World War II caused a return to the mining of base metals. The Vulcan Iron mine, in the Providence Mountains northeast of the Project, was excavated during that time. Since the end of World War II, mining in the area has considerably slowed. More recently, other nonmetals such as clay, talc, and cinder mining have gained popularity, especially around the Kingston Mountains in the vicinity of Interstate 15. Aggregate mining for sand and gravel has become prevalent in the area (King and Casebier 1976).

Manganese Mining in the Project Vicinity. Several manganese mines exist in this region, including the Logan Mine within the Calico Solar Project APE, and the Black Butte Mine, located just over one-half mile east of the Calico Solar Project APE. Manganese was first mined in earnest during World War I, when the demand increased due to its use in the production of iron and steel. After World War I, manganese mining throughout the country decreased and continued to wane throughout the Depression but once again increased with the onset of World War II in the 1940s. In addition to iron and steel production, manganese also was used in the minting of the war-time nickel between 1942 and 1945. By 1943, deposits of manganese had been located in several desert locations throughout San Bernardino County, including the Lavic, Owl, and Whipple Mountains. Manganese, in combination with copper and silver, was used to produce these coins in an effort to conserve nickel for military uses (Tucker and Sampson 1943).

In 1942, the Metal Reserve Company of Washington D.C. published competitive price schedules for manganese ores. They offered $48 per ton for high grade ore (ore containing 48% manganese), $35.20 per ton for low grade A ore (44% manganese), and $26.00 per ton for low grade B ore (40% manganese). Ores containing 35% to 39% manganese were also accepted at a reduced price. Manganese producers in San Bernardino County brought their ore to stockpile points in Parker and Phoenix, Arizona. Lower grade ores containing 15% to 35% manganese often took their ore to the Kaiser Steel Corporation in Fontana, California. In the early 1940s, manganese ore was shipped from 5 deposits in San Bernardino County with ore containing 20% to 46% manganese. After the war, several manganese deposits continued to be worked in San Bernardino County (Tucker and Sampson 1943; Wright and others 1953).

Southern California Edison and the Hoover Dam

Two parallel Southern California Edison (SCE) steel-tower 220-kilovolt transmission lines are located in the Pisgah Substation Triangle area and the historic built-environment 0.5-mile buffer of the Project APE. The SCE 220-Kilovolt North Transmission Line was constructed between 1936 and 1939 and the SCE South 220-Kilvolt South Transmission Line between 1939 and 1941. The transmission lines originate at the SCE switchyard at the Hoover Dam and terminate in Chino, California. The transmission lines were constructed to deliver power from the Hoover Dam to SCE service areas in southern California.

Plans for development of a hydroelectric plant on the Colorado River were conceived as early as 1902 in response to fuel shortages that were limiting the mining activities in the vicinity of the river. SCE began to investigate development of such a plant and signed an option to utilize river water for power generation. Engineers surveyed the Colorado River and a preferred dam site was selected, but at the time the technology to transport the power to the SCE's service area (a distance of 300 to 400 miles) at high voltages did not exist. Because of technological limitations and the decline in mining activity along the Colorado River, SCE abandoned this option (Myers 1983).

Throughout the next 20 years, development of a power generating facility on the Colorado River was discussed and debated by public and private power companies and the concept of the use of a dam was investigated to control the highly variable flows of the river. In 1921, SCE and U.S. Geological Survey engineers once again surveyed the river and throughout the 1920s, SCE filed licensing applications with the Federal Power Commission in an effort to obtain the right to construct dams and power generating facilities, but none were approved. In 1928, Congress passed the Boulder Canyon Act, which stipulated that the federal government would construct a dam on the Colorado River if public and private utility companies would take responsibility for the distribution of electrical hydropower. In 1930, SCE signed a contract stating that they would buy and distribute power for themselves and all other investor-owned utility companies. The Los Angeles Bureau of Power and Light agreed to purchase and distribute power for state and municipal utilities, as well as the metropolitan water district (Myers 1983).

Construction of Hoover Dam began in 1931 and was completed in 1935. Power production for use began in 1936 when power was delivered to the cities of Los Angeles, Pasadena, Glendale, and Burbank through three parallel transmission lines constructed by the Los Angeles Bureau of Power and Light (currently Los Angeles Department of Water and Power). The second company to distribute Hoover Dam power was the Nevada-California Corporation. The power was conveyed by a 132-kilovolt transmission line that had been originally constructed in 1930 and 1931 to deliver power to the dam site during construction. This transmission line is known as the Edison Company Boulder Dam-San Bernardino Electrical Transmission Line (Hatheway 2006; Hughes 1993; Myers 1983).

The Metropolitan Water District of Southern California was the next to distribute electrical power in 1938. This transmission line, known as the Metropolitan Water District Line, used technology similar to that used previously by SCE for 220-kilovolt transmission lines in southern California. Utility companies in southern California, such as the Pacific Light and Power Company (which merged with SCE in 1917) and SCE, were innovators in the development of high voltage systems. In 1926, Stanford University established a high-voltage laboratory and worked with Pacific Gas and Electric and SCE in research and development. Through this collaboration insulators for California's 220-kilovolt lines were developed (Hughes 1993; Myers 1983; Schweigert and Labrum 2001).

The SCE 220-Kilovolt North Transmission Line was constructed between 1936 and 1939, using the same design and technology SCE had been using for its high-voltage transmission lines in southern California (including its Vincent 220-kilovolt line), and the design used by the Metropolitan Water District for its Hoover Dam line. The transmission line was energized in 1939, after the completion of Hoover generating units A-6 and A-7 (Myers 1983; Schweigert and Labrum 2001).

When World War II began in Europe, SCE planners anticipated an increase in demand for power in southern California. SCE began construction on a second transmission line, the SCE South 220-Kilvolt South Transmission Line, in 1939. SCE North and SCE South take divergent courses from the SCE switchyard at the Hoover Dam, but meet near Hemenway Wash in Nevada, and run nearly parallel to each other from north of Boulder City, Nevada to Chino, California. SCE North and SCE South are parallel within the Calico Solar APE. Both SCE North and SCE South delivered electricity that was essential to war-time industries in Southern California. These industries included the Douglas, Vultee, and Northrup aircraft plants, Consolidated Steel, the Long Beach Naval Shipyard, Kaiser Steel, Alcoa, Columbia Steel, as well as automobile factories, tire plants, oil refineries, ordnance works, and military bases and depots (Myers 1983; Schweigert and Labrum 2001).

Natural Gas Pipelines

Two natural gas pipelines run through the Calico Solar Project APE — the Pacific Gas and Electric Pipeline and the Mojave Pipeline. Although it was known that natural gas could be used for fuel in the early years of the nineteenth century, it was not until 1859 when large amounts of natural gas were discovered in Titusville, Pennsylvania, that a commercial market for natural gas developed. Wide-spread use of natural gas began in the west when southwestern natural gas fields were discovered in the 1920s. Large natural gas fields found in the north Texas panhandle in 1918 and in Kansas in 1922, as well as the development of the technology needed to transport natural gas the long distances to urban areas, resulted in the development of the interstate gas pipeline industry (Castaneda 2001).

The Pacific Gas and Electric Pipeline on the Project Site is a 33-to-44-inch natural gas pipeline. The pipeline is an interstate pipeline that carries natural gas from the natural gas fields of Texas and New Mexico to Northern California. The 502-mile long pipeline was constructed in 1948, and at the time, was the largest pipeline in the country (PG&E Corporation 2004).

The Mojave Pipeline on the Project Site is a 24-inch natural gas pipeline, owned by El Paso Natural Gas Corporation, one of the largest natural gas companies in North America. The El Paso Natural Gas Corporation expanded their services into southern California in the 1940s in response to the post World War II population growth. The Mojave Pipeline is a 450-mile-long interstate pipeline that carries natural gas from Arizona to Kern County, California. It was constructed in the late 1940s (El Paso Corporation 2008; International Directory of Company Histories 1996).

While the modern practice of “monitoring” trenching for pipelines was not well-established at the time of the construction and installation of the PG&E and El Paso Natural Gas pipelines, subsequent surface surveys have not revealed negative impacts to cultural resources that are different from the range of site types and isolates identified during the survey for the Calico Solar project. A re-survey of the project is underway as this document is being prepared and this section will be updated in the future, if necessary.

Military Use

Several military bases are located in the Mojave Desert region and within the same region as the project, including Twenty-Nine Palms, south of the Calico Solar Project, and Fort Irwin, located approximately 37 miles northeast of Barstow. These, and other military installations in the area, led to an increase of traffic near the Project, and in the area population as civilians associated with the military took up residence.

During World War II, General George S. Patton established the Desert Training Center in California and Arizona, much of which was located on public land east of the Calico Solar Project APE. Training exercises were designed to prepare U.S. troops for combat in the hostile desert terrain and climate. The army established camps and emergency airfields, remnants of which can still be found, including rock alignments designating tent camps and emergency airfields. The Desert Training Center closed in 1944 toward the end of World War II. During desert training, the army created the first detailed maps of the Mojave Desert to facilitate training activities. The maps were created using aerial photography and land-based methods. After the war, those maps were used by the U.S. Geological Survey to create 15-minute topographic quadrangles in the late 1940s and early 1950s (Nystrom 2003). These training areas were located on public land east of the Project APE; there are no known desert training areas in the project vicinity.

Twenty years later, during the Cold War, the Mojave Desert in the vicinity of the Project again hosted a major training exercise. A training exercise, known as Desert Strike included troops from both the U.S. Army and Air Force and encompassed a 12 million-acre area in California and Arizona centered on the Colorado River. The two-week exercise was designed to test tactical deployment of nuclear weapons, and involved combat training between two hypothetical countries. Desert Strike occurred in May 1964 and resulted in the expenditure of approximately $60 million and 33 deaths (Garthoff 2001; Nystrom 2003; *Time Magazine* 1964).

C.3.4.6 CONCLUSIONS

Prior to arrival of Europeans and their diseases in California, the Calico Solar Project APE was inhabited for thousands of years by indigenous populations, as evidenced by multiple archaeological complexes of different cultural affiliations. During ethnographic times, the Serrano, Vanyume and the Chemehuevi inhabited the area. The project APE lies in a transitional zone near pluvial lakes, such as Troy Lake located to the west of the APE, which experienced episodes of inundations and desiccations. As a result it is unlikely that this area would have been suitable to support a large population for prolonged periods of time. Indigenous people traveling in this area adapted to these arid desert environments and managed successfully to exploit resources as is evident in the cultural materials they left behind.

During the Spanish and Mexican periods, San Bernardino County and the Project area remained relatively isolated. There were no Spanish and Mexican land grants in the region surrounding the project APE, and the Spanish were mainly interested in using the area as an overland route to their coastal missions. The Spanish explored and used the Mojave Trail trade route blazed by the Mohave Indians north of the project APE. This trail also was used by American explorers and mountain men who ventured into Mexican territory prior to the American period. The establishment of Fort Mohave on the banks of the Colorado River resulted in the use of the Mojave Trail as a wagon route, subsequently renamed the Mojave Road. This roadway was used as a travel and trade corridor until the railroad was constructed in the 1880s. After the railroad was built, travel through the Mojave Desert in the project vicinity shifted south into the project APE. In the early 1900s, a wagon road that had been constructed adjacent to the railroad began to be used by automobiles and was designed the National Old Trails Road. The National Old Trails Road was designed as U.S. Route 66 in the 1920s, and by the 1930s, its original alignment was abandoned in favor of the alignment of U.S. Route 66 to the south. In the late 1960s, I-40 was constructed along the north side of U.S. Route 66 in the Calico Solar Project APE.

During the American period, the area was not ranched or farmed due to arid conditions, though some attempts at cattle grazing have noted. Because of the arid conditions, the Calico Solar Project APE and its vicinity were used as a travel corridor rather than an area of settlement. Some mining activities occurred in the area, in particular manganese mining beginning in the 1940s. The area also was used as the setting for the Desert Strike military training exercises in 1964 and has been used as a corridor for electrical transmission lines and natural gas pipelines. Modern infrastructure in the project vicinity includes two steel tower transmission lines, wooden pole power lines, and underground pipelines along the south and east borders of Calico Solar Project. Radio facilities are also located south and east of the project.

C.3.4.7 CULTURAL RESOURCES INVENTORY

The analysis of the proposed action requires the development of a cultural resources inventory for the area where the action has the potential to disturb or destroy cultural resources. The development of the inventory has entailed the identification, description, and preliminary interpretation of the cultural resources in that area. More specifically, the effort to develop the inventory has involved a sequence of investigatory phases that includes background research, consultation with Native Americans and the broader public, primary field research, and the interpretation of the resultant information.

Investigation Context

The inventory effort for the Calico Solar Project began with the development of a geographic scope of investigation that would capture enough information to support a defensible cultural resources analysis. The scope of investigation for the proposed action includes considerations of both the geographic extent and the intensity of the geographic coverage of each investigation that contributes to the inventory effort. The geographic extent of the inventory investigations includes the different areas in which the proposed action has the potential to directly or indirectly effect cultural resources. The total of such areas is referred to as the “project area of analysis” or APE (see “The Project Area of Analysis and the Area of Potential Effects” subsection, above).

The cultural resources inventory for the current Calico Solar Project began with both background literature research and a field inventory of the entire APE. A subsequent third-party review of the archaeological inventory revealed that re-recordation of the resources identified during the field inventory would be necessary in order to provide a finer resolution of data that would better support this Staff Assessment. Staff made the decision to base this analysis on a 25% sample of archaeological sites identified during the initial inventory. This 25% sample was subject to the finer resolution re-recordation effort. As a result of the re-recordation work, the site forms were elaborated upon and updated, some sites were combined with others, some site boundaries were adjusted, and a few new sites were identified. The remaining 75% of the initial inventory will also be subject to the same finer resolution re-recordation effort; however, this work will be conducted following the decision on the project, along with all resource evaluation and mitigation investigations. Under these circumstances, a complex undertaking programmatic agreement (PA) is being prepared to adequately address the project's impacts to all cultural resources following approval of the proposed action for the Calico Solar Project, as described in detail below.

Complex Undertaking Programmatic Agreement for Section 106 Compliance

Concurrent with the discovery phase of the Energy Commission siting process, BLM and Energy Commission staff are developing an alternative approach to jointly satisfy NEPA, Section 106, and CEQA regulatory obligations. Energy Commission staff will participate in the development and execution of an agreement document that BLM staff will use to comply with Section 106, as well as to satisfy their obligations under NEPA, in order to consider the effects of the proposed action on cultural resources. The subject type of agreement document is known as a complex undertaking programmatic agreement (PA). The purpose of a complex undertaking PA is to afford a Federal agency (in this case, the BLM) a procedural mechanism to provide for the phased identification, evaluation and deferment of final evaluations for projects involving large land areas and corridors, as well as, the consideration and treatment of historically significant cultural resources when the effects of a proposed action on such resources, for different reasons, cannot be fully determined prior to the approval of that action. A complex undertaking PA is a document that sets out a regulatory process, which deviates from the standard Section 106 process and which addresses circumstances unique to a particular proposed action. The regulatory process set out in a complex undertaking PA is the result of negotiations among the lead Federal agency, other involved Federal agencies, the Advisory Council on Historic Preservation, the State Historic Preservation Officer, Native American groups, state and local governments, and the interested public. Such a regulatory process provides for the post-decision completion of steps in the standard Section 106 process that normally occur prior to a decision on a proposed action.

BLM and Energy Commission staff came to the decision to base the present cultural resources analysis on a statistically valid, 25% sample of the archaeological sites known from surface observation, as well as on 100% of built-environment resources and 100% of known ethnographic resources. BLM and Energy Commission staff believe that a controlled and well-documented 25% sample of the archaeological sites on the surface of the project APE, as well as what is known so far of the remaining 75% sample that will be subject to re-recordation, is a sufficient basis for a reliable assessment of the potential effects of the proposed action on that class of cultural resources and for the development of general processes and specific programs and protocols to resolve any significant effects that the analysis may identify. The proposed PA will, therefore, require the following:

1. Completion of the documentation for the remaining 75% of the surface archaeological sites in the project APE that are not part of the 25% sample discussed in this document
2. Final refinements to the 25% sample of surface archaeological sites discussed in this document
3. The implementation of a program to evaluate the historical significance of archaeological landscapes and districts, archaeological site types, and individual archaeological sites
4. Refinements to the character of the potential effects of the proposed action on different aspects of the archaeological resource base
5. Refinements to and the execution of multiple treatment plans to resolve those potential effects that are found to be significant

BLM and Energy Commission staff have concluded that the documentation of the 25% sample of the archaeological sites would serve as a major component of the present analysis and would be taken as sufficient to assess the potential effects of the proposed action on archaeological resources. The results of that effort therefore provide the basis of the analysis of the archaeological resource base in the present section.

This "Cultural Resources Inventory" subsection covers the methods and results of each phase of the background research and of the field investigations that have been conducted to construct a cultural resources inventory for the project area of analysis/APE. This subsection includes discussions of the archival research and the consultations that have taken place with Native American groups and the broader public about the project area of analysis/APE as a whole. This subsection will also provide discussions of the field investigations conducted to date for the project. The investigations include a geoarchaeological study of the project area, the pedestrian archaeological survey work conducted to date of the project area of analysis/APE, and the built-environment and ethnographic resource surveys. Separate subsections below explore the historical significance of the cultural resources found, assess the potential effects of the proposed action on significant cultural resources and on previously unidentified, buried archaeological resources, and propose mitigation measures for all significant effects.

Pre-Field Background Research

The background research for the present analysis employs information that the applicant and the BLM gathered from literature and records searches and information that the BLM and Energy Commission staff gathered as a result of consultation with local Native American communities and with other potential public interest groups. The purpose of the background information is to help formulate the initial cultural resources inventory for the present analysis, to identify information gaps, and to contribute to the design and the interpretation of the field research that will serve to complete the inventory.

Literature and Records Searches. On July 28, 2008, Robin E. Laska and Dustin Kay performed a records search at the San Bernardino Archaeological Information Center (SBAIC), which is the California Historical Resource Information System (CHRIS) cultural resources database repository for San Bernardino County. Ms. Laska searched all relevant previously recorded cultural resources and previous investigations completed for the Project area and a 1-mile search radius. Information included location maps for all previously recorded trinomial and primary prehistoric and historical archaeological sites and isolates, site record forms and updates for all cultural resources previously identified, previous investigation boundaries and National Archaeological Database (NADB) citations for associated reports, historic maps, historic addresses and resources listed on various state and federal inventories. These inventories included: the National Register of Historic Places, the California Register of Historical Resources, California Landmarks, California Places of Historic Interest, and others.

All previous cultural resource survey areas and all previously recorded cultural resource site locations were transferred to USGS 7.5' quadrangles and later digitized into geographic information system (GIS) using ArcGIS 9.2 software. The following USGS quadrangle maps were used to this purpose; Hector (1982 Provisional), Lavic Lake (1955 Photorevised 1973), Sleeping Beauty (1982 Provisional Minor Changes 1993), Sunshine Peak (1955 Photorevised 1992), and Troy Lake (1982 Provisional Minor Changes 1993) (S.B.B.M). These data were combined with additional layers including topography, aerial photography and others.

Results of Prefield Research

Previous Investigations. According to the SBAIC and the San Bernardino County Museum, 18 cultural resource studies have been performed within the Project APE and within the 1-mile search radius surrounding the Project APE. Of these, one study occurs exclusively within the Project APE, eight occur within the 1-mile search radius, but not within the Project APE, and nine occur within both the Project APE and 1-mile search radius. The previous investigations examined less than 5% of the Project APE; therefore, the vast majority of the APE has not been previously investigated. The previous investigations within the Project APE and 1-mile search radius are summarized below in Table 2.

Cultural Resources Table 2
Previous Surveys in the Records Search Area

NADB No.	Investigation Type	Prepared By	Prepared For	Date Submitted
1060038	Positive Archaeological Survey	Simpson, Ruth D.		1958
1060047	Negative Archaeological Survey	Simpson, Ruth D.		1960
1060874	Positive Archaeological Survey	Barker, James P., Rector, Carol H., and Wilke, Philip J.	Archaeological Research Unit, UCR	1979
1060964	Positive Archaeological Survey	Norwood, Richard H.	Regional Environmental Consultants	1980

NADB No.	Investigation Type	Prepared By	Prepared For	Date Submitted
1060965	Negative Archaeological Findings	Musser, Ruth A.	Unknown	1980
1061449	Positive Archaeological Survey	Well, Edward B., Weisbord, Jill and Blakely	E.R. of Applied Conservation Technology, Inc.	1964
1061979	Positive Archaeological Survey	Fagan Bryan *et al.*	New Mexico University	1989
1062220	Positive Archaeological Survey	BLM	Bureau of Land Management	1978
1062234	Positive Archaeological Survey	Yohe II, Robert M. and Sutton, Mark Q.	California State University, Bakersfield –Cultural Resource Facility	1992
1062330	Positive Archaeological Survey	Simpson, Ruth D.		1964
1062388	Positive Archaeological Survey	McGuire, Kelly R.	Far Western Anthropological Research Group	1990
1062399	Positive Archaeological Survey	McGuire, Kelly R. and Glover, Leslie	Far Western Anthropological Research Group	1991
1062406	Positive Archaeological Survey	Osborne, Richard H.	California State University, Bakersfield –Cultural Resource Facility	1991
1062710	Positive Archaeological Survey	Apple McCorckle, Rebecca and Liliburn, Lori	Dames and Moore	1993
1062808	Positive Archaeological Survey	Padon, Beth and Breece, Ladurel	Southern California Gas Company	1993
1062862	Positive Archaeological Survey	Apple McCorckle, Rebecca	Dames and Moore	1993
1063630	Negative Archaeological Survey	Budinger, Fred	Tetra-Tech	2001
1063631	Positive Archaeological Survey	Clark, Caven	ACS Limited	1998

Previously Recorded Cultural Resources. A total of 78 cultural resources have been previously recorded in the APE and 1-mile search radius (Table 3). Forty-two of these resources are archaeological sites, 28 are prehistoric isolates, and nine are historic-era resources (two of which are built-environment). Sixteen of the cultural resources occur within the Project APE (1 isolate, 13 prehistoric sites, and 2 historic sites); 63 occur within the 1-mile search radius (32 isolates, 29 prehistoric, and 2 historic sites), and three sites occur in both the APE and the 1-mile search radius (1 prehistoric site, and 2 historic sites) (Confidential Appendix E, Cultural Resources).

Two of the previously recorded sites, SBR-2910H and SBR-6693H, both of which are located within the 0.5-mile built-environment APE, are listed as eligible for the National Register Historic Places (NRHP). **SBR-2910H** is the National Old Trails Road/U.S. Route 66, which varies from a graded dirt road to a two-lane paved road. Historic trash scatters are found sporadically along the road consisting of historic glass, cans, signs, and car parts. This highway represents one of the earliest trans-continental automobile routes. Between 1990 and 1998 portions of this site were given status codes 2S2 (individual property determined eligible for the NR [National Register] by a consensus through Section 106 process; listed in the CR [California Register]) and 2S (individual property determined eligible for the NR by the Keeper; listed in the CR.) This resource is within the 0.5-mile built-environment APE for the Calico Solar Project – Phase 2.

SBR-6693H is the railroad line that was originally built in 1883 for the Atlantic and Pacific Railroad Company. From 1890, the railroad was operated by the Atchison, Topeka & Santa Fe Railroad until its merger in 1996 with the Burlington Northern Santa Fe Railway. In addition to the railroad track, associated historical artifacts include glass, metal, track and train parts, and railroad tableware. Between 1993 and 2002 portions of this site have been given status codes 2S2 (individual property determined eligible for the NR by a consensus through Section 106 process; listed in the CR) and 6Y (determined ineligible for NR by consensus through Section 106 process, not evaluated for CR or Local Listing). SBR-6693H bisects the Calico Solar Project APE and is located within the 0.5-mile built environment APE for both phases and within the Pisgah Triangle study area.

Cultural Resources Table 3
Previously Recorded Cultural Resource Sites
in the Project APE and One-Mile Radius

Primary	Trinomial	Site Type	Dimensions
36-061410		Black on white pottery sherd	NA
36-061415		Isolated jasper flake	NA
36-061416		Two isolated chalcedony flakes	NA
36-061417		Isolated chalcedony flake	NA
36-061420		Isolated chalcedony flake and isolated rhyolite flake	NA
36-061421		Isolated jasper flake	NA
36-061423		Isolated cryptocrystalline flake	NA
36-061424		Isolated white cryptocrystalline flake	NA
36-061425		Isolated white cryptocrystalline flake	NA
36-061426		Isolated red cryptocrystalline flakes	NA
36-061427		One isolated red cryptocrystalline flake tool and one red cryptocrystalline flake	NA
36-061428		Two isolated cryptocrystalline flakes	NA
36-061429		Isolated cryptocrystalline silicate flake	NA
36-061430		Isolated cryptocrystalline silicate flake	NA
36-061431		Isolated cryptocrystalline silicate flake	NA
36-061432		Isolated cryptocrystalline silicate flake	NA

Primary	Trinomial	Site Type	Dimensions
36-061433		Isolate: Two isolated cryptocrystalline silicate flakes	NA
36-061434		Isolated cryptocrystalline silicate flake	NA
36-061435		Isolated cryptocrystalline silicate flake	NA
36-061436		Isolated cryptocrystalline silicate flake	NA
36-061459		Isolate: 3 cryptocrystalline flakes	NA
36-061460		Isolate: One multidirectional core and 1 flake of same material	NA
36-061461		Isolate: One red cryptocrystalline flake	NA
36-064406		Isolated chert flake and one piece of angular waste	NA
36-064407		Two isolated chalcedony flakes	NA
36-064408		Isolated red jasper flake fragment	NA
36-064409		Isolated agate bifacial core	NA
36-064410	Relocated CA-10649	One isolated red jasper flake and a second flake with dorsal scars	NA
	CA-SBR-1585	Small lithic test and quarry area with flakes and one core	NA
36-001585	CA-SBR-1793	Also known as EM-266, this is a Petroglyph Site	NA
	CA-SBR-1889	Pottery sherds, awl, 2 bifaces	NA
	CA-SBR-1893	Lithic scatter containing mutates, projectile points and debitage	NA
	CA-SBR-1905	Also known as SBCM 674, this site consists of 2 projectile points, scrapers flakes and bone which were collected at time of recordation	NA
	CA-SBR-1907	Jasper quarry with sparse scatters consists of flakes, bifaces and scrapers	NA
	CA-SBR-1908 Relocated	Large quarry area containing debitage, cores and bifaces	NA
	CA-SBR-1988	Low density; sparse cobble testing/ quarry area consisting of cryptocrystalline silicate, basalt and rhyolite materials.	NA
	CA-SBR-2330H	Flaking stations with at least 11 loci and two cleared circles	NA
	CA-SBR-2910H Relocated	Lavic Chinese Labor Camp, Glasgow pottery along with hearths was recorded next to the Santa Fe Railroad near Lavic Siding. Built Environment? National Old Trails Road?	NA
	CA-SBR-3515H	Built Environment: Also known as National Old Trails Highway 66/ SM364. This is an early 20th century two-lane paved road at Mile Post 183 where it becomes a graded dirt road.	NA
	CA-SBR-3516	Two rock rings, it was not determined if they were historic or prehistoric	NA

Primary	Trinomial	Site Type	Dimensions
	CA-SBR-3076	Lithic quarry site containing flakes and cores of chert material and historic trash scatter	NA
	CA-SBR-4307	Two rock circles made of volcanic basalt	NA
	CA-SBR-4308	Several lithic scatters	NA
	CA-SBR-4309	Two lithic reduction stations that contain flakes and cores	NA
	CA-SBR-4405	Lithic scatter with a lithic reduction station. Possible basalt and andesite tools present on site.	NA
	CA-SBR-4558H Relocated	Built Environment?: A booth and cargo loading platform located where the railroad splits.	NA
	CA-SBR-4681H Relocated	Also known as SBCM 4918, This site is a 1930s and 1940s manganese mining area containing a galvanized steel structure, mill tailings, mine and historic trash scatters	NA
	CA-SBR-5600 Relocated	Lithic scatter	NA
	CA-SBR-5598	Lithic reduction station	NA
	CA-SBR-5599	Large cobble test/quarry area	NA
	CA-SBR-5794	Lithic scatter and rock rings	NA
	CA-SBR-5795	Cobble quarrying and lithic reduction area	NA
	CA-SBR-5796 Relocated	Lithic scatter originally containing 100s of flakes, several biface fragments and cores	NA
	CA-SBR-5797	Low density lithic scatter containing flakes and cores	NA
	CA-SBR-6511 Relocated	Low density lithic scatter with dozens of flakes and cores	NA
	CA-SBR-6512 Relocated	Very large low density lithic scatter containing debitage and shatter	NA
	CA-SBR-6513 Relocated	Also known as MP-26, this is a small low density lithic scatter that contains debitage	NA
	CA-SBR-6517	Also known as MP-27, this is a single segregated lithic reduction locus containing approximately 15 felsite flakes total	NA
	CA-SBR-6518	Small flake scatter with one core and 8 flakes	NA
	CA-SBR-6519	Small cobble test and quarry area with 2 Segregated Reduction Loci and debitage	NA
	CA-SBR-6520 Relocated	A single Segregated Reduction Locus made up of approx. 4 flakes	NA
	CA-SBR-6521 Relocated	Small cobble test and quarry area with one Segregated Reduction locus and debitage	NA
	CA-SBR-6522	Low density cobble test and quarry area with debitage, cores, bifaces and blanks	NA

Primary	Trinomial	Site Type	Dimensions
	CA-SBR-6525	Low density cobble test and quarry area with debitage, cores, bifaces and blanks	NA
	CA-SBR-6526	Also known as MP-84, this is a low density lithic scatter that contains 1 lithic reduction locus flakes and debitage	NA
	CA-SBR-6527	Also known as MP-85, this site contains 2 adjacent lithic reduction loci and flakes	NA
	CA-SBR-6528 Relocated	Also known as MP-86, this site is a small low density flaked stone scatter	NA
	CA-SBR-6693H-NRHP Relocated	Also known as MP-87, this is a small density lithic scatter Built Environment/Railroad?	NA
	CA-SBR-6786H	Built Environment?: Railroad Line built in 1883 for the Atlantic and Pacific Railroad Co., associated artifacts include track and train parts, railroad tableware, and insulator glass fragments	NA
	CA-SBR-6836	Cobble quarrying area comprised of approx. 200 flakes and 4 cores	NA
	CA-SBR-6895	Small lithic scatter containing approx. 6 jasper flakes	NA
	CA-SBR-6896	Single Segregated Reduction Locus containing flakes	NA
	CA-SBR-6897	Small, sparse lithic scatter consisting of 13 flakes, no tools	NA
	CA-SBR-6898	Small moderately dense lithic scatter consisting of approx. 20 cryptocrystalline flakes.	NA
	CA-SBR-7114	Cryptocrystalline lithic scatter with over 50 flakes and 4 bifaces.	NA
	CA-SBR-7115	Moderately dense lithic scatter with 51 cryptocrystalline flakes representing all stages of reduction.	NA
	CA-SBR-7116	Very sparse lithic scatter along lava ridges	NA
		Possible pot hunter deposit, several flaked litchis in small cluster	NA

NA: Not available

Discussion of Previously Recorded Resources within the APE.

CA-SBR-10649H is a very small prehistoric lithic test quarry/scatter containing at least four chert/jasper flakes, 1 white chert core and 1 volcanic core. The site is located atop a sandy clay and disturbed desert pavement terrace with an open exposure and 0° degree slope. The site was recorded by Stephanie Rose and Iain Berdzar of Tierra Environmental Services in February 2001.

CA-SBR-1896 is a prehistoric lithic scatter containing fire stones and projectile points. The site was recorded by Lyle Richards, date unknown.

CA-SBR-1908 is a very large low density prehistoric cobble test/quarry area, measuring 115 m N/S × 95 m E/W. Raw materials consist of cryptocrystalline silicate, basalt and rhyolite materials. The site is most dense at the top of the hill at mile post 157. Site was originally recorded in 1965 by an unknown person and updated by J. Berg of Far Western Anthropological research Group, Inc. in November 1989. During the survey done by Far Western the site was tested. A total of eight 25 × 50 cm test units were excavated finding only one flake in STP#2. In February 2001 the site was updated by J. Dietler and J. Toenjes of Tierra Environmental Services. The condition of the site was considered the same as 1989 and no further description was provided.

CA-SBR-4558H also known as SBCM 4918. This is a 1930s and 1940s historic manganese mining area containing a galvanized steel structure, mill tailings, mine and historic trash. The site is situated on the south side of the Cady Mountains and approximately 5 miles north of Pisgah along the Santa Fe Railroad. The site was by R. Brooks of BLM during October 1979.

CA-SBR-4681 is a prehistoric lithic scatter located atop an undisturbed alluvial bench. Lithic materials consist of a few relatively fresh basalt flakes and cryptocrystalline silicate jasper flakes. Some of the weathered basalt artifacts resemble the “Malpais” Complex. The site was recorded by Hardaker and Musser of BLM in January 1980.

CA-SBR-5600 is a prehistoric lithic reduction station located atop a desert pavement knoll. Raw materials consist of cryptocrystalline silicate (jasper) and basalt. The site has two components; one cryptocrystalline silicate jasper flaking station, and another consisting of basalt flakes with no evidence of ware. The site was recorded by Hardaker and Musser of BLM in January 1980.

CA-SBR-5796 is a prehistoric low density lithic scatter located in a bajada bisected by an alluvial wash. The site was originally recorded by J. Wollin of the New Mexico State University in 1985. During the survey there was lithic surface collection and testing; artifacts included dozens of flakes, mostly primary and several cores. Materials included cryptocrystalline silicate (jasper, chert, and chalcedony) and basalt. The site was updated in February 2001 by J. Dietler and J. Toenjes of Tierra Environmental Services. During the update a lithic scatter was observed.

CA-SBR-6511 is prehistoric low density lithic scatter measuring 40 m E/W × 50 m N/S. The site situated on a large alluvial plain in an area of moderately consolidated desert pavement mixed with areas of loose sandy soil. Materials include cryptocrystalline silicate and rhyolite. The site was tested; eight 25 × 50 test units were excavated in the portion of the site which will be impacted by the Mojave Pipeline. The site was recorded by L. Glover *et al.,* of Far Western Anthropological research Group, Inc. in November 1989.

CA-SBR-6512 is a prehistoric small density lithic scatter of mixed materials that is situated on the slope of a small sand dune which was built up along the side of a small lava flow. The site measures 20 m E/W × 11 m N/S. Raw materials include cryptocrystalline silicate, basalt and rhyolite. The site was recorded by L. Glover *et al.,* of Far Western Anthropological research Group, Inc. in November 1989.

CA-SBR-6513 is a prehistoric single segregated reduction locus located on unconsolidated desert pavement at the base of a small lava flow, that measures 2.4 m E/W × 1.4 m N/S. The SRL consists of approximately 15 felsite flakes. No tools are associated. The site was recorded by L. Glover *et al.,* of Far Western Anthropological research Group, Inc. in November 1989.

CA-SBR-6520 is a prehistoric small low density cobble test/quarry area consisting of one segregated reduction locus, one cryptocrystalline silicate core and approximately 16 additional pieces of debitage. The site measures 67 m NW/SE × 20 m SW/NE. Raw materials are cryptocrystalline silicate and basalt. The site was recorded by L. Glover *et al.,* of Far Western Anthropological research Group, Inc. in November 1989.

CA-SBR-6521 is a prehistoric low density desert pavement cobble test/quarry area site, measuring 135 m N/S × 70 m E/W. Raw materials consist of cryptocrystalline silicate, basalt, and rhyolite. The site is essentially an area of primary reduction with a few first stage bifaces. The site was tested; four 25 × 50 cm test units were excavated. Artifacts found consist of 4 bifaces, 4 cores, and 1 flake; the debitage came from reducing on site cobbles in pavement formation. No artifacts were collected.

The site was recorded by L. Glover *et al.,* of Far Western Anthropological research Group, Inc. in November 1989.

CA-SBR-6528 is a prehistoric small low density lithic scatter consisting of 10 flakes of reddish/brown/purple cryptocrystalline silicate. The site measures 17 m E/W × 14 m N/S. Tools found within the site consist of one bifacial core, one multi-directional cryptocrystalline silicate core and debitage. The site was recorded by Mikkelsen *et al.,* of Far Western Anthropological research Group, Inc. in November 1989.

CA-SBR-6693H-NRHP was originally recorded by Michael Lerch in 1990, who describes the railroad as having originally been built “in 1883 for the Atlantic and Pacific Railroad Co. by Southern Pacific, and subsequently purchased by the Atchison, Topeka & Santa Fe railroad, which has operated it since 1890. In 2001, Tierra Environmental Services updated the site stating that the railroad is currently operated by the Burlington Northern and Santa Fe Railroad Co. A wooden phone/telegraph line with two cross pieces with glass insulators and two wires paralleling the tracks were found. Other artifacts were found, such as track and train parts, railroad tableware, and insulator glass fragments.

C.3.4.8 CONSULTATIONS

Native American Consultation

With the filing of the application for a right-of-way, BLM took the lead for formal tribal consultation pursuant to the National Historic Preservation Act as well as other laws and regulations. The BLM initiated formal government-to-government consultation in the early stages of project planning by letter November 5, 2008 and has followed up with an additional letter and other information since then. To date, eight tribes have been identified and invited to consult on this project. A general informational meeting about the project was held on November 10, 2009. The BLM has responded to three requests for formal meetings with tribes the San Manuel Band of Mission Indians, Twentynine Palms Band of Mission Indians, and the Chemehuevi Reservation and have received some written comments from tribal governments.

Other Consultation

The ACHP, the CA SHPO, and the project proponent are all organizations or agencies that will be invited into consultation on the development of the Programmatic Agreement. Those consultations are ongoing.

C.3.4.9 NEW INVENTORY INVESTIGATIONS

Geoarchaeology Study

Except for minimal editorial contributions, the following subsection was adapted from "**Geoarchaeological Sensitivity Analysis of the Solar One Project Area" by** Jay Rehor, M.A., RPA taken from Solar One ***Data Response 92/93.***

Background and Setting

The purpose of the Geoarchaeological study was to….The following discussion is largely focused on identifying those portions of the project area that have the potential for harboring archaeological deposits *with no surface manifestation*. It has been shown that some alluvial landforms, with desert pavements that have evolved through accretion of eolian silts and sands and the gradual bearing of larger clasts to the surface, have the potential for containing buried archaeology (Ahlstrom and Roberts 2001). However, a representative portion (if not the vast majority) of this archaeological deposit will be incorporated into the surface pavement through the same accretionary process. Thus, these older surfaces are not likely to contain archaeology that is not at least partially evident on the surface.

Geomorphic processes have played a major role in the differential preservation of archaeological sites in the Mojave Desert. For example, early cultural sites related to the San Dieguito and Lake Mojave cultural complexes are almost exclusively known from surface contexts on terminal Pleistocene and early Holocene geomorphic surfaces (Sutton 1996:229). This represents the differential preservation of older sites on relict landforms, with other sites likely buried by subsequent depositional processes, or destroyed by erosional processes. These same processes have also affected the distribution of resources (i.e., lithic raw material, water, biotic communities, etc.) across the landscape and, thus, the placement of archaeological sites in relationship to those resources. The primary factors effecting geomorphic processes in the Mojave region are the underlying structural geology and climate change.

Regional climatic trends through the Late Pleistocene and Holocene are important to the current study because of effects on the production of material for alluvial deposition and the concomitant susceptibility of the landscape to erosion. Regional correlations between periods of alluvial fan deposition during the Latest Pleistocene and Holocene indicate that climatic changes superseded other factors as the primary force driving alluvial deposition (McDonald, McFadden, and Wells. 2003:203). Within the Mojave Desert, several major intervals of alluvial deposition have been identified and appear roughly correlative across the region, largely transcending geomorphic variation (Anderson and Wells 2003; Harvey and Wells 2003; McDonald, McFadden and Wells 2003).

In general, the Pleistocene-Holocene transition ca. 13,000 to 9,000 years before present (BP) represents a major period of fan deposition, followed by subsequent periods during the Holocene at approximately 8,000 to 5,000 BP, 4,000 to 3,000 BP (both corresponding with brief resurgences of Lake Mojave), and after approximately 1,500 BP. It was initially conjectured that these periods, especially around the Pleistocene-Holocene transition, correlated with general environmental desiccation, a decrease in soil moisture and vegetation, and an increase in sediment supply and erosion (e.g., Bull 1991; Wells et al. 1987). However, recent field studies have demonstrated that changes in vegetation cover alone do not explain increased sediment mobility. Instead, the most plausible hypothesis points towards a northward shift in the dominant late summer/early fall jet-stream, allowing tropical Pacific cyclones from southern Mexico into the region and causing unusually large amounts of precipitation over short periods (McDonald, McFadden and Wells 2003:202).

Pollen and lake level records suggest general trends in late Pleistocene and Holocene climate change, but these records do not make clear what meteorological changes are responsible for the trends. Pleistocene climate was wetter and cooler than today, with extensive lakes (including Troy Lake, several miles west of the Calico Solar project area), and pinion-juniper woodlands extending into much lower elevations (Spaulding 1990). The vegetation transition from the Pleistocene through early Holocene appears to have been relatively gradual, with woodlands retreating and giving way to desert scrub. During the middle Holocene (ca. 8,000 to 4,000 BP) climate appears to have been generally warmer and drier than today, but with some indications of significant oscillations in climatic patterns (Spaulding 1990), possibly akin to those suggested by McDonald, McFadden, and Wells (2003) and responsible for the middle Holocene Qf3 fan deposition in the Soda Mountains. The late Holocene climate was generally similar to modern conditions. However, given the higher resolution record for this more recent period, it appears that several periods of extended drought (including the Medieval Climatic Anomaly, ca. 1150 to 600 BP) as well as at least one cooler wetter period (the Little Ice Age, ca. 600 to 150 BP; Grove 1988) marked the late Holocene.

Periodic increases in effective moisture likely resulted in higher seasonal wash flow, improving the exploitable habitat for human residents, and accelerating the geomorphic processes that led to the burial or erosion of archaeological sites. These climatic changes also increased the sediment supply available for wind-blown (eolian) transport on dry lake beds and former stream channels during intervals of decreased effective moisture. Eolian processes deflated sediment source areas and deposited that material elsewhere. Taken together, these processes created, destroyed, and buried landforms that humans may have occupied across the Mojave Desert.

In additional to climate, tectonics play a less active but equally important role, through the uplift of remnant landforms and the exposure of raw materials (lithics) for human use. At least two strands of the Alquist-Priolo Fault Zone run through the southern portion of the project area, and have caused noticeable uplift and preservation of relict landforms. In addition, volcanic activity, which is inherently linked to tectonics, has had a dramatic effect on the geomorphic development of the project area.

Identification of Major Landforms within the Project Area

The Calico Solar Project study area is bounded to the north and east by the granitic/quartz monzonite/basaltic pluton that forms the Cady Mountains, and to the south by the Pisgah Lava flows. The rock outcrops of the Cady Mountains are heavily eroded and mantled by Quaternary fan piedmonts, with more recent fan aprons issuing from the leading edge of these piedmonts. Alternatively, the Pisgah Lava flows have largely created a barrier to the introduction of more recent alluvial material from the mountains and fans to the south, and have served to preserve older deposits at the surface. All of these Quaternary landforms are actually comprised of numerous remnants and more recent deposits of varying ages. By examining the relationship between the landform components we can develop relative age estimates, conclusions as to the depositional history of that landform, and the potential of each landform to harbor buried paleosols of appropriate age.

Before beginning such a discussion, however, a common set of descriptive landscape terms and definitions is necessary. Many different terms are used to describe desert geomorphology, with vastly different implications of scale, accuracy, and implied formation processes. “Alluvial fan” and “bajada” are two common terms that are often misleading because they are used to refer to different types of depositional and erosional landscapes and subsume numerous smaller landform components. The terminology adopted in this study follows after Peterson (1981) because the classification system emphasizes the temporal and spatial relationship between landform components, and was devised in relation to the study and classification of Basin and Range soils− making it highly relevant to the current geoarchaeological study. A discussion of these various landforms is provided in the following sections, with direct reference to the Calico Solar study area.

At the broadest scale, the Calico Solar study area — including the surrounding piedmonts to the north, east, and south — can be classified as a “semi-bolson.” Common in desert regions of the Basin and Range, semi-bolsons differ from true bolsons in that they lack a playa or floodplain, which alluvial fans normally terminate on, and instead are cut through by an axial drainage that marks the termination of the various piedmont landforms. The Calico Solar project area is similar to portions of the semi-bolson in that it lacks many of the distinct depositional features of the larger down-stream axial channel (e.g., terrace, floodplain). The typical axial channel eventually opens out into a true bolson and associated playa. In the case of the Calico Solar study area, this is represented by Troy Lake, several miles west of the project area near the western extent of the Cady Mountains.

The Calico Solar project area semi-bolson can be further divided into two dominant structural sections. The larger of these consists of the Cady Mountains and associated coalescing alluvial fan piedmont — gradually sloping down to the southwest — that dominates the northern approximately 2/3 of the project area. The second structural section is formed by several different component landforms that are generally lower but more topographically diverse, including the Pisgah Lava flows (functionally related to the Lava Bed Mountains, further to the south), several old remnant fans, inset fans, and associated alluvial flats. These northern and southern sections are divided by the axial channel, which runs roughly east–west, and which has likely been significantly altered by the Burlington Northern Santa Fe rail line that generally follows the same course.

The combined results of this study are summarized in Table 4. The following is a discussion of these results.

Cultural Resources Table 4
Summary of Geoarchaeological Sensitivity of Landforms within the Calico Solar Project Study Area

Area	Landform	Age	Depositional Regime*	Sensitivity
Northern Section	Rock Outcrops	Tertiary or older	Erosional	None
	Upper Alluvial Fan Piedmont	Pleistocene to Mid-Holocene	Erosional	Very Low
	Lower Alluvial Fan Apron	Pleistocene to Holocene	Variable	Low
Southern Section	Pisgah Lava	Late Pleistocene	Stable	None to very low
	Erosional Fan Remnant (fanglomerate)	Pleistocene	Erosional	Very Low
	Inset Fans	Pleistocene to Holocene	Variable	Very Low to Low
	Relict Alluvial Flat	Pleistocene (?)	Erosional (variable)	Very Low
	Axial Channel (and associated minor landforms)	Late Holocene	Variable	Very Low to Moderate

*Represents the dominant regime since the terminal Pleistocene

Northern Section. The northern portion of the study area is the simpler of the two. This area consists of a fan piedmont that is comprised of numerous coalescing alluvial fans issuing from the mouths of small mountain valleys within the Cady Mountains. The piedmont is composed of the upper alluvial fans themselves, as well as more recent fan aprons at lower elevations. The surfaces of these landforms typically consist of numerous active and abandoned channels and intervening surfaces that range from Early Pleistocene to Holocene in age (Dohrenwend et al. 1991:327). Given the punctuated deposition and erosion of these landforms during the Holocene, however, the archaeological record represented on these landforms may be incomplete.

The most distinct, well-developed desert pavement observed on the alluvial fan piedmont is located in the northeast portion of the piedmont, which has the largest proportion of andesite bedrock (Dibblee 2008). This andesite is generally more resistant than the coarse grain granite and monzonite, and appears to form a more distinct varnish. Given the predominance of granitic parent material, we can expect that desert pavements within the northern portion of the project area will generally be much weaker than in other areas of the Mojave Desert, where more resistant parent material may be present (including the southern portion of the project area). Additionally, comparison of pavement surfaces within the project area may be tenuous, especially between the northern and southern portions, which consist of very different parent materials and geomorphic histories. While a well-developed pavement is invariably indicative of an old land surface, a poorly developed pavement is not inherently young. None the less, an initial field reconnaissance, and a general understanding of the development of alluvial fans within the Basin and Range, suggested that the majority of surfaces within the northern fan piedmont are late Pleistocene to Holocene in age. Given these constraints, an examination of subsurface conditions was considered necessary to evaluate landform ages and to determine the potential for buried archaeological deposits.

- **Rock Outcrops** (Sensitivity: None). At the higher reaches of the piedmont (the northern extent of the project area), rock outcrops are present. These are limited exposures of highly dissected Tertiary andesite and basalt bedrock which form steep, highly-eroded hills (inselbergs) sticking up out of the alluvial fans (Dibblee 2008). While these limited andesite and basalt outcrops provide some of the parent material that make up the alluvial fans, the vast majority appears to be granite and quartz monzonites, which also form the majority of the southern Cady Mountains and into which extend the mountain valleys that transport the material that forms the alluvial fans (Dibblee 2008). Of course, these rock outcrops have little or no potential for harboring buried archaeological deposits.
- **Upper Alluvial Fan Piedmont** (Sensitivity: Very Low). In general, there appears to be a trend of decreasing sediment size as one moves downslope along the piedmont gradient. This is typical of alluvial fans, with bouldery material near the fan head and fine sands at the distal toe (Peterson 1981:22). Test pits and borings within the northern portion of the Calico Solar project area (e.g., TP 016, 026, 027, and 040 through 047) consistently revealed profiles dominated by angular to sub-angular cobbles and gravels, with a clast supported matrix of sandy loam. Different weathering profiles laterally (east–west) across the piedmont indicate that the various fans that make up the piedmont are of different ages– as is expected given the results from other mountain fronts in the Mojave Desert (e.g., Bull 1991; Eppes, McDonald, and McFadden 2003; McFadden and Wells 2003). However, no buried soils were identified and the very coarse clast size indicates a very high-energy colluvial/debris flow depositional environment that precludes the preservation of paleo-surfaces and associated archaeological remains.

  The oldest major alluvial fan structure on the piedmont appears to be located along the eastern boundary. Very well-developed varnish and rubification on the desert pavement in the upper portion of the fan, and well-developed subsurface weathering profiles throughout the fan suggest a late Pleistocene age or older. The subsurface profile exhibits very strong pedogenic development, with an upper vesicular horizon, a Btk-horizon with strong reddening (5YR 5/4), and multiple calcic horizons, the strongest exhibiting Stage IV cementation. Coarse high-energy angular and sub-angular colluvial/debris flow material is apparent throughout the profile, and is consistent with other profiles observed across the upper fan piedmont.

  The lithology of the northern coalescing fan piedmont is important for two reasons: the parent material of the alluvial fans directly affects the ability of distinct desert pavements to form and, thus, determination of surface age (as discussed above);

and it dictates the availability of usable lithic raw materials for prehistoric populations. Coarse grained granites and monzonites have very little utility as a raw lithic material, as they are not appropriate for flaked stone tool industries, and are similarly difficult to use as groundstone due to their coarse grain and friable nature. The predominance of this parent material may largely explain the dearth of prehistoric archaeological sites on older alluvial fan segments within the northern portion of the project area. This same reasoning would further reduce the potential for buried archaeological resources with the fan piedmont (including the lower fan aprons, see below). In conjunction with the lack of identified paleosols and the consistently high-energy subsurface deposits, the sensitivity for buried archaeological deposits within the upper alluvial fan piedmont is considered very low.

- **Lower Alluvial Fan Apron** (Sensitivity: Low). The finer grain material that dominates the lower portions of the fan piedmont, the near absence of well-developed pavement surfaces, as well as the geomorphic structure– with countless small anastomatizing channels and distinct bar and swale surface morphology– are all typical of fan aprons. However, the topographical continuity between the upper and lower portions of the piedmont is atypical of alluvial fans and their associated younger aprons (Peterson 1981:22-24) and raises questions about the functional relationship and timing of deposition between the upper alluvial fan and the lower aprons. Is the surface morphology and grain size differentiation between the two portions of the fan piedmont a result of timing (i.e., the upper surfaces are older and had time to develop pavement surfaces), or a result of natural clast sorting (i.e., coarse grain material naturally settles-out up-slope, with progressively finer material as one moves down gradient)? The apparent young age of the lower apron surfaces is an initial indicator of their potential to harbor buried archaeological deposits. However, further investigations indicate that there is a low geoarchaeological potential due to the nature of their geomorphic evolution.

  Powell states that younger alluvial fan aprons often “bury or feather out onto older fans distally” (2002:16). Thus, this middle and lower portion of the northern fan piedmont has undergone deposition (and erosion?) since the earliest documented human occupation of this area. Therefore archaeological sites in this portion of the project area have been removed by erosion or may remain buried under these younger fan deposits. Along the eastern alluvial fan piedmont at Clark Mountain, in the northeastern Mojave, it was demonstrated that major progradation of the fan aprons occurred between 8,000 and 4,000 BP, followed by a switch to an erosional regime during the late Holocene. It was conjectured that this transition was due to a reduction in available sediment for deposition (CH2MHill 2008). After an initial erosion of the uplands, fluctuating precipitation and sediment-starved runoff eroded recently deposited material on the lower hill slopes. The middle and lower portion of the Calico Solar alluvial fan piedmont, dominated by fan aprons, is not a stabilized surface. Recent landforms such as bar and swale topography, countless small anastomatizing gullies, and larger channels extend across most of this area and indicate ongoing desiccation and active erosion.

  Buried pedogenic horizons were identified in numerous test pits and borings within the apron portion of the northern fan piedmont. The nature of these contacts are indicative of the initial formation of the lower piedmont and suggests that deposition is typically preceded by significant erosion. The upper unit consists of a single fining upward sequence dominated by coarse sub-angular gravels and cobbles at its base, and sandy loam with few gravels near the surface. This suggests that this portion of the fan apron was formed as a single depositional package, likely during the middle or late Holocene. However, the coarse material at its base, and the very distinct lower erosional contact, indicate that initial deposition of the apron was relatively high-energy and preceded by significant erosion. The lower buried pedogenic unit has a Btk-Bkm-Bk-Ck-C profile, consistent with a Pleistocene age and a truncated upper profile.

The upper unit consists of an Av-Bwk-Ck-C profile that is better developed, with a maximum of Stage I+ to II carbonate development, and consistent with a middle Holocene (?) age. Note that the surface pavement is only slightly more distinct than the preceding example, despite the apparent pedogenic age difference. The surface is more accurately described as stony, with no varnish and only very minor rubification on the ventral surfaces of surface clasts. Again, this unit has coarse angular debris flow-type gravels at its base, and a distinct erosional contact with the underlying paleosol. However, rather than being a single depositional unit, the upper apron mantle appears to be composed of at least three lithologic units, each represented by a fining upward sequence. The continuous weathering profile across these lithologic contacts indicates that they were deposited in relatively rapid succession, with no periods of stability which would have formed individual pedogenic profiles. The lower buried pedogenic unit has a Km-Bkm-Bk-Ck-C profile, again, consistent with a Pleistocene age and an even more heavily truncated upper profile.

Although distinct very old paleosols, buried below recent alluvium, were consistently identified within the lower portions of the alluvial fan piedmont, they are marked by heavily erosional upper contacts. It appears that significant erosion occurred prior to deposition of the fan apron mantles. This erosion would have destroyed any archaeology deposited on these older (now buried) surfaces, and effectively nullifies the potential for buried archaeology within the middle and lower portions of the northern fan piedmont. The presence of more recent lithologic contacts indicates that the fan aprons were sometimes formed through multiple depositional events, but the lack of identifiable paleosols at these contacts suggests that they were laid down more-or-less contemporaneously and, therefore, have a low archaeological potential.

Southern Section. The southern portion of the study area is comprised of generally older and more variable landscape elements compared to the northern portion. While also considered a piedmont, the southern area appears to be generally much older, comprised of numerous relict landforms, with differing source material and component landforms.

An initial clue to the age of the landforms of the southern area is provided by the Pisgah Lava flow. This flow is generally considered to have erupted in a series of closely related events ca. 20,000 BP.[2] The Pisgah lavas overlie numerous deposits just south of the study area, including the older alluvial sediments (Qoa), fanglomerate (Qof), and

[2] Sylvester et al. (2002) place the timing of the eruptions at 18,000 ±5,000 BP based on argon-argon dating, whereas Phillips (2003) obtained a date of 22,500 ±1,300 BP based on cosmogenic ^{36}Cl analysis. These dates are within the expected range, of a few thousand years, for the multiple flows issuing from the Pisgah crater.

various clay units (Qc and QTc) mapped by Dibblee (2008) and observed during the field visit for this current study. As such, all of these mapped deposits are at least older than ca. 20,000 BP (i.e., were laid-down well before human occupation in the region). Additionally, the emplacement of the Pisgah lavas effectively blocked deposition of new alluvial material from the Rodman Mountains to the south. This explains both the lack of large late Pleistocene and Holocene alluvial fan deposits– that are present in the northern portion of the Calico Solar project area and throughout the Basin and Range– as well as the presence of so many relict landforms at the surface. Whereas the alluvial fan material in the northern section has its source in the mountain valleys of the Cady Mountains, any more recent depositional landforms within the southern section are comprised of material reworked from the older relict alluvial landforms.

- **Pisgah Lava** (Sensitivity: None to Very Low). As stated above, the Pisgah Lava flows have been dated to approximately 20,000 BP. As such, they have no potential for harboring buried archaeological deposits. The exception to this statement is the eolian sand deposits that have mantled certain limited areas along the base of the lavas. Relatively limited sand sheet has built up along the edge of a portion of the flow near the Pisgah Substation, in the eastern portion of the study area. Limited subsurface exploration indicated that the sheet was only approximately 30 cm thick and directly overlaid the lava flow. Lack of soil development within the sand sheet suggests that it is a very recent, unstabilized deposit. No subsurface archaeological materials were observed.

  Figure 11 shows a desert pavement that has developed on a portion of the Pisgah flow — elevated on a mantle of accretionary eolian sand and silt — and gives an indication of the degree of pavement development that can be expected on a 20,000 year old lavic surface.

  A portion of at least one large archaeological site identified during inventory efforts (KRM-135; URS 2009) is located in close association with the Pisgah Lava flows. The higher elevation western portion of this site is located on fine grain sediments, with a pebbly surface, which appear to be mantled into small embayments of the lava flow. The sediments within these areas appear to be a mixture of fine grain alluvium from a nearby drainage which have been deposited as an older terrace set and preserved within these embayments, along with more recent eolian sands and silts accreted onto the existing surface. As such, these limited portions of KRM-135 appear to have the potential for at least a minor subsurface component, and may represent the only limited potential for buried archaeological deposits associated with the Pisgah Lava flows.

- **Erosional Fan Remnant** (Sensitivity: Very Low). A large proportion of the southern section of the project area is dominated by very old alluvial landforms referred to here as "erosional fan remnants." The erosional fan remnants are generally coincident with the areas of Quaternary fanglomerate (Qof) as mapped by Dibblee (2008). The fanglomerate is an early Pleistocene or older alluvial/fluvial deposit up to 300 feet thick, comprised of poorly sorted coarse gravels and cobbles of mixed Mesozoic porphyry complex, metavolcanics, and Tertiary volcanic rocks (as well as chalcedony/jasper). The clast-supported matrix appears to be comprised of loamy sand with a high $CaCO_3$ content. This very old Quaternary geologic unit has been uplifted along the multiple faults that run north–south through the southern portion of the project area. These faults may have a normal and rotational component, with the highest portions of the uplifted erosional fan remnants located along the fault scarp, which have eroded steeply toward the east (along the scarp) and more gradually to the west.

As the name implies, these uplifted relict landforms are largely erosional, particularly along the steeper side slopes of the fan remnants. The flatter summits of the fan remnants (or “ballenas” if the ridges have been completely separated from other portions of the original alluvial unit) are more stabilized and may exhibit more well-developed desert pavements than the side slopes. This pavement likely formed through a combination of accretionary processes (McFadden, Wells, and Jercinovich 1987) as well as erosional process, where the finer alluvial matrix is eroded away leaving a disproportionate amount of larger clasts at the surface (McAuliffe and McDonald 1995). Subsurface profiles along the side slopes exhibit Stage III to IV $CaCO_3$ morphology, consistent with a Pleistocene or older age.

An additional small area of erosional fan remnant, not mapped as Qof by Dibblee (2008), was identified near the Pisgah Substation, in the western portion of the project area. The subsurface profile, exposed in a channel that cuts through the deposit indicates that it is similar to the Qof — with similar lithology and $CaCO_3$ development — and may be functionally related. The uplifted exposed summit of the fan remnant is limited to a small area east of the Pisgah Substation, while an older depositional fan apron that appears to be related to the fan remnant extends out to the west.

In general, the areas mapped as erosional fan remnant (and Qof by Dibblee 2008) have a very low potential for harboring buried archaeological deposits. These landforms are far too old to bury archaeologically sensitive paleosols. The large number of prehistoric archaeological sites present on the surface of these landforms speaks to both their antiquity and the presence of valuable lithic materials (volcanics and silica rich precipitates) within the fanglomerate deposits.

An exception to this, as on other landforms discussed in this study, is the presence of small confined areas of fine-grain recent eolian deposition. Within the erosional fan remnants, these areas are generally limited to small coppice dunes (small piles of sand built up around and temporarily stabilized by vegetation). The coppice dunes observed in the project area are generally very small, averaging less than 0.5 meter tall by 1 meter wide. Due to their limited area, it is very unlikely that they would obscure an entire site, or bury artifacts significantly different than those observed on the site as a whole.

- **Inset Fans** (Sensitivity: Very Low to Low). Numerous distinct inset fans were mapped within the southern portion of the Calico Solar project area. These are very gross landform designations and, in reality, the areas mapped as inset fan may be comprised of numerous component landforms. However, the dominant landforms in these areas consist of depositional alluvium (fans) inset between older relict landforms.

  Perhaps the most geomorphically complicated and interesting of these inset fan units is IF1, located in the central-western area of the southern section of the Calico Solar project area. This area has a gravel and cobble surface lag deposit that forms a well-developed desert pavement, and appears somewhat similar to the clasts from the surrounding Qof fan remnants. The source material for these clasts is likely largely from the eroded fan remnants. However, an examination of the subsurface matrix indicates a much different geomorphic origin for this area. IF1 is underlain by a reddish brown lean clay, which exhibits a course angular blocky structure. Ped faces, when freshly excavated and exposed, exhibit a distinct glossy clay film that may be slickensides, related to periodic wetting and drying cycles. Geotechnical borings B006, B007, and B008 indicate that this clay is over 50 feet thick.

In lower lying areas (including the relict alluvial flat; see below), the clay is overlain by a shallow, well-developed soil profile with a well-developed desert pavement that represents a secondary inset fan. These soils exhibit Stage II to III $CaCO_3$ formation, with diffuse carbonate throughout the profile and distinct thick and indurated laminae within the Bk- and/or K-horizons. Where observed, subsurface profiles contain a well-developed Av-Bwk-Bk-Btk-BCk pedogenic sequence. These pedogenic features suggest that the soil within the IF1 area (and relict alluvial flat), as well as the clay they overlie, are very old, and are consistent with Pleistocene and early Holocene soils observed at other locales within the Mojave Desert (see e.g., McDonald, McFadden, and Wells 2003:Table 1). The contact between the surface soil unit and the clay appears to be an erosional unconformity.

In higher relief portions of IF1, it appears that these soils have either been stripped away or never formed, leaving distinct inset fan remnants and ballenas composed entirely of the clay with a coarse gravel and cobble deflated lag deposit at the surface. Indeed, the IF1 structure is old enough that it too has been dissected and contains both erosional and depositional landforms. An additional indication of the age of the clay unit is the presence of distinct, approximately 5cm thick veins and inclusions of gypsum precipitate within the clay. Given its age and physical characteristics, the underlying thick clay unit at IF1 may be functionally related to the late Miocene or early Pleistocene claystones (QTc) mapped by Dibblee (2008) south of the Calico Solar project area. These are described as light reddish-brown lacustrine deposits that are soft to moderately hard (Dibblee 2008) and which are likely the result of a large paleo-lake that once occupied the area.

Given the age of the soils, the lack of identified paleosols, the very old unconformable lower clay unit, and the largely erosional nature of the relict IF1 inset fan, the potential for buried archaeological deposits is considered extremely low.

The other inset fan units (IF2 and IF3), mapped to the east of IF1 are more typical of inset fans in desert piedmont contexts, in that they do not appear to be underlain by, or composed of, the very old resistant clay unit. These inset fans are, instead, largely composed of reworked and redeposited alluvium from the side slopes of the fan remnants into which they are inset. Subsurface pedogenic indicators observed during the field reconnaissance and in geotechnical borings indicate that these other inset fans are relatively old (middle Holocene?). Subsurface profiles observed within inset fans IF2 and IF3 generally correspond to an Av-ABw-Btk-Bk Cox-C sequence with Stage I+ to II $CaCO_3$ morphology. While these soils are likely younger than those observed in other areas across the southern section of the study area, no paleosols were discovered.

In general, these inset fans are considered unlikely to contain buried archaeological sites because they were largely laid down unconformably on the erosional Pleistocene fanglomerate deposits. The preservation of archaeological material is wholly dependent on the erosional history prior to deposition of the inset pediment.

Given the highly erosive nature of the fanglomerate piedmont in general, this type of localized subsurface preservation seems unlikely.

The final smaller inset fan (IF4) mapped at the western extent of the Calico Solar project area, inset between the relict alluvial flat and the Pisgah Lava appears much younger and more active than the other inset fans. The meandering channel that created the inset fan has been heavily affected by modern disturbance adjacent to it, and the construction of a culvert under Highway 40 which focuses numerous small upstream gullies into a single drainage. Profiles within a stabilized bank of the incising channel show that it has actively eroded the underlying paleosol (probably related to the relict alluvial flat) and redeposited it unconformably further downstream. The nature of the relatively high-energy unsorted gravelly alluvium upstream suggests that any artifacts on this surface may be the result of erosion and redeposition. As such, the IF4 inset fan is also considered to have very low potential for buried archaeological deposits (with no surface manifestation); though additional reworked artifacts, where they are evident on the surface, may be partially buried in a highly disturbed context within recent depositional units.

- **Relict Alluvial Flat** (Sensitivity: Very Low). The large area mapped as "relict alluvial flat," in the western portion of the project area, appears to be functionally related to the IF1 inset fan. As such, this area could also be considered an apron of the IF1 inset fan. However, alluvial flat is preferred here because it describes the properties of the geomorphic surface — a nearly level alluvial surface between the piedmont and axial stream of a semi-bolson — without assuming genesis from a single parent landform, and without inherent morphological assumptions.[3] As with other landforms, the term "relict" implies that the surface has been stable for a considerable time and, as such, has also been highly dissected.

  This landform can be distinguished from other relict landforms in the southern area by a nearly flat, low lying surface that is cut by numerous braided and anastomatizing channels/gullies. These channels are dominantly oriented in the same direction as the major axial channel (i.e. east–west) that crosses the project area. Between these small channels/gullies tend to be bars of intact desert pavement. Although no borings or test pits were advanced within the western portion of the relict alluvial flat, the geoarchaeological reconnaissance and an earlier geologic reconnaissance of the project area (URS 2008) – which mapped a surface clay unit at the western extent of the project area– suggest that the landform is underlain by the thick Pleistocene/ Miocene clay. Soils in this area have well-developed subsurface horizons that are similar to those observed within the IF1 inset fan (see previous discussion).

  The geomorphic evolution and interpretation of geoarchaeological sensitivity for the relict alluvial flat is considered similar to that of the IF1 inset fan. Given the well-formed pavement, upper pedogenic unit, and dissected nature of the relict flat, it appears that this area was dominated by a stable and subsequent erosional geomorphic regime for much of the Holocene. The potential for buried archaeological deposits within this area is considered very low.

[3] For example, a fan apron is generally assumed to consist of a thin mantle of relatively young alluvium that typically buries an older pedogenic soil (Peterson 1981:51).

- **Axial Channel** (Sensitivity: Very Low to Moderate). The “axial channel” represents the area occupied by the main drainage that bisects the Calico Solar semi-bolson, as well as component landforms related to the active channel. While the active channel is primarily an erosional structure, small depositional features such as alluvial flats, limited terraces, and fine overbank deposits are the result of deposition by the axial channel. In the absence of identified springs or fresh water sinks/lakes, the axial channel represents the largest and most reliable source of seasonal water within the Calico Solar project area. As such, this would have represented a very important resource to prehistoric populations in the project area. The only limited evidence for food processing (milling equipment) found during the cultural resources survey of Calico Solar is found in close proximity to this watercourse.

  Excavations were performed at TP050, near the interface of the lower fan piedmont apron and the axial channel zone. It is difficult to determine if the fine-grain alluvium at the surface of this location originates from the on-fan drainages or the axial channel, but appears that it may be related to an overbank deposit of the channel. The subsurface profile within TP050 is well-developed but unusual. The lack of pavement development at the surface is not consistent with the subsurface profile. An Av horizon has developed in the upper 3 to 5 cm, with a slightly consolidated loamy sand with gravel subsoil (ABw). This is followed by a zone of weak clay and carbonate accumulation (Btk) with observable rubification (ox). This overlies a second Btk-horizon with much stronger structure, distinct clay films on grains within peds, and carbonate accumulation completely surrounding larger gravels and cobbles (Stage II). This is underlain by an indurated carbonate layer (Bkm; Stage III+), as well as a Bk and Cox horizon not shown in Figure 18b.

  The existence of multiple B-horizons and gradual increase of carbonates to an indurated lamina is common in very old soils. However, the low carbonate accumulation and weak structure in the upper horizons (with such a well-developed lower profile) is unusual. A distinct lithologic contact is observable between the two Btk horizons with the upper dominated by fine-grain loamy sand and the lower dominated by coarse gravels and cobbles. While this may simply represent a facies shift during a single depositional event, the above observations suggest that the contact may also be pedogenic, with the lower Btk representing a truncated portion of a buried soil. In either case, the potential for intact buried archaeological deposits is low (i.e., either a buried surface is absent, or any archaeological deposits on that surface have likely been removed through subsequent erosion).

  Test Pit 051 was placed in a similar geomorphic setting near the interface of the toe of a fan apron and the axial channel zone. The upper pedogenic unit is less well-developed than the preceding example, with an AB-Bw-Bwk-C profile, corresponding to a late Holocene age. This unit overlies a very old buried pedogenic unit with a Btk-Bkm-Km1-Km2-Bk-Ck-C profile. Again, a truncated erosional contact seems to be indicated.

  No well preserved upper horizons of paleosols were observed in the subsurface explorations within the vicinity of the axial channel. However, multiple truncated paleosols were noted below relatively young fine-grain alluvial deposits. This suggests that there is the potential for low-energy burial of older land surfaces under significant amounts of recent alluvium (up to 2 meters) within the reach of the axial channel. The preservation of archeological deposits on these surfaces is entirely dependent on the erosional history prior to burial (in both of the test pits discussed here, it appears that significant erosion may have occurred prior to burial). Given these considerations, the geoarchaeological sensitivity of the axial channel is considered low within the current active channel/wash, but moderate on the small terraces and minor component landforms adjacent to the channel where, given the right geomorphic history, significant fine-grain low-energy alluvium *may* bury intact relict surfaces. The archaeological sensitivity of these limited areas is bolstered by the proximity to the only major seasonal watercourse identified within the study area.

Conclusions

The findings from this geoarchaeological study of the Calico Solar project area are consistent with previous findings from the Mojave Desert. In a recent summary of the region, Sutton (1996) concludes that, contrary to the popular belief that all archaeological sites in the Mojave Desert exist in surface contexts, "there are… many depositional environments [within the Mojave], and there is a great potential for buried sites in many areas… e.g., along the Mojave River, along lakeshores, and in cave sites" (1996:225). Given results from other areas (e.g., Roberts, Warren, and Eskenazi 2007), dune complexes, springs, and other areas with widespread episodic and stabilized eolian deposition, should also be added to the list. All of these landform types are largely absent from the Calico Solar Project study area, consistent with an overall low sensitivity for buried archaeological sites within the landforms of the project area.

The axial channel (and associated deposits), which cuts across the central portion of the study area and interfaces with fine-grain sediments from the toe of the alluvial fan piedmont, may represent the only geomorphic feature in the Calico Solar project area where buried archaeological deposits (with no surface manifestation) may reasonably be expected. While much smaller than the Mojave River drainage discussed by Sutton (1996), the same geomorphic processes that have buried sites along the Mojave River may be at play here, though on a much smaller scale. The fine-grain alluvial deposition along the margins of the axial channel — in the form of limited terrace deposits and alluvial flats — is functionally similar to that along the Mojave River, though large stratified alluvial terraces like those associated with the larger river, are clearly absent. As such, buried archaeological deposits, if present in this portion of the project area, will likely be aerially confined sites with a sparse deposit similar to surface sites in the Calico Solar study area, buried under up to 2 meters of very recent fine-grain alluvium. Given the likelihood that the course of the axial channel has meandered over its history, and scoured any existing land surfaces, the preservation of buried archaeological sites in this area will likely be greatly limited.

The vast majority of the northern alluvial fan piedmont is represented by a subsurface depositional environment that is too high-energy and coarse, with no observed paleosols, to preserve buried archaeological deposits. This lack of depositional sensitivity is coupled with an absence of economically viable lithic resources, which may largely explain the absence of surface sites on the fan piedmont. The high-energy erosional contacts between buried paleo-surfaces and overlying mantle deposits within the fan aprons, coupled with the lack of viable economic resources, largely precludes the presence of buried archaeological deposits within in this portion of the project area as well. Both the very old age and largely erosional nature of the major landforms in the southern section of the project area indicate that buried archaeological sites (with no surface manifestation) are very unlikely. It appears that the greatest potential for site burial in the southern portion of the Calico Solar Project area is in those places where unconsolidated and active eolian sands have obscured alluvial landforms. However, these eolian features appear to be so limited that they are unlikely to obscure any significant portion of an archaeological site.

A secondary conclusion of this geoarchaeological study is that prehistoric site location within the Calico Solar Project study area seems to be largely dictated by the availability of raw lithic materials. The series of coalescing fans that make up the alluvial fan piedmont north of the railroad tracks have their source in the Cady Mountains. An examination of Dibblee's (2008) geologic map of the Cady Mountains, indicates that the dominant material present above these fans is granite to quartz monzonite (gqm), with more limited (and presumable more resistant) outcrops of basalt and andesite (Tb and Ta). This is confirmed by subsurface geoarchaeological investigations of the alluvial fans, which show that the majority of material present is coarse-grained granitic sands, gravels, and cobbles, with little utility for prehistoric tool making. On the other hand, the fanglomerate remnant alluvial fans — and inset alluvial fans, which generally are comprised of reworked fanglomerates — that make up the majority of the landforms south of the railroad tracks, have a much more variable parent material — including volcanics, metavolcanics, and silicates (jasper, etc.) — more conducive to prehistoric tool production.

Except for minimal editorial contributions, the following subsection was adapted from Solar One ***Data Response 94*** by Jay Rehor, M.A., RPA

Staff's assertion that "the degree of desert pavement [development] is *not* in fact indicative of the presence of buried archaeological deposits" is an accurate statement (CEC 2009: 4; *emphasis* added). However, clarification is needed within both Staff's statement, and the initial theoretical model that was being reacted to (URS 2009:4-2). A well-formed desert pavement does not preclude the existence of a *buried component* to a site located on that pavement, but it does significantly decrease the likelihood that a buried archaeological deposit *not already evident on the surface* is buried below it. See Data Response 93 for a discussion of buried archaeological sites with no surface manifestation.

The vast majority of prehistoric archaeological sites recorded within the Calico Solar Project Area are situated on well-developed desert pavements located in the southern portion of the Project Area. The age of an archaeological deposit, in relationship to a given pavement, has relevance in terms of the potential for buried site components. Given the currently accepted accretionary model of desert pavement formation (see Data Response 93), if (relatively younger) artifacts are deposited on an already well-developed and stabilized pavement, few, if any, of the artifacts will work their way down in the stratigraphic column. Alternatively, if (relatively older) artifacts are deposited on an actively accreting and, as yet, unformed or stabilized surface, over time a portion of these artifacts will become incorporated as part of the desert pavement, while a portion will remain throughout the depositional column. For example, it has been shown that Paleo-Indian sites, located on desert pavement in arid to semi-arid environments, can possess artifacts from the surface of the pavement up to 70 cm deep (Apple and York

1993; Davis 1970). Although it is unlikely that accreted sediments accumulated this thick, additional subsurface pedoturbation (e.g., argillic shrink/swell, displacement by plant roots) may explain the significant depth of these very old artifacts below the surface.

The lack of time-sensitive diagnostic artifacts across the Calico Solar project area makes it difficult to assess what sites are older, and thus more likely to contain buried artifacts, versus those that are younger and less likely to contain buried components. One corollary, which may prove useful, is the degree of weathering of surface artifacts. The longer that artifacts have been part of the desert pavement, the more patination and visible weathering from eolian abrasion on the surface of the artifact. As such, this theory would contend that sites with a large number of heavily weathered surface artifacts will have a higher number of subsurface artifacts than a site with relatively "fresh" looking artifacts. Testing of this concept may prove beneficial during any Phase II investigations at Calico Solar. Additionally, while the accretionary model of pavement formation likely explains the majority of pavements observed across the Calico Solar project area, some pavements/stony surfaces likely formed through erosion and are unlikely to contain buried site components (see e.g., the Data Response 93 discussion of relict fan remnants within IF1).

While it is true that artifacts *may* be present below a surface archaeological site on desert pavement, it has been consistently demonstrated that in such contexts artifact density decreases significantly and rapidly with depth (typically confined to the upper few centimeters), and that buried artifacts are similar in type to those on the surface with no discernable temporal stratification (e.g., Basgall 2000, 2003; Davis 1979; Hunt 1960; Wallace 1962). As such, it is unlikely that any functional interpretation will be altered by the recovery of the limited artifacts incorporated in the subsurface matrix of a site on desert pavement. The discussion of artifacts buried beneath desert pavement surfaces may be moot, at least for the majority of the sparse lithic sites at Calico Solar, which lack any diagnostic artifacts (i.e., no new functional or temporal information is likely to be gained from any limited subsurface recovery).

The peer-reviewed sources that Staff references in Data Request 94 (Harvey and Wells 2003; McDonald, McFadden, and Wells 2003; Wells, McFadden, and Dohrenwend 1987) do not deal specifically with the relationship between desert pavement development and the burial and preservation of the archaeological record. Instead, these studies deal with the timing of major depositional events and, peripherally, with accretionary desert pavement formation processes on these landforms (see the proceeding response for a discussion of this literature and topics). In fact, these studies, in the limited nature in which they address desert pavements, do actually *support* the contention that more well-developed pavements are less likely to contain buried archaeology (not already evident on the surface). Within these studies, moderate to strongly developed desert pavements are consistently shown to be associated with early Pleistocene to early Holocene landforms (see e.g., McDonald, McFadden, and Wells 2003: Table 1; Harvey and Wells 2003: Table 2). As such, well-developed desert pavements are generally too old to bury archaeological deposits, and *are* indicative of the absence of archaeological deposits not at least partially evident on the surface. However, an even better measure of landform age– and associated buried archaeological potential– includes a combined analysis of soil development, parent material, and pavement development, as discussed in the previous Data Response 93.

Perhaps more directly relevant to staff's concerns, regarding the potential for buried components of surface archaeological sites in desert pavement contexts, is a recent publication by Ahlstrom and Roberts (2001) which reports on findings from the Sonoran Desert in southern Arizona. Based on excavations at eight archaeological sites with significant amounts of stabilized desert pavement, the authors report finding a total of 23 buried thermal features, four "occupation surfaces", one pit structure, and one refuse deposit. The authors claim that their results "call into question the idea that low-density, low-diversity artifact scatters associated with desert-pavement surfaces can simply be dismissed as surface manifestations with no potential for subsurface cultural remains" (Ahlstrom and Roberts 2001:2).

Despite Ahlstrom and Robert's (2001) claims, a close reading of their study suggests that the subsurface features identified in their investigations seem to be confined to very specific contexts: fine-grain alluvial and/or eolian depositional environments, within or directly adjacent to cleared circle features in the desert pavement, and sites with a relatively diverse artifact assemblage. Indeed, all of the sites discussed in the paper contain a high artifact diversity (at least compared to the sites recorded at Calico Solar), including lithics, ceramics, ground-stone/milling tools, rock rings, and cleared circles. Although numerous hearth features were found buried below a pebble surface, the authors contention that they were buried below desert pavement is not borne out by the evidence. In fact, hearth features that were buried below "desert pavement" were directly adjacent to the edge of a cleared circle. As such, the pebbles and stones covering the surface above the hearth features were not part of an intact desert pavement, formed over thousands of years, but smaller clasts which had begun to creep into and "heal" the surface disturbance of the cleared circle feature.

Unfortunately — and by the authors' own admission (Ahlstrom and Roberts 2001:2) — data on the quality and quantity of desert varnish or rubification was not collected prior to destruction of the ground surface. However, there was presumably an observable difference in the true desert pavement surrounding the cleared circles, and the stones which had begun to infill from the outer edge toward the center and covered the buried features (e.g., further distance between surface clasts; lower degree of varnish and rubification than surrounding clasts from undisturbed pavement; rubification on the dorsal surface of stones which had originally developed in-place and then were redeposited "upside-down"; etc.). None the less, Ahlstrom and Roberts' results are instructive to archaeologists working in arid environments with desert pavement. If testing features cleared in the desert pavement ("cleared circles"), archaeologists should be aware of differences in the quality of the stone surface at the edge of the clearings, and place units accordingly at the edge of the true cleared area.

Based on years of experience and accumulated data, Carrico and Quillen (1982:184), concluded that "excavations of rock circles and cleared circles have consistently proven unproductive in southern California and western Arizona desert regions." Indeed, Ahlstrom and Robert acknowledge that their "research contradicts the experience of archaeologists who have excavated rock rings and cleared circles, or who have dug units through desert pavement without result" (2001:19). As such, their findings must be taken in the larger context and by no means guarantee that subsurface features will be present in association with cleared circles. Rather, their results suggests that limited testing of such features should continue, in certain contexts, and that cleared circles on desert pavements shouldn't be written-off completely — despite a preponderance of evidence to the contrary.

C.3.4.10 CLASS III INTENSIVE FIELD SURVEY

Archaeological Field Survey Methodology

Survey of the Calico Solar Project APE was conducted between August 4 and October 31, 2008. Key cultural resources personnel who conducted and/or supervised the field survey and prepared the technical report are Brian K. Glenn, MA, RPA (URS Cultural Resources Group Leader and Editor), Rachael Nixon, MA, RPA [URS Principal Investigator (PI)], Sarah Mattiussi (URS Staff Archaeologist), and Kirsten Erickson, MA (URS Architectural Historian). Field crews and field-office personnel were directly supervised by URS PI Rachael Nixon and URS Staff Archaeologists Dustin R. Kay and Sarah Mattiussi. The pedestrian survey for the Class III Intensive Field Survey covered the Calico Solar (phase 1 and 2) APE as well as an additional 200 feet beyond the APE. The principal survey method consisted of a systematic walk-over in parallel transect intervals no greater than 15 meters. Areas of steep terrain (greater than 45° angle) where access was not feasible due to unsafe/unstable surfaces were not surveyed. These areas total less than 11 acres and occur within the northeastern Project APE along the south-southwest facing slope of the Cady Mountains. The areas of steep terrain not surveyed have an extremely low likelihood of containing cultural resources based on the angle and decomposition of volcanic rocks eroding downslope. Areas that were situated within or atop steep terrain with the potential for cultural resources were investigated (*e.g.,* caves and ridge tops). The survey transects extended across the entire horizontal extent of the archaeological Project APE. Survey crews were guided by Trimble XH sub-meter global positioning system (GPS) units uploaded with records search, township, built-environment features, and project-specific boundary data. Individual crews were assigned portions of sections for survey. Garmin Model 150 GPS units were carried as backups and as communication devices.

The guidelines applied to field survey and recordation of cultural resources within the Calico Solar Project APE was provided by BLM archaeologist Jim Shearer. The guidelines provided that archaeological sites consisted of 5 or more historic period artifacts or prehistoric period artifacts with a tool (6 or more artifacts) within 30 meters of each other. Groups of 5 or fewer prehistoric artifacts (without a tool) within 30 meters of each other were recorded as isolated finds. Individual and groups of less than 5 historic period artifacts were not recorded.

Site containing higher concentrations of artifacts over a large area were assigned individual Locus numbers. Loci were assigned for areas within sites with higher artifact concentrations. A locus was assigned to concentrations of more than 6 artifacts within a discrete location. Discrete locations were defined as single reduction loci, multiple single reduction loci, and/or lithic scatter concentrations. In the case of multi-component sites, historic and prehistoric components were assigned an individual locus when possible.

From previous investigations on similar terrain, it was inferred that archaeological sites would be found on areas of desert pavement. For the purpose of this investigation desert pavement was defined as a desert surface that is covered with closely packed, interlocking angular or rounded rock fragments of pebble and cobble size. Within the Calico Solar Project APE, and other areas of the desert, a portion of the cobble constituents of desert pavement are of cryptocrystalline silicate (chalcedony, jasper, others) materials used by Native Americans for the production of flaked stone tools. As such, the correlation of these surfaces with the archaeological materials contained therein may be informative. In addition, the pavement stabilization level is directly correlated with the likelihood of the matrix containing buried deposits, *i.e.,* the more visible sediments the more likely the presence of buried archaeological deposits. The following is an elementary subdivision of desert pavements used to classify variability in surfaces.

- <u>Partially stabilized</u> pavement has 30% or greater of sediments visible.
- <u>Moderately stabilized</u> pavement has 10% to 30% of sediments visible.
- <u>Stabilized pavement</u> has pavement 0% to 10% of sediments visible.

The California Archaeological Resource Identification and Data Acquisition Program: Sparse Lithic Scatters (CARIDAP) was applied in the preliminary field surface identification and management recommendation with regards to lithic scatters identified within the Project APE (Jackson et al., 1988). No subsurface testing, data recovery, or surface collections of artifacts occurred during the Class III Intensive Field Survey. The CARIDAP criteria for classification as a sparse lithic scatter are as follows:

1. Contains only flaked-stone and lack other classes of archaeological materials (e.g., groundstone, fire affected rock, bone, or shellfish remains, pottery);
2. Appears to lack a substantial subsurface deposit (based on surface observations only); and
3. Exhibit surface densities equal to or less than three flaked-stone items per square meter.

These guidelines were applied throughout the entire Class III Intensive Field Survey for the Calico Solar Project APE.

<u>Site Recording Methodology</u>

Once identified in the field, survey teams recorded archaeological sites and isolates by completing the appropriate Department of Parks and Recreation (DPR) 523 Series forms. Form information was collected using a combination of staff observations and data recording devices including sub-meter GPS and digital cameras. Each isolated find and sites were given a designation that included the initials of the team leader and a sequential number, e.g., RAN-001 with isolated finds including the designator “ISO,” e.g., RAN-ISO-002. Site and loci boundaries were delineated by team members transecting the area of the find with transects spaced no greater than 5 meters apart. Artifacts and/or artifact clusters were flagged, described, and photographed. Individual artifacts not part of a larger concentration were point-provenienced with the GPS, as were concentration smaller than 5 meters across. Concentrations with a diameter of 5 meters or more were recorded as polygons representing the outer loci boundary. Digital photographs were taken of selected artifacts and concentrations. Each site was recorded with one or more photographs. All photographs were recorded onto the team's log with relevant data including temporary site/isolated designation, date, direction, recorder, and subject. Trails segments also mapped with the sub-meter GPS, following the trail until terminated or no longer feasible to follow, measured, described in notes, and photographed.

Data Processing

Data collected in the field was transferred to electronic field office data files on a daily basis. Data were quality checked to ensure conformance with the scope of work, agency satisfaction, and regulatory compliance. GPS data were downloaded using TerraSync software and transmitted to GIS staff for post-processing, e.g., applying differential data correction. Initial plots of data from each survey team were compiled and reviewed to determine the validity of resource boundaries with regard to established methods. Where appropriate, resource areas were combined into larger units based on distance between artifacts and/or concentrations, i.e., less than 30 meters. GIS data were organized to allow for submission to BLM according to recently adopted protocols.

Built-Environment Field Survey Methodology

On August 19 and October 27 and 28, 2008, an intensive historic architecture survey was conducted to account for the properties that appeared to be older than 45 years (1963 or earlier) within the historic architecture APE, which included the Project APE and a half-mile radius. Following completion of the survey, URS Architectural Historian Kirsten Erickson recorded the properties that appeared to be older than 45 years through the appropriate DPR 523 series forms (Confidential Appendix D, Newly Recorded and Updated Built-Environment Resources), and evaluated the properties for eligibility per the criterion of the NRHP and/or CRHR. Properties less than 45 years old were noted, but not formally recorded or evaluated.

As part of the historic architecture survey, Ms. Erickson contacted San Bernardino County Land Use Services, City of Barstow Community Development department, and Mojave River Valley Museum on September 15, 2008 to identify cultural resources within a 1-mile radius around the Project footprint listed pursuant to ordinance or recognized by a local historical society or museum. To date, no responses have been received from the local agencies and historical society.

In addition to these efforts, site-specific and general primary and secondary research was conducted at the University of California at Riverside, Rivera and Science libraries; the San Bernardino Archaeological Information Center at the San Bernardino County Museum; San Bernardino County Recorder's office; San Bernardino County Assessor's office; and numerous online resources. Thomas Taylor, Manager of Biological and Archaeological Services for Southern California Edison, provided site-specific information about the Pisgah Substation and the 12-kilovolt and 220-kilovolt transmission lines within the Project Area.

Historic maps were obtained from the University of California at Riverside science library and the Archaeological Information Center at the San Bernardino County Museum in Redlands. Maps obtained include 1955 15-minute U.S. Geological Survey quadrangles, five maps depicting the Old National Trails Highway, Punnett Brothers Map of San Bernardino County (1914), Kremmerer's map of San Bernardino County (1925), and Thomas Brothers Settlers and Miner's Map of San Bernardino County (1932). These maps were reviewed to identify possible unrecorded historical structures and archaeological sites within the APE and 1-mile search radius.

Results of Cultural Resource Field Inventory

Results of Pedestrian Archaeological Survey of the Project APE. Overall surface visibility was good to excellent across the Calico Solar Project APE. Visibility ranged from 90% to 100%, and averaged approximately 80% of the ground surface; areas with greater visibility were thoroughly inspected for cultural materials to ensure adequate coverage for resource discovery. Evidence of disturbances within and surrounding the APE include numerous rodent burrows, flash flooding, mining activities, livestock trampling, OHV use, and access roads.

The relocation of previously recorded resources in the APE has presented a challenge, as most of the previously recorded resources were documented prior to the invention or widespread use of Global Positioning System (GPS) technology. The ability to accurately place the locations of small sites on a 1:24,000-scale USGS topographic map in a flat expansive environment such as the project area without the aid of GPS technology is imperfect at best, and the accuracy of the location information for these previously recorded resources is questionable. The lack of detailed site descriptions and absence of site sketch maps in many of the older site forms further hampered the site relocation effort. Due to the factors described above, only fourteen of the 49 previously recorded sites in the APE were re-located, including the following; CA-10649H, CA-SBR-1896, CA-SBR-1908, CA-SBR-2910H, CA-SBR-4558H, CA-SBR-4681, CA-SBR-5600, CA-SBR-5796, CA-SBR-6511, CA-SBR-6512, CA-SBR-6513, CA-SBR-6520, CA-SBR-6521, CA-SBR-6528, CA-SBR-6693H. The applicant's consultant, URS, is confident that many more of the previously recorded sites may have been encountered during the current survey effort; however, they could not be matched on an individual basis to the existing DPR forms due to inaccurate locational information and limited site descriptions. The inability to accurately relocate previously recorded cultural resources renders it impossible to correlate old site forms with the new site data obtained by the current field survey effort. Thus, new site record forms with GPS-based site locations are being prepared for all resources identified within the project APE that could not be confidently linked to a previously recorded resource. Updated DPR site forms were prepared only for the fourteen relocated resources listed above.

The URS archaeological team identified a total 401 archaeological resources in the project APE as part of the initial Class III archaeological field survey, including 248 isolates and 139 archaeological sites (9 of which were updates) within the Calico Solar Project APE. Of the 139 new and updated archaeological sites, 128 are prehistoric, 11 historic, and 4 multi-component. Resources listed and described below in Table 5 are newly identified.

Cultural Resources Table 5
Initial Cultural Resources Inventory for the Project Area of Analysis
(SES 2008c, SES 2008e)
(100% of APE)

Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location & Landform
DRK-001 Ca-SBR-12990	Lithic Scatter/Lithic Reduction	Prehistoric	Very Low	North Alluvial fan
DRK-012 CA-SBR-12991	Lithic Scatter/Lithic Reduction	Prehistoric	Moderate	North Alluvial fan
DRK-021H CA-SBR-12992H	Trash Scatter	Historic	Low	North Alluvial fan
DRK-023 CA-SBR-12993	Lithic scatter	Prehistoric	Low	North Alluvial fan
DRK-026 CA-SBR-12994	Lithic scatter	Prehistoric	Low	North Alluvial fan
DRK-045 CA-SBR-12995	Lithic scatter	Prehistoric	Low	North Alluvial fan
DRK-110H CA-SBR-12996H	Trash Scatter	Historic	Low	North Alluvial fan
DRK-111/H CA-SBR-12997/H	Trash Scatter/Lithic Scatter	Prehistoric/ Historic	Very Low	North Alluvial fan
DRK 114 CA-SBR-12998	Lithic scatter	Prehistoric	Low	North Alluvial fan
DRK-115H CA-SBR-12999H	Trash Scatters	Historic	Low	North Alluvial fan
DRK-116 CA-SBR-13000	Lithic Scatter/Lithic Reduction	Prehistoric	Very Low	North Alluvial fan
KRM-002 CA-SBR-13028	Lithic Scatter/Lithic Reduction	Prehistoric	Moderate	North Alluvial fan
KRM-003 CA-SBR-13029	Lithic Scatter	Prehistoric	Low	North Alluvial fan
KRM-008 Ca-SBR-13030	Lithic Scatter/Lithic Reduction	Prehistoric	Low	North Alluvial fan
KRM-024 CA-SBR-13031	Trail	Prehistoric	Very Low	North Alluvial fan
KRM-028 CA-SBR-13032	Trail	Prehistoric	Very Low	North Alluvial fan
RAN-011 CA-SBR-13053	Lithic scatter	Prehistoric	Moderate	North Alluvial fan
RAN-025 CA-SBR-13054	Lithic scatter	Prehistoric	Very Low	North Alluvial fan
SGB-007 CA-SBR-13095	Lithic Scatter/black-on-gray ceramic sherd	Prehistoric	Moderate	North Alluvial fan

Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location & Landform
SGB-013 CA-SBR-13096	Lithic scatter	Prehistoric	Low	North Alluvial fan
SGB-017 CA-SBR-13097	Lithic scatter	Prehistoric	Moderate	North Alluvial fan
SGB-041 CA-SBR-13104	Lithic scatter	Prehistoric	Moderate	North Alluvial fan
SGB-097 CA-SBR-13105	Lithic scatter	Prehistoric	Very Low	North Alluvial fan
SGB-099 CA-SBR-13106	Lithic scatter/hearth	Prehistoric	Very Low	North Alluvial fan
SGB-104 CA-SBR-13107	Lithic scatter	Prehistoric	Very Low	North Alluvial fan
SM-027 CA-SBR-13113	Lithic Scatter	Prehistoric	Low	North Alluvial fan
EJK-002 CA-SBR-13123	Lithic Scatter	Prehistoric	Low	South Relict Alluvial fan
CA-SBR-4558H	Logan Mine	Historic	Moderate	North Alluvial fan
CA-SBR-6512/CA-SBR-6513 (SGB-028)	Lithic Scatter/Lithic Reduction/Stone Mounds	Prehistoric	Low	South Inset fan
DRK-112H P36-014519H	Cairn	Historic	Very Low	North Alluvial fan
DRK 113H P-36-014520	Cairn	Historic	Very Low	North Alluvial fan
RAN-035H P-36-014578	Cairn	Historic	Very Low	North Alluvial fan
DRK-133 CA-SBR-13001	Lithic scatter	Prehistoric	Low	South
DRK-134/H CA-SBR-13002/H	Lithic scatter/historic trash scatter	Prehistoric/ Historic	Moderate	South Alluvial fan
DRK-136 CA-SBR-13003	Lithic Scatter	Prehistoric	Low	South Alluvial fan
DRK-139 CA-SBR-13004	Lithic Scatter	Prehistoric	Moderate	South Inset fan
DRK-140 CA-SBR-13005	Lithic Scatter	Prehistoric	Moderate	South Inset fan
DRK-141 CA-SBR-13006	Lithic Scatter/ Lithic Reduction	Prehistoric	Low	South Inset fan
DRK-142 CA-SBR-13007	Lithic Scatter Lithic Reduction	Prehistoric	Low	South Inset fan
DRK-145 CA-SBR-13008	Lithic Scatter/ Lithic reduction	Prehistoric	Very Low	South Inset fan

Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location & Landform
DRK-150 CA-SBR-13009	Lithic Scatter	Prehistoric	Moderate	South Inset fan
DRK-152 CA-SBR-13010	Lithic Scatter	Prehistoric	Moderate	South Inset fan
DRK-153 CA-SBR-13011	Lithic Scatter	Prehistoric	Low	South Inset fan
DRK-155H CA-SBR-13012H	Trash Scatter	Historic	Moderate	South Alluvial fan
DRK-160 Ca-SBR-13013	Lithic Scatter	Prehistoric	Moderate	South
DRK-163H CA-SBR-13014H	Trash Scatter	Historic	Moderate	South Alluvial fan
DRK-166 CA-SBR-13015	Lithic Scatter/ Lithic Reduction	Prehistoric	Low	South Pisgah Lava
DRK-167 CA-SBR-13016	Lithic Scatter	Prehistoric	Moderate	South Pisgah Lava
DRK-168H CA-SBR-13017H	Trash Scatter	Historic	Moderate	South Alluvial Fan
DRK-170 CA-SBR-13018	Lithic Scatter\ Lithic Reduction	Prehistoric	Low	South Pisgah Lava
DRK-171 CA-SBR-13019	Lithic Scatter	Prehistoric	Low	South Pisgah Lava
DRK-173 CA-SBR-13020	Lithic Scatter/ Lithic Reduction	Prehistoric	Low	South Pisgah Lava
DRK-174 CA-SBR-13021	Lithic Scatter/ Lithic Reduction	Prehistoric	Low	South Pisgah Lava
DRK-175 CA-SBR-13022	Lithic Scatter	Prehistoric	Low	South Pisgah Lava
DRK-176/H CA-SBR-13023/H	Lithic Scatter Trash Scatter	Prehistoric Historic	Moderate	South Axial Channel
DRK-177 CA-SBR-13024	Lithic Scatter	Prehistoric	Low	South Pisgah Lava
DRK-178 CA-SBR-13025	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South
DRK-182 CA-SBR-13026	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South
DRK-184 CA-SBR-13027	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South
KRM-160 CA-SBR-13038	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South
KRM-164 CA-SBR-13039	Lithic Scatter	Prehistoric	Moderate	South Inset fan

Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location & Landform
KRM-167 CA-SBR-13040	Lithic Scatter/Lithic Reduction/Rock Feature	Prehistoric	Moderate	South
KRM-170 CA-SBR-13041	Lithic Scatter/Lithic Reduction/Rock Feature	Prehistoric	Moderate	South Inset fan
LTL-008 CA-SBR-13042	Lithic Scatter	Prehistoric	Moderate	South Pisgah Lava
LTL-009 CA-SBR-13043	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah Lava
LTL-011 CA-SBR-13044	Lithic Scatter	Prehistoric	Low	South Inset fan
LTL-012 CA-SBR-13045	Lithic Scatter	Prehistoric	Low To Moderate	South Inset fan
LTL-015 CA-SBR-13046	Lithic Scatter/Lithic Reduction	Prehistoric	Low To Moderate	South Pisgah Lava
LTL-016 CA-SBR-13047	Lithic Scatter/Lithic Reduction	Prehistoric	Low To Moderate	South Pisgah Lava
LTL-017 CA-SBR-13048	Lithic Scatter	Prehistoric	Moderate	South Pisgah Lava
LTL-018 CA-SBR-13049	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah Lava
LTL-019 CA-SBR-13050	Lithic Scatter	Prehistoric	Low	South Pisgah Lava
LTL-022 CA-SBR-13051	Lithic Scatter	Prehistoric	Low	South Pisgah Lava
LTL-023 CA-SBR-13052	Lithic Scatter	Prehistoric	Moderate	South Pisgah Lava
RAN-101 CA-SBR-13055	Lithic Scatter/Lithic Reduction	Prehistoric	Very Low	South Inset fan
RAN-108 CA-SBR-13056	Lithic Scatter	Prehistoric	Very Low	South Inset Fan
RAN-107 CA-SBR-13057	Lithic Scatter	Prehistoric	Moderate	South Inset fan
RAN-110 CA-SBR-13058	Lithic Scatter	Prehistoric	Low	South Inset fan
RAN-114 CA-SBR-13059	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah Lava
RAN-116 CA-SBR-13060	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah Lava
RAN-118 CA-SBR-13061	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah Lava
RAN-120 CA-SBR-13062	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah Lava
RAN-123 CA-SBR-13063	Lithic Scatter	Prehistoric	Low	South Pisgah Lava
RAN-128 CA-SBR-13064	Lithic Scatter/Lithic Reduction	Prehistoric	Very Low	South Pisgah Lava

Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location & Landform
RAN-131 CA-SBR-13065	Lithic Scatter/Lithic Reduction	Prehistoric	Moderate	South Axial Channel
RAN-138 CA-SBR-13066/H	Lithic Scatter/Historic Artifacts	Prehistoric/ Historic	Very Low	South Pisgah Lava
RAN-139 CA-SBR-13067	Lithic Scatter/Lithic Reduction	Prehistoric	Very Low	South Pisgah Lava
RAN-146 CA-SBR-13068	Lithic Scatter	Prehistoric	Very Low	South Inset fan
RAN-154 CA-SBR-13069	Lithic Scatter	Prehistoric	Very Low	South Inset fan
RAN-155 CA-SBR-13070	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah Lava
RAN-163 CA-SBR-13071	Lithic Scatter/Lithic Reduction	Prehistoric	Very Low	South
RAN-168 CA-SBR-13072	Lithic Scatter	Prehistoric	Moderate	South Axial Channel
RAN-169 CA-SBR-13073	Lithic Scatter	Prehistoric	Moderate	South Alluvial Fan
RAN-170 CA-SBR-13074	Lithic Scatter	Prehistoric	Moderate	South Alluvial fan
RAN-171 CA-SBR-13075	Lithic Assemblage	Prehistoric	Good	South Axial Channel/ Alluvial fan
RAN-173 CA-SBR-13076	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah Lava
RAN-175 CA-SBR-13077	Lithic Scatter	Prehistoric	Low	South
RAN-177 CA-SBR-13078	Lithic Scatter	Prehistoric	Moderate	South
RAN-179 CA-SBR-13079	Lithic Scatter	Prehistoric	Low	South Pisgah Lava
RAN-180 CA-SBR-13080	Lithic Scatter	Prehistoric	Moderate	South Axial channel
RAN-181 CA-SBR-13081	Lithic Scatter	Prehistoric	Moderate	South Axial channel
RAN-183 CA-SBR-13082	Lithic Scatter/Lithic Reduction	Prehistoric	Very Low	South Pisgah Lava
RAN-186 CA-SBR-13083	Lithic Scatter	Prehistoric	Very Low	South Inset channel

Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location & Landform
RAN-188 CA-SBR-13084	Lithic Scatter	Prehistoric	Low	South Pisgah Lava
RAN-190 CA-SBR-13085	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah Lava
RSS-005 CA-SBR-13086	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah Lava
RSS-006 CA-SBR-13087	Lithic Scatter	Prehistoric	Low	South Pisgah Lava
RSS-008 CA-SBR-13088	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah Lava
RSS-009 CA-SBR-13089	Lithic Scatter	Prehistoric	Low	South Axial channel
RSS-011 CA-SBR-13090	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah Lava
RSS-013 CA-SBR-13091	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Axial channel
RSS-014 CA-SBR-13092	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah Lava
RSS-017 CA-SBR-13093	Lithic Scatter/ Lithic Reduction/ Rock Feature	Prehistoric	Low	South Pisgah Lava
RSS-018 CA-SBR-13094	Lithic Scatter	Prehistoric	Low	South Pisgah Lava
SGB-024 CA-SBR-13098	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah Lava
SGB-032 CA-SBR-13099	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Axial Channel
SGB-034 CA-SBR-13100	Lithic Scatter	Prehistoric	Low	South Alluvial Fan
SGB-036H CA-SBR-13101H	Historic Privies and trash scatter	Historic	Low	South Alluvial Fan
SGB-037 CA-SBR-13102	Lithic Scatter	Prehistoric	Very Low	South Inset Fan
SGB-038 CA-SBR-13103	Lithic Scatter	Prehistoric	Very Low	South Alluvial Fan
SGB-112\H CA-SBR-13108/H	Lithic Scatter/Lithic Reduction Historic Trash	Prehistoric Historic	Moderate	South Pisgah Lava
SGB-114 CA-SBR-13109	Lithic Scatter	Prehistoric	Low	South Pisgah Lava
SGB-118 CA-SBR-13110	Lithic Scatter	Prehistoric	Very Low	South Pisgah Lava

Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location & Landform
SGB-120 CA-SBR-13111	Lithic Scatter	Prehistoric	Low	South Pisgah Lava
SGB-127 CA-SBR-13112	Lithic Scatter	Prehistoric	Low	South Pisgah Lava
KRM-131 CA-SBR-13120	Lithic Scatter/Lithic Reduction	Prehistoric	Very Low	South
KRM-133 CA-SBR-13121	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South
KRM-165 CA-SBR-13122	Lithic Scatter	Prehistoric	Low	South Inset fan
EJK-004 CA-SBR-13124	Lithic Scatter	Prehistoric	Low	South Relict Alluvial Flat
EJK-005 CA-SBR-13125	Lithic Scatter	Prehistoric	Low	South Relict Alluvial Flat
EJK-009 CA-SBR-13126	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Relict Alluvial Flat
EJK-021 CA-SBR-3076	Lithic Scatter	Prehistoric	Low	South Relict Alluvial Flat/ Insert Fan
RAN 102 CA-SBR-4681	Lithic Scatter/Lithic Reduction	Prehistoric	Very Low	South Inset Fan
RAN-189 CA-SBR-5600	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah Lava
DRK-180 CA-SBR-5976	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South
RSS-020 CA-SBR-6528	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Inset Fan
CA-SBR-6521	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South
SGB-112/H	Lithic Scatter/Trash and Refuse Scatter	Prehistoric Historic	Moderate	South Pisgah Lava
CA-SBR-1908/H	Lithic Scatter/Lithic Reduction/150+stone mounds/Historic Trash Scatter/National Old Trails Road	Prehistoric Historic	Moderate in certain sectors	South Pisgah Lava/Inset Fan

C.3.4.11 THIRD-PARTY REVIEW OF ARCHAEOLOGICAL FIELD SURVEY

The resources described and depicted in Table 5 above are the result of URS' initial field inventory/recordation effort of the entire Calico Solar Project APE (Glenn and Nixon 2009). As part of a third-party review of the URS field inventory, the BLM (Barstow Field

Office) retained a third-party reviewer, LSA Associates, Inc. (LSA), in August 2009, to conduct ground-truth visits to a sample of the URS-recorded resources. Utilizing the printed DPR forms prepared by URS, as well as Trimble GPS units with Geographic Information Systems (GIS) digital data containing each site's boundaries and internal features, LSA conducted the task of verifying the DPR forms, recorded site boundaries, feature locations, and artifact classes at 28 (20%) of the 139 archaeological sites recorded by URS. The results of this ground-truthing effort conducted by LSA revealed errors in the initial URS resource recordation effort. The BLM and the Energy Commission, therefore, determined that a re-recordation effort of the cultural resources within project APE was warranted in order to provide a finer resolution of data that would better support this Staff Assessment.

C.3.4.12 RE-RECORDATION OFA 25 PERCENT SAMPLE OF ARCHAEOLOGICAL SITES IN PROJECT APE

Based on the results of the original 20% site revisit, LSA was then subsequently tasked by BLM-Barstow and the Energy Commission to design a field strategy for the re-recordation of an approximately 25% sample of the sites in the APE. As requested by BLM-Barstow and Energy Commission staff, the sample of sites identified for the re-recordation effort were randomly selected and stratified according to landform by LSA from the 139 archaeological sites initially identified by URS (Glenn and Nixon 2009). The intent of the field strategy developed by LSA was to provide a framework in which the resources could be adequately characterized and documented. URS was then tasked with re-recording the 25% sample of sites in accordance with the field strategy developed by LSA. It is intended that the remaining 75% of the sites within the APE would also be subject to re-recordation; however, due to time constraints, the remaining 75% re-recordation effort of sites in the APE will be addressed as part of the terms and conditions of the Programmatic Agreement.

<u>Results of 25% Re-recordation Effort</u>

A total of 38 archaeological sites were revisited and revised as part of the 25% sample re-recordation effort. The site areas of the 25% sample sites were re-examined in 3-meter intervals. As a result of the site revisits, the boundaries of some sites were expanded based on field observations, and in some cases, the site areas increased approximately 100% as compared to the previously recorded site boundaries. Most of the site boundary expansion was the result of the combination of one or more smaller sites with the randomly selected 25% sample sites. In addition, 10 new unrecorded cultural resources that were overlooked during the initial survey effort were also identified during the 25% sample site revisits, including four prehistoric sites with "rock piles" of unknown function and six historic campsites and artifact scatters along the edges of the National Old Trails Road (NOTR), which transects the project from east to west. The results of the 25% sample revisits, amounting to a total of 43 sites, are presented in Table 6 below.

Cultural Resources Table 6
Cultural Resources Inventory for the Project Area of Analysis
(25% sample of archaeological resources and
100% of ethnographic and built-environment resources)

Cultural Resource Classification and Designation(s)	Resource Type	Description*	Project Area Location	Landform Context
Archaeological Resources ***Prehistoric Archaeological Resources***				
KRM-135 CA-SBR-13033	Lithic Scatter/ Lithic Reduction	Prehistoric	South	Inset fan/ Relict alluvial fan
KRM-137 CA-SBR-13034	Lithic Scatter	Prehistoric	South	Inset fan/ Relict alluvial fan
KRM-153 CA-SBR-13036	Lithic Scatter	Prehistoric	South	Inset fan/ Relict alluvial fan
KRM-131 CA-SBR-13120	Lithic Scatter/ Lithic Reduction	Prehistoric	South	inset fan
KRM-133 CA-SBR-13121	Lithic Scatter/ Lithic Reduction	Prehistoric	South	Inset fan
EJK-005 CA-SBR-13125/H	Lithic Scatter	Prehistoric	South	Relict alluvial fan
RSS-006 CA-SBR-13087	Lithic Scatter	Prehistoric	South	Pisgah lava
RSS-008 CA-SBR-13088	Lithic Scatter/ Lithic Reduction	Prehistoric	South	Pisgah lava
RSS-011 CA-SBR-13090	Lithic Scatter/ Lithic Reduction	Prehistoric	South	Pisgah lava
SGB-114 CA-SBR-13109	Lithic Scatter	Prehistoric	South	Pisgah lava
SGB-118 CA-SBR-13110	Lithic Scatter	Prehistoric	South	Pisgah lava
SGB-127 CA-SBR-13112	Lithic Scatter	Prehistoric	South	Pisgah lava
DRK-150 CA-SBR-13009	Lithic Scatter	Prehistoric	South	Inset fan
DRK-155H CA-SBR-13012H	Trash Scatter	Historic	South	Alluvial fan
DRK-166 CA-SBR-13015	Lithic Scatter/ Lithic Reduction	Prehistoric	South	Pisgah lava
DRK-170 CA-SBR-13018	Lithic Scatter/ Lithic Reduction	Prehistoric	South	Pisgah lava

Cultural Resource Classification and Designation(s)	Resource Type	Description*	Project Area Location	Landform Context
DRK-171 CA-SBR-13019	Lithic Scatter	Prehistoric	South	Pisgah lava
KRM-028 CA-SBR-13032	Trail	Prehistoric	North	Alluvial fan
RAN-114 CA-SBR-13059	Lithic Scatter/ Lithic Reduction	Prehistoric	South	Pisgah lava
RAN-163 CA-SBR-13071	Lithic Scatter/ Lithic Reduction	Prehistoric	South	Pisgah lava
RAN-169 CA-SBR-13073	Lithic Scatter	Prehistoric	South	Alluvial fan
RAN-175 CA-SBR-13077	Lithic Scatter	Prehistoric	South	Axial Channel
RAN-177 CA-SBR-13078	Lithic Scatter	Prehistoric	South	Pisgah Lava
RAN-011 CA-SBR-13053	Lithic scatter	Prehistoric	North	Alluvial fan
RAN-110 CA-SBR-13058	Lithic Scatter	Prehistoric	South	Inset fan
DRK-133 CA-SBR-13001	Lithic scatter	Prehistoric	South	Pisgah Lava/Inset Fan
DRK-140 CA-SBR-13005	Lithic Scatter	Prehistoric	South	Inset fan
DRK-182 CA-SBR-13026	Lithic Scatter/ Lithic Reduction	Prehistoric	South	Pisgah Lava
KRM-003 CA-SBR-13029	Lithic Scatter	Prehistoric	North	Alluvial fan
KRM-170 CA-SBR-13041	Lithic Scatter/ Lithic Reduction/ Rock Feature	Prehistoric	South	Inset fan
LTL-009 CA-SBR-13043	Lithic Scatter/ Lithic Reduction	Prehistoric	South	Pisgah lava
RAN-025 CA-SBR-13054	Lithic scatter	Prehistoric	North	Alluvial fan
RAN-107 CA-SBR-13057	Lithic Scatter	Prehistoric	South	Inset fan
RAN-154 CA-SBR-13069	Lithic Scatter	Prehistoric	South	Inset fan
RAN-183 CA-SBR-13082	Lithic Scatter/ Lithic Reduction	Prehistoric	South	Pisgah lava

Cultural Resource Classification and Designation(s)	Resource Type	Description*	Project Area Location	Landform Context
SGB-013 CA-SBR-13096	Lithic scatter	Prehistoric	North	Alluvial Fan
DRK-112H	Rock cairn	Prehistoric	South	Relict alluvial fan
KRM-141 CA-SBR-13035	Lithic Scatter	Prehistoric	South	Inset fan/ Relict alluvial fan
CA-SBR-6512/CA-SBR6513 (SGB-028)	Lithic Scatter/ Lithic Reduction/ Stone Mounds	Prehistoric	South	Inset fan
RAN-155 CA-SBR-13070	Lithic Scatter/ Lithic Reduction	Prehistoric	South	Pisgah lava
Multiple Component Archaeological Resources				
SGB-112\H CA-SBR-13108/H	Lithic Scatter/ Lithic Reduction Historic Trash	Prehistoric Historic	South	Pisgah lava
DRK-176/H CA-SBR-13023H	Lithic Scatter Trash Scatter	Prehistoric Historic	South	Axial channel
KRM-154	Lithic Scatter	Prehistoric	South	Inset fan/ Relict alluvial fan

*See Appendix A for complete archaeological site descriptions.

Re-Recordation of Remaining 75% of Sites in the APE

As mentioned above, the re-recordation of the remaining 75% of sites in the APE will be completed in accordance with the PA. Based on a Data Request from BLM and Energy Commission staff, approximately 107 additional sites will be revisited. The site revisit task is ongoing at the time of the preparation of this document.

C.3.4.13 DISCUSSION OF RESULTS OF ARCHAEOLOGICAL SURVEYS

The environment and soils in the northern section of the project area differ from those in the southern section. The two sections are approximately delineated by the existing railroad line. The majority of cultural resources are observed in the southern portion and the ground surface is covered by developing and well developed desert pavement. This area has been affected by aeolian erosion forces and appears to exhibit potential for buried deposits. The northern portion contains alluvial and colluvial sediments on an extensive fan system that experiences substantial surface sheet wash.

Prehistoric site types consist of lithic reduction sites composed of local materials exhibiting basic flake and cobble technology. Unless otherwise noted, the lithic scatters did not include temporally diagnostic artifacts or features. Some of these sites contain numerous rock pile features of unknown function. Historic site types include transportation and mining related remains.

Historical Significance of the Cultural Resources Inventory

State and Federal regulatory programs require the BLM and the Energy Commission to consider the potential effects of the proposed action on historically significant cultural resources. Under the subject programs (CEQA, NEPA, and Section 106), formal evaluations of historical significance conclude the process of identifying which cultural resources in the inventory for the proposed action must be given further consideration. Cultural resources that can be avoided by construction may remain unevaluated. Unevaluated cultural resources that cannot be avoided are treated as eligible when determining effects. The early phases of the typical planning process often results in the development of a preliminary cultural resources inventory that includes more resources than a proposed action would ultimately affect, because the preliminary inventory cannot take into account the final design of the facility. Whereas efforts are on-going to design construction to avoid cultural resources, for the purpose of the present analysis, staff here assumes that the construction, operation, maintenance, and decommissioning of the proposed action may wholly or partially destroy all archeological sites on the surface of the project area. As a result, staff recommends that all known cultural resource in the project area of analysis be subject to formal evaluations of historical significance.

The time required for formal evaluations of historical significance for the complete cultural resources inventory would exceed the one-year licensing process. The Energy Commission staff has not been able to complete evaluations of the historic built environment resources and all archaeological resources in the project area of analysis; therefore, resource evaluations will occur subsequent to BLM and Energy Commission decisions on the proposed action pursuant to terms of a Programmatic Agreement. This subsection provides basic descriptions of the 25% inventory sample of archaeological resources, preliminary identifications of the archaeological landscapes and districts to which the archaeological resources may contribute, preliminary identifications of the archaeological site types that may be useful in evaluating the historical significance of whole groups of archaeological sites, and basic descriptions of the individual archaeological sites that do not appear to be elements of any archaeological landscape or district or do not conform to any identified site type. Each archaeological resource discussion will conclude, where appropriate, with a preliminary statement on the potential historical significance of each potential landscape, district, type, or particular resource. Discussions of probable effects to the full range of significant cultural resources will be made in the "Assessment of Impacts and Discussion of Mitigation" subsection below. As noted above, staff is participating in the development of a Programmatic Agreement (PA). One of the purposes of the PA is to identify the analytical processes that will be used to determine the significance of cultural resources and ensure appropriate mitigation for any impacts to those resources.

Archaeological Resources

Cultural Resources Table 8
Absolute and Relative Frequencies of the Landform Distribution of Whole Archaeological Resources and Components of Archaeological Resources in the Northern and Southern Sections for the Proposed Action Based on 25% Re-survey Results

Resource or Resource Component Classification and Type	Resource or Resource Component by Landform Context Northern Section (north of railroad)				
Prehistoric Archaeological Resources*	Rock Outcrops	Upper Alluvial Fan Piedmont (N=4)	Lower Alluvial Fan Apron		
Lithic Scatter		4			
Trail Segments		1			
Historical Archaeological Resources	Rock Outcrops	Upper Alluvial Fan Piedmont	Lower Alluvial Fan Apron		
None					
Resource or Resource Component Classification and Type	**Resource or Resource Component by Landform Context Southern Section (south of railroad)**				
Prehistoric Archaeological Resources*	Pisgah Lava (N=14)	Erosional Fan Remnant (NA)	Inset Fans (N=16)	Relict Alluvial Flat (N=13)	Axial Channel (N=1)
Lithic Scatter	14		16	13	1
Rock Features			2		
Historical Archaeological Resources	Pisgah Lava (N=1)	Erosional Fan Remnant (NA)	Inset Fans (NA)	Relict Alluvial Flat	Axial Channel (N=1)
Historic refuse deposit	1			N/A	1

*"Deposit" is a broad term that encompasses both diffuse artifact scatters and diffuse scatters that include periodic artifact concentrations.

Prehistoric Archaeological Resources. This analysis takes into consideration a total of 43 prehistoric archaeological resources (see Table 6). These resources consist of 42 archaeological sites and one prehistoric trail segment that are the result of the 25% sample of the cultural resources inventory for the project area of analysis/APE. The total number of sites is slightly greater than 25% because of the previously individual sites that were integrated with other sites as a result of the re-recordation effort (see Cultural Resources Table 7, above). The archaeological sites and prehistoric trail segment have been sorted into archaeological resource or site types (see Cultural Resources Table 8, above), and then sorted below into 3 site type groups, lithic scatters (N=40), historic deposits (N=2), and trail segments (N = 1). This subsection provides basic descriptions, interpretations, and, where appropriate, preliminary statements on the potential historical significance of each district and site type group.

<u>Preliminary Comment on the Historical Significance of Prehistoric Archaeological Resources</u>

Site Types and Site Type Groups

Lithic Scatter. The lithic scatter site type group includes chipped stone deposits, sparse chipped stone deposits, sparse chipped stone and angular jasper deposits, and “angular rock” concentrations in association with sparse chipped stone deposits. The absolute majority of the archaeological deposits in this site type group are found on the Pisgah Lava, Insert Fan, and Relict Alluvial Flat landforms where they make up the relative majority of site types on those landforms. The site type group largely appears to represent the procurement of stone suitable for the production of chipped stone artifacts and the early stages of production (including lithic reduction) of expedient flake tools through hard hammer percussion techniques, although the finished tools are seldom found at sites in the project area of study. The proposed PA would provide the opportunity to consider whether and how the relative ages of the archaeological deposits of this site type group may be determined, and whether and how behavioral associations may be made among these deposits and other prehistoric archaeological deposits in the project area. Determinations on the historical significance of the deposits in the site type group would rely on the outcomes of these considerations.

Prehistoric Trail Segments. The 25% sample of the cultural resources inventory for the proposed Calico Solar Project includes what is thought to be one prehistoric trail segment. The functions of trails within the Project area seem to be both related to accessing the desert pavement as a lithic raw materials source in the southern portion of the Project area and as a general route of travel through the area.

The longest, continuous trail identified during the survey phase traverses the Calico Solar Project area in the upper alluvial fan piedmont below the mountain front in the northern section of the project. The trail enters the Calico Solar Project area along its eastern boundary close to 3 miles northeast of the Pisgah Substation and crosses the area between 500 and 1,000 meters down slope of the front of the Cady Mountains and mountain valleys. Sites in this portion of the Project area are subject to high energy events as streams emanate from the mountain valleys and rework sediments in a complex network of braided channels. The effects of this phenomenon are apparent in the segmented nature of the trail.

While the longevity of portions of the trail is compromised by fluviation, the rocky nature of the surface also serves to preserve elevated and stabilized portions of the trail. The dynamic nature of this location makes the choice of positioning the trail difficult to interpret. The actual construction of the trail would take greater energy expenditure, in that clast size is much larger at this position in the landscape than further down the bajada slope. Typical clasts can be as large as small boulders. Impacts to the trail by flood events would demand that the trail be frequently repaired. Transecting the valley near the base of the mountains, where many channels are incised into the fan sediments, would be difficult and would require more energy. Conversely, further down the valley, near the axial channel on the fan apron of the alluvial piedmont, where travel might be easier, there is a lack of surface rock. Therefore, evidence of trails in this region would not be preserved or apparent during a surface survey. In addition to eolian deposition, sheet wash and constant down-cutting by runoff from the upper portion of the alluvial fan piedmont would alter the surface sediments and render the trails undetectable. Thus, conjecture about trails in this region of the Project area is not really feasible.

Rock Feature Concentrations. There is an unusually high density of rock features in the project APE and they occur in groups of 20 or more. The features are built from various sizes of round and angular pebbles and cobbles from the immediate area. They include cairn and rock mound features. The primary association of the features is with landscape surfaces from which surface boulders and rocks have been cleared. The primary artifact association of the rock features in the project is with prehistoric flakes and fragments, although not all features have them. Associations with historic artifacts are limited to the margins of the National Old Trails Road or other historic roads. The archaeological deposits of this site type are found exclusively on the Insert Fans and Relict Alluvial Fan Piedmont landforms. It is uncertain from surface inspection, recordation, and review of the pertinent literature whether the rock features are all prehistoric, all historic, or both. The behavioral interpretation of the site type, and determinations on the historical significance of the deposits would be made under provisions in the proposed PA and would rely on the interpretations ultimately derived for them.

Potential Prehistoric Archaeological Landscape. Data Request 106 asked whether a major portion of the Calico Solar Project area represents a part of a prehistoric archaeological landscape or district related to the exploitation of a consequential source of tool stone along the toe of the Cady Mountain bajada and south along the channels with ephemeral streams that drop into Troy Lake.

As was done to evaluate the potential for historic districts, above, URS considered the potential to define a prehistoric archaeological landscape while preparing the responses to cultural resources Data Requests 92 through 105. The potential landscape also was evaluated by reviewing the State of California Department of Parks and Recreation (DPR) forms completed for the individual resources within the potential landscape. The potential eligibility of those resources for the National Register of Historic Places (NRHP) or California Register of Historic Resources (CRHR), as a landscape that would include a large suite of flaked stone artifact scatters was evaluated for their potential to represent a significant and distinguishable entity, even if many of the scatters lack individual distinction. The potential landscape was evaluated using guidelines of the National Park Service and the State of California.

As discussed above, a grouping of cultural resources and their setting must be historically or functionally related and visually convey a historical theme or environment to be considered eligible for listing in the NRHP as a landscape. In addition, the landscape must possess sufficient historical significance and integrity. Clearly, the archaeological resources within the Project area, individually, and as a group, display a functional uniformity. All sites, presumed prehistoric in age, were used primarily, if not exclusively for exploitation of the tool stone that is ubiquitous on the desert pavements within the bolson. For this reason, the sites are inherently and directly linked to the landscape. Thus, the bolson in which the Project area is situated can be characterized as an archaeological landscape.

The mere presence of an archaeological landscape, does not, alone, qualify it for listing on the NRHP or CRHR. Several other criteria must be met for register eligibility. These are examined and evaluated, below.

The boundaries of a district or landscape “must be a definable geographic area that can be distinguished from surrounding properties by changes such as density, scale, type, age, style of sites, buildings, structures and objects, or by documented differences in patterns of historic development or associations” (U.S. Department of the Interior, National Park Service 2002:6). While distinctive for the direct relationship between tool stone and archaeological evidence of utilization of these lithic resources, the archaeological landscape within the Project area cannot be well-bounded, nor can it be distinguished from similar landscapes that occur throughout this portion of the Mojave Desert. The portion of the Calico Solar Project area that contains the majority of the lithic reduction sites is south of the axial channel, where sedimentary deposits are composed of a series of uplifted Pleistocene fan remnants and younger inset fans. Cryptocrystalline silicates, including jasper and chalcedony, basalts, andesite, and other volcanic materials constitute the majority of the desert pavement. The pavement occurs on the eroding fan remnants and the inset fans, as well as on relict portions of the alluvial flat. These desert pavements provide a ready source of high quality tool stone. However, such rich sources of tool stone are not confined to the project area, nor are they unique.

The source of the tool stone is thought to be fanglomerate and gravel (Qof) and volcanic fanglomerate (Tvf) as mapped by Diblee (2008), which are not confined to the Project area or vicinity. Thus, the tool stone source and landscape is not well bounded. Furthermore, similar formations, with equally high quality tool stone occur throughout the southern California deserts. Like the sources in the Project area, these were utilized throughout prehistory. Thus, the archaeological landscape in the Project area is not sufficiently bounded nor distinguished from surrounding areas to meet NRHP standards. Furthermore, the characteristic theme of the archaeological landscape cannot be dated. Only a handful of temporally diagnostic artifacts have been recorded among the lithic reduction sites. It is presumed, but unknowable, that this tool stone source was utilized throughout prehistory. Therefore, this archaeological landscape does not have the distinctive or significant qualities required for eligibility under Criterion C/3.

Again, the lack of datable material at the sites within the Project area precludes their consideration for eligibility under Criteria A/1 and B/2. Both criteria require information that could link the landscape with particular events and trends, or with historically significant people. Absent information about who used these sites, and when they were used, neither of these criteria can be met. Further, the registers require that a period of significance be identified for the district or landscape.

Finally, the lack of datable material also severely limits the utility of the assemblages to address important research issues. Data from the lithic reduction sites in the Calico Solar Project area can address only two, fairly insignificant questions: what materials were being exploited and what reduction residue was produced? These are insignificant because:

(1) the source material is well-documented and obvious, and (2) debris from lithic reduction is of predictable forms that can inform on the methods and products of reduction, unless, as is the case in the Project area, assemblages from different reduction episodes may be mixed. Components must be well dated to provide information about trends in resource procurement, artifact/tool forms, and technological changes through time. In fact, for a number of reasons, these issues can be addressed much more productively using data from sites where the tool stone was taken and used. First, the source locality only bears the residues of reduction, while the use site will bear evidence of the forms in which the stone arrived, and the types of tools manufactured. Second, diachronic changes in technology are best addressed using data from destination sites where components are well-dated, not at mixed tool stone procurement sites. Third, the presence of certain source materials in destination/use sites provides an indication of the direction and distances the materials traveled, either through trade or direct procurement; source sites rarely bear evidence of who used the tool stone. Lastly, destination sites that are well-dated, typically bear other artifacts and ecofacts that can inform on reasons why patterns of lithic resource procurement may change through time (e.g., climate change, resource stress, technological change, circumscribed territories, etc.). In sum, the lithic reduction sites and landscape do not have sufficient data potential to qualify for listing under Criterion D/4.

Preliminary Comment on the Historic Significance of Historic Resources

Historical Archaeological Resources

Site Types and Site Type Groups

Historic Refuse Deposits. The historic refuse deposit site type group includes historic refuse deposits. The archaeological deposits in this site type group are found on the Pisgah Lava, Relict Alluvial Flats, and Axial Channel landforms where they make up 27%, 50% and 100% of the historical archaeological site types, respectively. The behavioral interpretation of the site types in this group, and determinations on the historical significance of the deposits would be made under provisions in the proposed PA and would rely on the interpretations ultimately derived for them.

Built-Environment Resources. The proposed action appears to have the potential to affect each of the 8 built-environment resources in the project area of analysis (see Cultural Resources Table 7, above), none of which staff recommends as eligible for either the NRHP or the CRHR. The built-environment resources inventory includes cultural resources that represent the themes of: electric energy transmission (Pisgah Triangle Sub-station, Southern California Edison 12-Kilovolt Transmission Line); transportation (Hector Road and the National Old Trails Road, including associated locations of gravel mining, artifact concentrations and activity areas such as rest stops); natural gas energy transmission (Pacific Gas and Electric Pipeline and the Mojave National Gas Pipeline); and aviation (SGB-112/H).

- **Hector Road.** Four segments of Hector Road were recorded within the Calico Solar Phase 1 and Phase 2 project areas. The Hector Road interchange off of Interstate 40 provides access to the project area. Hector Road extends for a short distance south of Interstate 40 to U.S. Route 66. North of Interstate 40, Hector Road has been realigned since its original construction, and much of the historic segment of the road between Interstate 40 and the BNSF is not within the Calico Solar project area. The road in the vicinity of the Interstate 40 interchange is a two-lane paved roadway. North of the Interstate 40 interchange, Hector Road is reduced to one-lane, graded, dirt roadway. An improved railroad crossing has been constructed at Hector Road, which remains locked with a gate and padlock and is only used by local traffic with access permission. The improved crossing includes crossing arms and slightly sloped asphalt ramps that bring the road up to railroad grade and back down to road grade level.

From the BNSF, Hector Road continues northward about 1 mile to the northwest corner of Section 3, Township 8 North, Range 6 East, and then continues eastward along the section line for 3 miles. At the northeast corner of Section 1, Township 8 North, Range 6 East, Hector Road turns to the southeast and continues across sections 6 and 8 until its junction with the SCE 220-kV transmission line road. This segment of the road is a one-lane, graded dirt road that appears to be maintained and frequently used. The route of Hector Road from the railroad to the transmission line road has not been modified since its original construction in the late 1930s or early 1950s. Sometime after 1955, Hector Road was extended about 0.5 mile southeast to a road that leads to the Black Butte manganese mine. Hector Road likely was constructed to provide access to mines in the project vicinity. The road also could have been used to transport construction materials to the SCE 220-kV transmission line and the Pisgah Substation from the railroad.

Hector Road is not associated with any distinctive or significant event, person, design, or construction, and all data potential has been accounted for during the recordation process. The road is representative of typical construction, which has been well-documented in California and the West. Therefore, based on site investigations and historic research, Hector Road is recommended not eligible for the National Register and is not a historic resource pursuant to California Register under any of criterion for eligibility.

Based on site investigations and historic research, Hector Road is recommended not eligible for listing in the NRHP and CRHR. Hector Road is a modest example of a typical one-lane dirt graded rural road. It is not associated with any distinctive or significant events, persons, design/construction, or has the potential to yield important information about the past. The road is representative of typical construction, which has been well-documented in California and the West.

- **Pacific Gas and Electric and Mojave Pipelines.** The Pacific Gas and Electric Pipeline and the Mojave Pipeline are natural gas pipelines that run through the Solar 1 Phase 2 project area. Both of these pipelines were constructed prior to 1955, but there are no visible features of either pipeline in the Calico Solar Project Area. In addition, the Advisory Council on Historic Preservation has exempted federal agencies from taking into account the effects of their undertakings on historic natural gas pipelines (Advisory Council on Historic Preservation 2002). A brief history of these pipelines is provided in Section 3. The two pipelines would not be affected by the proposed project, and they are recommended as not eligible for the NRHP or CRHR under any criteria. DPR 523 forms were not completed for either pipeline.
- **National Old Trails Road [CA-SBR-2910H].** The National Old Trails Road in the project area includes eight remnant segments of a batched mix oil road. The

condition of the road segments is poor — most of the road surface is crumbled and cracked, and in places has eroded. Some segments are buried in sand, but may be partially intact. The National Old Trails Road was designated by highway “booster” organizations in 1912, and by the late 1920s much of the highway was either oiled or surfaced with gravel. In 1926, the National Old Trails Road was designated as U.S. Route 66, but in the 1930s, it was abandoned in favor of a route to the south, which is the current alignment of historical U.S. Route 66. Both the National Old Trails Road and 1930s alignment of U.S. Route 66 have been recorded under site number CA-SBR-2910H. Because remnants of both the 1912 alignment of the National Old Trails Road and the 1930s alignment of U.S. Route 66 are located within the Solar 1 study areas, separate update forms were completed for the National Old Trails Road and U.S. Route 66. In the 1970s, the Bureau of Land Management recorded a segment of the 1912-era National Old Trails Highway as part of the California Desert Project, and a segment of the 1930s U.S. Route 66 within the Eastern Mojave Planning Unit. The CA-SBR-2910H site form was updated during a survey for the All American Pipeline replacement project in 2001, in which the 1930s alignment was recorded. As a whole, the National Old Trails Road is significant as an early automobile transportation route across the Mojave Desert and as an early route for the historically significant U.S. Route 66 and is considered eligible for the NRHP and CRHR under Criterion A/1.

The eight segments of National Old Trails Road in the project APE are isolated, segmented, in generally poor condition, and retain little integrity. Research did not reveal any associations with distinctive or significant person, event, persons, design, or construction, and all data potential has been accounted for during the recordation process. These segments of National Old Trails Road in the Calico Solar Project APE is a typical example of an early automobile roadway and data potential is considered exhausted through recordation. Therefore, the eight segments of National Old Trails Road within the APE are recommended as contributing elements to the existing historic property for the National Register and as a historic resource pursuant to California Register under any of the criterion for eligibility. It is also recommended that additional research address the gravel mining associated with the construction of the National Old Trails Road and at the site of the possible associated rest stop at site RSS-017.

- **Southern California Edison 12-Kilovolt Transmission Line.** The SCE 12-kilovolt transmission line was constructed in 1961 as a rural distribution line. The line within the Calico Solar Project Area consists of fifteen 40-foot-tall utility poles, which are each 0.75 foot in diameter. The poles have a single T-post on the top with 3 ceramic insulators and 3 transmission lines. The poles are creosote-treated pine and each pole features an identification tag and an embossed nail on the left for height (40) and an embossed date nail (61) on the right. There also is an associated 207-foot-long historic transmission road and sparse historic trash in the vicinity of the transmission line.

  The 12-kv transmission line is not associated with any distinctive or significant event, persons design or construction, and all data potential has been accounted for during the recordation process. The 12-kv transmission line is modest example of a pine T-post utility pole transmission, of typical construction, which has been well-documented in the California and the west. Therefore, based on site investigations and historic research, the SCE 12-kilovolt transmission line is recommended not eligible for the National Register and is not a historic resource pursuant to California Register under any of criterion for eligibility.

- **Southern California Edison 220-Kilovolt North and South Transmission Lines.** The SCE 220-kilovolt North and South Transmission Lines are single-circuit transmission lines with lattice steel, wedge A-frame and metal-waisted tower structures. The evenly-spaced tower structures are approximately 75-feet-tall and include 3 conductor wires, 2 static wires, and insulators. Each Tower (within the Project APE) structure has four legs, which are anchored in concrete footings. The transmission lines are located in a rural setting on property managed by the BLM. The transmission lines originate at the SCE switchyard at the Hoover Dam and terminate in Chino, California. Two approximately 4.7-mile segments of the transmission lines were recorded within the Pisgah Substation Triangle area and the historic built-environment 0.5-mile buffer. A historic context is presented below.

  Construction the Hoover Dam started in 1931 and was completed in 1935. Power production for community use began in 1936 when power was delivered to the cities of Los Angeles, Pasadena, Glendale, and Burbank through three parallel transmission lines constructed by the Los Angeles Bureau of Power and Light (currently Los Angeles Department of Water and Power). The Los Angeles Bureau of Power and Light transmission lines were determined to be eligible for the NRHP and were formally nominated for listing in the NRHP in 2000, but apparently were not listed (Federal Highway Administration 2005; Hughes 1993; Myers 1983).

  The second company to distribute Hoover Dam power was the Nevada-California Corporation. The power was conveyed by a 132-kilovolt transmission line that had been originally constructed in 1930 and 1931 to deliver power to the dam site during construction (which has been recorded as CA-SBR-10315H]). This transmission line includes two-legged, prefabricated steel towers with angle cross arms, in contrast the four-legged lattice towers used in the SCE North transmission line. This transmission line also is known as the Edison Company Boulder Dam-San Bernardino Electrical Transmission Line and has been determined eligible for the NRHP and is listed in the CRHR (Hatheway 2006; Myers 1983).

  The Metropolitan Water District of Southern California was the next to distribute electrical power in 1938. This transmission line, known as the Metropolitan Water District Line, used technology similar to that used previously by SCE for 220-kilovolt transmission lines in southern California. Utilities companies in southern California, such as the Pacific Light and Power Company (which merged with SCE in 1917) and SCE were known as innovators in the development of high voltage systems. In 1926, Stanford University established a high-voltage laboratory and worked with Pacific Gas and Electric and SCE in research and development. Through this collaboration insulators for California's 220-kilovolt lines were developed. The Metropolitan Water District Line has been determined eligible for the NRHP under Criterion A for its association with Hoover Dam (Hughes 1993; Myers 1983; Schweigert and Labrum 2001).

  The SCE 220-Kilovolt North Transmission Line was constructed between 1936 and 1939, using the same design and technology SCE had been using for its existing high-voltage transmission lines in southern California (including its Vincent 220-

kilovolt line), and the design used by the Metropolitan Water District for its Hoover Dam line. The transmission line began receiving power from the Hoover Dam in 1939, after the completion of Hoover generating units A-6 and A-7 (Myers 1983; Schweigert and Labrum 2001).

When World War II began in Europe, SCE planners anticipated an increase in demand for power in southern California. SCE began construction on a second transmission line, the SCE South 220-Kilvolt South Transmission Line (SCE South or Hoover-Chino No. 2), in 1939. SCE North and SCE South take divergent courses from the SCE switchyard at the Hoover Dam but meet near Hemenway Wash in Nevada and run approximately parallel to each other from north of Boulder City, Nevada to Chino, California. SCE North and SCE South are parallel within the Solar 1 project area. Both SCE North and SCE South delivered electricity that was essential to war-time industries in Southern California. These industries included the Douglas, Vultee, and Northrup aircraft plants, Consolidated Steel, the Long Beach Naval Shipyard, Kaiser Steel, Alcoa, Columbia Steel, as well as automobile factories, tire plants, oil refineries, ordnance works, and military bases and depots (Myers 1983; Schweigert and Labrum 2001).

The SCE 220-Kilovolt North and South Lines are associated with the early operation of Hoover Dam and both played a significant role in providing electricity essential to World War II industries located in southern California. The Los Angeles Bureau of Power and Light transmission lines, the Edison Company Boulder Dam–San Bernardino Electrical Transmission Line, and the Metropolitan Water District Line, all of which provide Hoover Dam power to southern California, have all been determined eligible for the NRHP, and the Edison Company Boulder Dam–San Bernardino Electrical Transmission Line also is listed in the CRHR (Hatheway 2006; Myers 1983; Schweigert and Labrum 2001).

The SCE 220-Kilovolt North and South Lines were previously recorded in Nevada (site numbers 26CK6249 and 26CK6250) during the Boulder City/U.S. 93 Corridor Study, and were determined eligible for the NRHP by the Federal Highway Administration and Nevada State Historic Preservation Office (Federal Highway Administration 2005). Both the Southern California Edison 220-kilovolt North and South Lines are in-use and regularly maintained in the Solar 1 project area, but retain sufficient integrity to be considered for register listing. Because of the association of the transmission lines to the Hoover Dam and their significance in the World War II effort, the SCE 220-Kilovolt North and South Lines are recommended eligible for the NRHP under Criterion A and the CRHR under Criterion 1.

The transmission lines were constructed using the same design and technology SCE had been using for its existing high-voltage transmission lines in southern California. SCE and other southern California utilities companies were known as innovators in high-voltage systems (Hughes 1993). Further study would need to be conducted to determine the significance of the design to southern California utilities and how many examples of this type remain extant to determine if the SCE North and South transmission lines are eligible under Criterion C/Criterion 3.

Research did not reveal any associations with any important persons (Criterion B/Criterion 2) and the transmission line does not have the potential to yield important information (Criterion D/Criterion 4).

- **Pisgah Substation.** The Pisgah Substation is a Southern California Edison switching station that was constructed in 1940 during the construction of the SCE South 220-Kilvolt South Transmission Line and is considered a component of the transmission line (personal communication, Thomas Taylor, Manager, Biological and Archaeological Resources, Southern California Edison, 18 September 2008). It shares its name with the railroad siding of Pisgah and Pisgah Crater, which are located in the vicinity. A switching station is an intermediate station, which has incoming and outgoing power lines of the same voltage. Unlike other substations, a switching station does not transfer power from a higher voltage to a lower voltage, but instead works to control increases and decreases in voltage.

  In addition to the equipment associated with the function of the substation, including switch gears and bus bars, the Pisgah Substation also has three buildings, which house the relay station and battery equipment. The largest of these buildings is a rectangular brick building that faces southeast. The building has steel-frame fixed and casement windows. The main entrance is a single entry door with 15 lights, which is accessed by concrete steps with a metal railing. The hipped roof is clad with asphalt shingles and clay tile along the ridge lines.

  The other two buildings are smaller and appear to be used for storage. The building located at the north corner of the substation is a wood-framed box-shaped structure with a hipped roof that has exposed rafter ends and is clad with clay tile. There is a wood roll-up door on the southeast side of the building, suggesting that it is used to store vehicles or larger equipment. The other building is located adjacent to the wood-framed building and is a brick, box-shaped structure with a hipped roof that has exposed rafter ends and is clad with clay tile. The windows are steel frame casements and the building is accessed by a single entry wood door. All of the buildings are in good condition and appear to be in-use.

  The Pisgah Substation is not associated with distinctive or significant person, and the substation is of a typical design for its era and is not a rare surviving example (personal communication, Thomas Taylor, Manager, Biological and Archaeological Resources, Southern California Edison, 18 September 2008). Although this switching station is associated with the Southern California Edison 220-Kilovolt North and South Lines, which is recommended eligible for the National Register and California Register under Criteria A/1 (see above evaluation). The Pisgah Substation is a component of the transmission line, therefore it also recommended eligible for the National Register and as a historic resource pursuant to California Register under criteria A/1 for eligibility.

- **Pisgah Crater Road.** Pisgah Crater Road currently runs between the SCE 220-kilovolt transmission line road to the Pisgah Crater, a volcanic cinder cone located south of the Project Area. U.S.G.S. 15-minute topographic quadrangles indicate that this road was extended sometime after 1955 because the map only depicts the road between Pisgah Crater south of U.S. Route 66 and a small segment north of U.S. Route 66 that terminates at the BNSF Railway. The segment of Pisgah Crater Road that is historic-age (45 years old or older) is paved with asphalt and is approximately 24 feet wide. The Pisgah Crater currently is being mined for aggregate and is located on private land. The road does not appear to be regularly maintained and likely is only sporadically used to access the mine.

> Pisgah Crater Road is not associated with any distinctive or significant event, person, design, or construction, and the data potential has been accounted for during the recordation process. The majority of the road is located on private land and much of the crater has been destroyed by mining. No records were found to indicate that the Pisgah Crater was ever a well-known tourist destination for U.S. Route 66 travelers. The road is representative of typical construction and design, which has been well-documented in California and the west. The Pisgah Crater Road is of common design and construction. Further study of the road is unlikely to yield important information about the past. Therefore, Pisgah Crater Road is recommended as not eligible for listing the National Register and is not a historical resource pursuant to the California Register under any of the criterion for eligibility.

Brief descriptions of the built-environment resources and recommendations on their historical significance are presented below. The information for the descriptions and evaluations is drawn from the applicant's cultural resource technical reports and the applicant's responses to Energy Commission and BLM data requests (SES 2008e, 2009h).

Landscapes

Early Twentieth Century Gravel Mining Landscape. Gravel mining appears to have been a relatively widespread form of land use in the project area from approximately 1900 through the early 1960s. Although much of the gravel mining appears to have been associated with the construction of the National Old Trails Road, no specific archival information has been found regarding the gravel mining operations. This earlier operation, on the basis of the data presently in hand, appears to date from approximately 1900 to 1920 and further appears to have been operated using older, largely non-mechanical gravel mining techniques. These techniques appear to have involved the use of draft animals to pull rakes or scraping sleds across the relatively well-developed desert pavements of the Insert Fans landform to extract the gravel resource. This apparent form of mining has left the mined desert pavements with a distinctive pattern of scarification, linear swaths of the ground surface relatively devoid of gravel and punctuated at somewhat regular intervals with low gravel lag mounds. The scarification pattern permits one to readily delineate the area that was subject to this form of mining.

Staff proposes the designation of a historical archaeological landscape, an industrial landscape that represents the apparent early twentieth century gravel mining operation in the south-central portion of the project area and that it apparently associated with the construction of the National Old Trails Road. The landscape, on the basis of the results of the 25% sample of the cultural resources inventory for the proposed action, presently includes the area that exhibits the distinctive pattern of scarification that was the result of this operation and the historical archaeological component of RSS-017, an apparent early twentieth century rest area alongside the National Old Trails Road. The further inventory of potential contributing elements to the proposed landscape, refinements to the recordation of those elements, and determinations on the historical significance of the landscape as a whole and of the individual contributing elements, both as contributing elements and as stand-alone archaeological resources would be made under provisions in the proposed PA.

Manganese Mining in the Project Vicinity. Three of the 11 documented manganese mines within San Bernardino County are in the Project vicinity — the Logan Mine, Black Butte Mine, and Lavic Mountain Manganese Mine. The Logan Mine is the only one of these within the Project APE.

The Logan Mine (also referred to as the Trans-Oceanic Mine) was not located until early 1930 and its first ore shipment, 71 tons of ore with 44% manganese, was made in 1934. E.F. Logan of Daggett, and later of San Bernardino, owned the mine, which in 1953, consisted of six claims. During 1942 and 1943, Logan leased the mine to Suckow Borax Mines Consolidated Company of Los Angeles. In 1943, the Logan Mine shipped about 300 tons of ore with 40% manganese to the Metals Reserve Company. By the end of 1943, the mine was idle, and no employees were working at the mine. Subsequent to the Suckow lease, the mine produced 200 tons of ore with 19% manganese for the Kaiser Steel Corporation in Fontana. In 1953, the California Division of Mines and Geology reported that the Logan Mine continued to be worked occasionally (Tucker and Sampson 1943; Wright and others 1953).

The California Division of Mines and Geology rated the manganese mines located on the southwest slope of the Cady Mountains in the Project vicinity as third in terms of production in all of San Bernardino County. The New Deal Mine at the south end of the Owlshead Mountains was the largest producer, followed by the mines in the Whipple Mountains. All three mines in the Project vicinity were small operations that were only active during times when manganese was in great demand and prices were high. Of the three mines, the Logan Mine was the most productive. Although work was done at the Lavic Manganese Mine during World War II, no ore was shipped during this era and records indicate only 100 tons of ore was shipped from the mine during World War I. Both the Black Butte Mine and the Logan Mine were active during World War I and World War II. The Black Butte Mine produced approximately 425 tons while the Logan Mine produced more than 700 tons. When compared to the manganese mines county-wide, the manganese mines in the Cady Mountains produced far less manganese ore than those in the Owlshead and Whipple Mountains. The Monument King Mine in the Whipple Mountains reportedly shipped approximately 1,800 tons of ore and the New Deal Mine in the Owlshead Mountains shipped more than 15,000 tons (Tucker and Sampson 1943; Wright and others 1953).

The Logan Mine Site (CA-SBR-4558H) was originally recorded in 1979 and is the archaeological remnants of a surface manganese mining site. It is also referred to as the Trans-Oceanic Mine. The Logan Mine was one of three manganese mines in the Project vicinity, but the only one within the Project APE. E. F. Logan of Daggett, and later of San Bernardino, owned the mine, which by 1953 consisted of six claims. Activity at other mines in San Bernardino County began either in World War I or World War II when the demand for manganese ore was high (manganese is used in making iron and steel and foreign supplies were reduced during the wars). The Logan Mine was located in the early 1930s at a time when domestic manganese mining was at an ebb because war-time subsidies were not in place. The records are silent as to why E.F. Logan chose to begin his manganese enterprise at this time, but it may have been a means of making extra money during the Great Depression. Little capital is needed to operate a small manganese operation, and the federal government continued to stockpile the metal in limited quantities. Logan continued to at least intermittently work the mine during the 1930s, and in 1934, Logan's first ore shipment consisted of 71 tons of ore with 44% manganese and 2% silica (Wright and others 1953).

During World War II, Logan leased the mine to Suckow Borax Mines Consolidated Company of Los Angeles. In 1943, the Logan Mine produced about 300 tons of ore with 40% manganese that was shipped to the Metals Reserve Company. By the end of 1943, the California Division of Mines and Geology reported that the Logan Mine was idle, and no employees were working at the mine. Subsequent to the Suckow lease, the mine produced 200 tons of ore with 19% manganese and shipped it to the Kaiser Steel Corporation in Fontana. In 1953, the California Division of Mines and Geology reported that the mine continued to be worked occasionally (Tucker and Sampson 1943; Wright and others 1953).

The Logan Mine site (CA-SBR-4558H) measures approximately 4,048 feet SW/NE by 1,243 feet SE/NW with a total area of 75 acres (GIS calculation). The site has 12 mining cairns, 11 features, two historic refuse deposits, open pit mines, and dynamite blast quarry areas. The site is situated in and along the base of the Cady Mountains. Features occur along washes and lower desert pavement terraces, as well as on ridge tops. There are several road segments that have washed out throughout the site leading to areas of surface mining and structures within the site, all of which are in ruins. The site area is bounded to the north and northwest by the Cady Mountains and to the east, west, and south by open undeveloped BLM land. Sediment across the site is typically metavolcanic rocks, desert pavement, and fine grain alluvial sand with small to medium subrounded to sub-angular gravels and cobbles ranging from 1 to 30 centimeters in size.

Of the three manganese mines in the Project vicinity, the Logan Mine appears to have been the most active, but like the other two mines appears to have been a small operation with only a few employees at a time. Historical records do not describe the equipment used on site to extract and process the ore, but during the field investigation, structures that appear to be related to the concentration of manganese ore were documented. Most manganese mines in the vicinity relied only on hand sorting to concentrate the ore. Structures and pulverized ore at the Logan Mine indicate that the mine had a more elaborate concentration system. Features 6 through 9 probably are part of a small mill operation. Features 6 and 7 are remnants of a fallen wood and concrete structure that may have been part of a conveyor that delivered ore to Feature 8. Feature 8 has a concrete structure that may have served as a base for milling equipment. Nearby timber structures probably were chutes used to store ore. Feature 9 is a concrete-lined slurry pool measuring 20 feet wide and 16 feet deep that may have been used for some type of flotation process. Waste piles of pulverized rock surround these features. The mill and associated features probably date to the World War II years of operation when subsidized prices made investment in machinery feasible.

The concentration and processing area of the mine is located near the south end of the site. Feature 5, a collapsed wood-frame structure clad with corrugated metal with plastered interior walls, wood frame awning windows, and a porch, and Feature 11, a 52- by 55-inch privy, also are in this area. Debris found in the area includes lumber; tires; bed/couch springs; truck seat springs; brown glass; and oil, paint, and gas cans. The presence of these features and the associated debris indicates that this area may have been a habitation area for the mine workers. Debris noted within the concentration and processing area included a truck frame and parts, mason jars, sheet metal, siding, metal processing parts, oil filters, gas cans, rubber, wood/lumber, melted rubber, an oil can, and paint cans.

Features 2, 3, and 4 are located south of the concentration and processing area. Feature 2, a concrete pad with mounting bolts, and Feature 3, a wood utility pole, indicate that electricity was available on site. Feature 4 is east of Features 2 and 3 and is a 300-foot-deep well pipe or stand pipe.

Feature 10, the closest feature to the surface mine itself in the north end of the site, is a rock-lined foundation with posts in situ. Structural debris was located down a nearby drainage, and a historic refuse deposit was found northwest of the feature. Historic refuse included food and kerosene containers, glass, ceramics, construction materials, and a sole of a shoe. This trash indicates that this area also was used as a worker habitation area or was a dump site. A large quantity of household debris also was located down slope from the feature.

Feature 1, located southeast of Feature 10, consists of structural debris associated with a stand pipe. The debris appears to be fallen, non-residential, wood-framed mine structures with corrugated metal siding. At the center of the eastern site boundary, an L-shaped pipe was observed that extends upward 72 inches with 36 inches exposed and west 72 inches with 9 inches exposed, with the remainder subsurface. The pipe rests atop a pocket of eroded earth consistent with water flow down through the pipe. A rock foundation is located on the northern end of the site. The foundation is a rectangular and U-shaped, and is constructed with red metavolcanic rocks typical of the area.

The Logan Mine was evaluated within the context of manganese mining in the Project vicinity and in San Bernardino County. Like other mines in the area, the Logan Mine was active during times when manganese was in great demand and worked intermittently at other times. The Logan Mine was the largest producer of the three manganese mines in the Cady Mountain area, but was not a large producer in comparison with other mines in the Owlshead and Whipple mountains in San Bernardino County. Archaeological recording documented that there was some type of small-scale milling and concentrating operation at the Logan Mine. Historic documents indicated the processing or ore at most manganese mines in the region was limited to hand sorting, and had not reported the milling operation at the Logan Mine. Because the other two Cady Mountains manganese mining sites are not within the Project APE, they were not visited to determine if similar structures are present at those mines. Although there are a few standing features at the Logan Mine, it has been abandoned for some time and vandalism and neglect has affected the condition of the site. Historical records contain much information about manganese mining in California and San Bernardino County. The site recording of the Logan Mine and historic research that was conducted as part of this study has thoroughly documented the site and further research is unlikely to yield important information. Therefore, CA-SBR-4558 is not recommended eligible for the National Register and is not a historical resource pursuant to CEQA under any of the criteria for eligibility.

Historically, settlers have mined in and around the Mojave Desert since the late 19th century. Such sites are frequently demarcated by simple structures, rock cairns, and/or posts. The Cady Mountains have witnessed historical various mining activity. Research indicates that the Logan Mine, a manganese mine within the Project APE, was developed in the 1930s. Production apparently peaked in 1942 when 300 tons of ore were shipped to meet war time demands. The mine, however, was idle the following year and was only intermittently worked in the 1950s.

The results of the survey found that the Logan Mine (CA-SBR-4558H) has fallen into extreme disrepair. The ruins of this site consist of dilapidated structures associated with mining, including open pit mines, dynamite blast quarry areas, mining claim/cairns (one with the original mining claim), remnants of buildings and structures, and refuse associated with the occupation and operation of the mine. Overall, the condition of the site has been compromised over time, by looting, target practice, off-highway vehicular travel, and the elements. Historical records document much information about manganese mining in California and San Bernardino County. The recording of the Logan Mine site and historic research that was conducted as part of this study has thoroughly documented the site and further investigation has little potential to yield important information. The resource is recommended not eligible for the NRHP and CRHR. There are no other mines in the Project APE.

There are various mining claim cairns in and around the northern and eastern portion of the Cady Mountains, which extend into the Project APE. Along the abandoned segment of the National Old Trails Highway two cairns also were observed (P36-014519 and P36-014520). These rock concentrations are almost exactly 400 feet apart and both are approximately 250 feet from the centerline of the former alignment of the Old National Trails Highway. The placement of the cairns and absence of known mining deposits in the area indicates that these cairns probably are associated with the highway and may have been land surveying monuments. San Bernardino County was responsible for route planning at the time the Old National Trails Highway was designated, and the route may or may not have been professionally engineered. No historical "as built" drawings of the highway have been located, and thus, we cannot make a direct association between the rock cairns and the highway. Modern surface prospects also occur in the Project APE. They are shown on modern maps (1982 U.S.G.S. 7.5-minute topographic quadrangles), but are absent from historic maps (1955 U.S.G.S. 15-minute quadrangles). All of the surface prospects lack diagnostic material (documentation and/or datable cans/refuse) and are considered modern. There are numerous modern cairns marking OHV routes and camp sites that should not be confused with historic or prehistoric cairns.

C.3.4.14 POTENTIAL HISTORIC DISTRICTS

Southern California Edison Historic District

Resources that could be included in the potential SCE Historic District are the SCE 220kV North and South Transmission Lines (CA-SBR-13115H and CA-SBR-13116H), Pisgah Substation (CA-SBR-13117H), and archaeological site CA-SBR-12992H.

The SCE 220-kV North and South Transmission Lines are single-circuit transmission lines that originate at the SCE switchyard at Hoover Dam and terminate in Chino, California. Both transmission lines played significant roles in providing electricity that was essential to World War II industries located in southern California. The transmission lines were previously recorded in Nevada (site numbers 26CK6249 and 26CK6250) during the Boulder City/U.S. 93 Corridor Study, and the Federal Highway Administration and Nevada State Historic Preservation Office made a consensus determination that they are eligible for the NRHP. Both transmission lines are in service and are regularly maintained in the Project area, but they retain historical integrity. Because of the association of the transmission lines to Hoover Dam and their significance in the World War II effort, the SCE 220-Kilovolt North and South Lines were evaluated as eligible for the NRHP under Criterion A and the CRHR under Criterion 1.

The Pisgah Substation is an SCE switching station that was constructed in 1940 (personal communication, Thomas Taylor, Manager, Biological and Archaeological Resources, Southern California Edison, 18 September 2008). In addition to the equipment associated with the function of the substation, including switch gears and bus bars, the Pisgah Substation also has three buildings, which house the relay station and battery equipment. Because the Pisgah Substation is a component of the SCE 220-kV North and South Transmission Lines, the substation also was evaluated as eligible for the NRHP under Criterion A and for the CRHR under Criterion 1.

Archaeological site CA-SBR-12992H is a small, low-density scatter of historic trash with approximately 750 items, including glass fragments, animal bone fragments, tableware, ceramics, cans, wire, leather, and wood. The site has four concentrations of historic refuse. The site is near the SCE North and South Transmission Lines, and may be the remains of a work camp related to the construction of the transmission lines and the Pisgah Substation. The site was evaluated as not eligible for the NRHP and CRHR because of the low quantity of artifacts, lack of integrity, low probability of subsurface artifacts and features, and little potential for the site to yield important information.

The SCE 220-kV North and South Transmission Lines and Pisgah Substation are historically and functionally related and visually convey a historic theme in the Project vicinity. Both resources also possess historical significance and integrity and were recommended as individually eligible for the NRHP and CRHR. No artifacts were found that directly associate archaeological site CA-SBR-12992H to the SCE facilities, but its proximity to the transmission lines suggests it is related. However, the archaeological site was evaluated as not eligible and would not be a contributor to the potential historic district.

Both the National Park Service and State of California definitions indicate that historic districts must have definable and precise boundaries and that these boundaries rarely are defined by planning or management boundaries, or by ownership parcels, but rather must be based upon the spatial locations of the district’s contributing properties (Title 14, California Code of Regulations, section 4852(a)(5); U.S. Department of the Interior, National Park Service 2002). The SCE 220-kV North and South Transmission Lines are long, linear resources that extend more than 200 miles between Hoover Dam in Nevada to Chino, California. Only about 4.7 miles of the transmission lines were recorded as part of this Project within the Pisgah Substation Triangle area and the historic built environment 0.5-mile buffer. Because the entire route of the transmission line was not studied as part of this Project, it is impossible to delineate a boundary that is not arbitrarily defined by the Project and buffer areas. Therefore, it seems inappropriate to define a district. Both transmission lines and the substation were recommended as individually eligible for listing in the NRHP and CRHR, and inclusion in a historic district would not upgrade their status for preservation purposes.

Atlantic & Pacific (Atchison, Topeka, & Santa Fe) Railroad Historic District

Resources that could be included in a potential Atlantic & Pacific (Atchison, Topeka, & Santa Fe) Railroad Historic District are the railroad (CA-SBR-6693H) and seven nearby refuse deposits. The Atlantic & Pacific Railroad was originally recorded as a historic resource in California in 1990. The Southern Pacific Railroad Company originally constructed the segment of the railroad in the Project vicinity as part of the Mojave to Needles branch in 1882 and 1883. In 1884, the Atlantic & Pacific Railroad, a subsidiary of the Santa Fe Pacific Railroad, leased the Mojave to Needles branch and purchased the single-track branch in 1911. In 1897, the branch was redesignated as the Santa Fe Pacific Railroad and later became known as the Atchison, Topeka, & Santa Fe Railway. In 1923, a second track was added. The railroad currently is used and maintained as the Burlington Northern Santa Fe Railway. In the Project area, the railroad has a double trackway on a raised, ballasted bed. The railroad has been previously evaluated as eligible for the NRHP and CRHR under Criterion A/1 for its association with the history of transportation in California. Although much of the railroad has been upgraded for continued use and few historical materials remain in place, the segment in the Project vicinity retains integrity of location. Thirteen previously unrecorded bridges were identified during the Class III intensive field survey along the railroad within the Project APE and the 1/2-mile built environment buffer. Five of the bridges retain sufficient integrity to be considered contributing elements to the railroad. The other eight are either modern replacement bridges or have been highly modified.

As of 2006, about 1,800 railroad-related properties had been listed in the NRHP. Most of these properties included depots, railroad cars, and locomotives. The only listed railways are shorter spur lines (Railway Preservation Resources 2006). Historic railroad districts that have been established in other locations typically include buildings and structures, such as homes, depots, warehouses, and commercial buildings, which were built as a result of the railroad and rarely include the railroad structure itself as a contributing property. Both the National Park Service and State of California definitions indicate that historic districts must have definable and precise boundaries and that these boundaries rarely are defined by planning or management boundaries (Title 14, California Code of Regulations, Chapter 11.5, Section 4852(a)(5); U.S. Department of the Interior, National Park Service 2002). The railroad is a long, linear resource that extends across seven states, and only about 10.5 miles of the railroad were recorded as part of this Project within the historic built environment 0.5-mile buffer. Because the entire route of the railroad was not studied as part of this Project, it is impossible to delineate a boundary for a segment of the railroad in the Project vicinity that would not be arbitrarily defined by the Project and buffer areas. Therefore, it seems inappropriate to define a district.

URS reviewed the site descriptions for the seven historic refuse sites located in the vicinity of the railroad, including CA-SBR-13002/H, -13012H, -13014H, -13017H, 13023/H, -13101, and -13108H. Because the sites have few temporally diagnostic artifacts, it is unclear whether these sites are contemporaneous. In addition, the types of artifacts do not indicate clear associations with the railroad. Three of these sites were evaluated as not eligible for the NRHP and CRHR because of the low quantity of artifacts, lack of integrity, low probability of subsurface artifacts and features, and little potential to yield important information. Four of these sites (CA-SBR-13002/H, -13012H, -13014H, -13017H) were recommended as eligible for the NRHP and CRHR for their potential to yield important information, and testing was recommended to provide the lead agency with additional data necessary to determine eligibility. The recommended limited subsurface testing at four of the historic refuse sites should be conducted to determine if additional information can be obtained to support the hypothesis that these sites are related to railroad activities or some other activity.

In summary, defining a railroad district seems inappropriate because any boundary on a segment of the railroad would be arbitrary, and the associations of the trash scatters have not been confirmed. The railroad in the Project area and the four trash scatters that have potential to yield important information were recommended eligible for listing in the NRHP and CRHR. Inclusion of those properties in a historic district would not upgrade their status for preservation purposes.

National Old Trails Highway/U.S. Route 66 Historic District

Resources that could be included in the potential National Old Trails Highway /U.S. Route 66 Historic District are extant segments of National Old Trails Highway, U.S. Route 66, and two rock concentrations. (The CEC and BLM identified a third rock concentration, P36-014578, in their data request, but it is located well to the north of the highways in the vicinity of the Logan Mine and almost certainly is unrelated to the highways).

U.S. Route 66 in the Solar 1 historic built environment 0.5 mile buffer area is a two-lane, paved roadway that currently serves as a frontage road for Interstate 40. This segment was originally constructed in the 1930s, south of the highway's original alignment, which was known as the National Old Trails Road. The National Old Trails Road in the Project area is represented by eight remnant segments of a batched mix oil road. The condition of the road segments is poor — most of the road surface is crumbled and cracked, and in places has eroded. Some segments buried by sand may be partially intact.

The National Old Trails Road was designated by "booster" organizations in 1912, and by the late 1920s much of the highway was either oiled or surfaced with gravel. In 1926, the National Old Trails Highway was designated as U.S. Route 66, but in the 1930s the segment in the Project area was abandoned in favor of a route to the south, which is the current alignment of historical U.S. Route 66. Both the National Old Trails Road and 1930s alignment of U.S. Route 66 have been recorded under site number CA-SBR-2910H, and previously evaluated as eligible for the NRHP under Criterion A as one of the first all-weather highways in the United States.

The segment of U.S. Route 66 in the study area retains historical integrity and is considered eligible. The National Old Trails Road in the study area is physically distinct from the U.S. Route 66 (U.S. Route 66 is south of Interstate 40 and the National Old Trails Road is north of the Interstate. The National Old Trails Road preceded U.S. Route 66 chronologically and physically and has its own history and characteristics. The

National Old Trails Road is recommended as a distinct cultural resource that merits its own site number and independent determination of eligibility.

Two cairns also were recorded (P36-014519 and P36-014520) along the abandoned segment of the National Old Trails Highway. These rock concentrations are almost exactly 400 feet apart and both are approximately 250 feet from the centerline of the former alignment of the Old National Trails Highway. The placement of the cairns and absence of known mining deposits in the area suggests that these cairns may have been survey markers associated with the highway. San Bernardino County was responsible for route planning at the time the Old National Trails Road was designated, and the route may or may not have been professionally engineered. No historical as-built drawings of the highway have been located, and thus, a direct association between the rock cairns and the highway remains ambiguous. The cairns are recommended ineligible for the NRHP and not significant historical resources eligible for listing in the CRHR.

Segments of U.S. Route 66 and the National Old Trails Road have been listed in the NRHP in several states. U.S. Route 66 related districts have been listed but they include properties such as roadside businesses related to the development of the highway within the boundaries of a specific town or locality. There are no such properties in the Project vicinity, although a rest area associated with the National Old Trails Road may be present east of the CA-SBR-1908 site area at site RSS-017. A statewide inventory of U.S. Route 66 has not been conducted for California. If a historic district or multiple property listing of the highway was defined in California, the segment of the 1930s U.S. Route 66 in the Project vicinity probably would be considered a contributing element. However, defining a U.S. Route 66 district at the Project limits would be arbitrary for a highway that ran through Illinois, Missouri, Kansas, Oklahoma, Texas, New Mexico, Arizona, and California. Because the other associated properties have little historic value, there seems to be little justification for defining a National Old Trails Road/U.S. Route 66 Historic District.

Ethnographic Resources

There are no ethnographic resources that are presently known with certainty to be in sight of the proposed project area.

Preliminary Discussion on the Historical Significance of Ethnographic Resources. There are no ethnographic resources of historic significance in the proposed project.

C.3.4.15 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Materials and Equipment Staging Area. A100-acre lay down yard will be cleared on the southeast corner of the project site where SunCatchers will be assembled. Assembly buildings will be constructed adjacent to the Main Services Complex for the onsite assembly of the SunCatchers. The assembly buildings will be decommissioned and salvaged for re-use once all Calico Solar SunCatchers have been installed. SunCatchers will be installed in the area vacated by the removal of the construction laydown areas and assembly buildings when construction is completed.

Operations Impacts

Liquid Wastes. SunCatcher mirror washing, operations dust control, potable water use, and water treatment under regular maintenance routines will require an average of 33.4 gallons of raw water per minute, with a daily maximum requirement of 56.6 gallons of raw water per minute during the summer peak months each year, when each SunCatcher receives a single mechanical wash. Road and SunCatcher area long-term maintenance would include:

- Temporary soil stabilization (SS) techniques, such as scheduling construction sequences to minimize land disturbance during the rainy and non-rainy seasons and employing BMPs appropriate for the season; preserving existing vegetation by marking areas of preservation with temporary orange propylene fencing; using geotextiles, mats, plastic covers, or erosion control blankets to stabilize disturbed areas and protect soils from erosion by wind or water; using earth dikes, drainage swales, or lined ditches to intercept, divert, and convey surface runoff to prevent erosion; using outlet protection devices and velocity dissipation devices at pipe outlets to prevent scour and erosion from storm water flows; and/or using slope drains to intercept and direct surface runoff or groundwater to a stabilized water course or retention area.
- Sediment Control (SC) techniques, such as using silt fences, straw bales, and/or fiber rolls to intercept and slow the flow of sediment-laden runoff such that sediment settles before runoff leaves the site.
- Wind Erosion (WE) control by applying water or dust palliatives, as required, to prevent or alleviate windblown dust.
- Tracking Control (TC) techniques to limit track-out, such as using stabilized points of entering and exiting the project site and stabilized construction roadways on the site.
- Other measures, as appropriate, to comply with the regulations.

Project Closure and Decommissioning

SES recognizes that development of a final termination and restoration strategy will be a collaborative process with the BLM and the CEC. Prior to authorization it is anticipated that more clarity related to this effort will be directed by the BLM. Following is a brief discussion of concepts that may be more fully considered in the development of a termination and restoration strategy for the project.

- Although the project setting for this project does not appear, at this time, to present any special or unusual closure problems, it is impossible to foresee what the situation will be in 30 years or more when the project ceases operation.
- To ensure adequate review of a planned project closure, the project owner would submit a proposed facility closure plan to the CEC and BLM for review and approval at least 12 months (or other period of time agreed to by the FAO) prior to commencement of closure activities.
- In order to ensure that public health and safety and the environment are protected in the event of an unplanned temporary facility closure, it is essential to have an on-site contingency plan in place. The on-site contingency plan will help to ensure that all necessary steps to mitigate public health and safety impacts and environmental

impacts are taken in a timely manner. The project owner would submit an on-site contingency plan for the FAO review and approval. The plan would be submitted no less than 60 days (or other time agreed to by the FAO) prior to commencement of commercial operation.

- In addition, consistent with requirements under unplanned permanent closure addressed below, the nature and extent of insurance coverage, and major equipment warranties must also be included in the on-site contingency plan. In addition, the status of the insurance coverage and major equipment warranties must be updated in the annual compliance reports.

SES continues to develop the design for the project, and will coordinate with all required agencies as part of the CEC/BLM permitting process. It is SES's understanding that a bond will be required for the SES Calico Solar Project.

Trenching for Buried Linear Facilities (Pipelines, Transmission Lines). SunCatcher systems will be tied together by an underground cable system.

Demolition of Structures on the Project Site or Along Linear Facilities. None.

Alterations to Old Substations or Transmission Lines to Upgrade for More Capacity. Final design and construction of transmission facilities and reliability upgrades at the SCE Pisgah Substation and the Pisgah-Lugo 230 kV Transmission Line (should they be required) will be completed by Southern California Edison.

Addition of New and Incompatible Structures in an Old Neighborhood (even an Industrial One), or in the Rural Setting of an Old Agricultural Landscape, or in an Old Transmission Line Corridor, Affecting the Integrity of Setting and Feeling. With the presence of gas pipelines, historic roads, railroad line, transmission lines, and a substation, the project area is currently an open and relatively undeveloped landscape.

<u>Identification and Assessment of Direct Impacts on Archaeological Resources and Recommended Mitigation</u>

A. Identification analysis is based on the three following observations:

1. Whereas testing has not been completed, a subset of sites may qualify for the NRHP and CRHR.
2. Given the low quantity and density of cultural resources present, it may be possible to avoid known cultural resources by project construction.
3. The potential exists for buried archaeological deposits.

B. The Project is anticipated to have the following effects/impacts:

1. Significant effect per NEPA.
2. Significant impact per CEQA.
3. Adverse effect per Section 106 of the NHPA.

The construction of the proposed Calico Solar thermal power facility may wholly or partially destroy the majority of the surface archaeological resources in the proposed project area and may wholly or partially destroy other buried archaeological deposits that may be components of project area landforms. The complete cultural resources inventory to date includes approximately 139 individual archaeological sites on the surface of the project area. Efforts are being made to avoid impacts/effects to archaeological resources. The surface sites include both stand-alone resources, groups of resources that fall into the archaeological site types described in the “Historical Significance and the Cultural Resources Inventory” subsection above, and resources that are contributing elements to the archaeological landscapes and districts that are also described in that subsection. Although staff is presently unable to identify precisely which of the different cultural resources are historically significant and is therefore presently unable to articulate the exact character of the effects that the construction of the proposed facility would have on such resources, staff does foresee that the construction of the proposed facility would, under both NEPA and CEQA, have a significant effect on the environment and would, under Section 106, have an adverse effect on historic properties. The proposed PA will set out procedures whereby staff, the State Historic Preservation Officer, the Advisory Council on Historic Preservation, the applicant, Native American groups, and other interested parties will identify programs and protocols that ensure that significant effects will be mitigated to a level that is not significant. Although the specific programs and protocols do not presently exist, it is possible to describe the performance standards that will be used to ensure that the resolution of significant effects to historically significant cultural resources is adequate, as well as the types of measures that can be used to resolve such effects.

As noted above, the analytical process involves five steps: 1) determination of the geographic extent of the project area of analysis; 2) creation of an inventory of the known resources within that area; 3) assessing the historical significance of those known resources; 4) assessing the effects of the project on significant historical resources; and 5) resolving significant effects on significant historical resources, and ensuring that all significant impacts/effects are mitigated. Energy Commission licensing decisions and BLM right-of-way grant decisions also typically identify the likelihood of encountering previously unknown resources and contain provisions that require specific procedures that ensure that any effects to these resources can be resolved. Due to the fact that the high number of cultural resources for this project renders the evaluation of all known resources infeasible, staff is recommending that that type of approach be extended to those known resources that it is infeasible to evaluate prior to agency decisions.

The PA provides a valuable vehicle for this approach. As noted above, the first step of the analytical process is complete. To complete the second step and acquire the data necessary to complete the third step, the PA will require that the project owner conduct fieldwork to collect the balance of the requisite primary data on the cultural resources in the project area of analysis with which to evaluate their historical significance. This fieldwork will consist of, as appropriate, the collection of further surface and subsurface data on each resource sufficient to develop formal recommendations of historical significance. The fieldwork will consist of a sequence of surface and subsurface phases of investigation. Criteria set out in the PA will guide decisions on the number and extent of the phases needed to investigate each subject cultural resource. The conclusion of the third step will be accomplished by applying the thresholds of resource integrity identified above in section C.3.3.3 for newly-discovered resources. Similarly, the fourth step will involve identification of any of the types of effects identified in Section C.3.3.4 above to significant historical resources. The fifth and final step — implementing treatment measures that meet standards for the resolution of significant effects on significant historical resources and historic properties under CEQA, NEPA, and Section 106 — will occur through the joint efforts of the Energy Commission and BLM, and will be reflected in the PA. Common types of measures can include avoidance (requiring that physical structures be located only in certain areas), monitoring by cultural resources specialists and Native American monitors, recordation, recovery, and curation.

The methods that the PA will employ to resolve potentially significant effects to significant cultural resources will vary relative to the values for which the resources are found to be significant. For example, cultural resources that are found to be significant on the basis of their information value, principally archaeological deposits, will be subject to suites of treatments the purposes of which will variably be to actively avoid all or part of subject deposits, to record and preserve representative samples of the unique spatial or associative information that is intrinsic to the depositional history of each deposit, to collect and curate representative samples of material culture assemblages, to provide for the preparation and dissemination of professional technical publications and public interpretative materials, and to develop and implement plans to foster the long-term historic preservation of subject deposits. Archaeological resources in the project area of analysis that may be subject to unique treatment plans may include archaeological landscapes and districts and archaeological site types in addition to individual archaeological sites.

The resolution of potentially significant effects on cultural resources that derive historical significance from values other than information potential is not as straightforward. Mitigation options for cultural resources that are significant for different associative values such as association with important events or patterns in prehistory or history, with important persons, or with distinctive construction and design techniques may range widely. As the Section 106 consultation process is currently involved in developing mitigation options for a number of different cultural resources with broader associative values, staff does not wish to inadvertently preempt the outcomes of that process by laying out what would essentially be guesses about the direction that particular mitigation measures may go.

Behavioral interpretation and determinations on the historical significance of the deposits would be made under provisions in the proposed PA and would rely on the interpretations ultimately derived for them. The further inventory of potential contributing elements to the proposed cultural landscapes, refinements to the recordation of those elements, and determinations on the historical significance of the landscape as a whole and of the individual contributing elements, both as contributing elements and as stand-alone archaeological resources would be made under provisions in the proposed PA. The PA would stipulate treatment measures based on consultation with consulting parties.

If NRHP and/or CRHR-listed or eligible properties will be adversely affected by the project, a cultural resources treatment plan will be developed in consultation with the consulting parties to the PA. This plan would stipulate specific measures that will be implemented during final design, prior to and during construction, and during project operations. Treatment measures may include but are not limited to the following:

- Avoidance of resources wherever possible, including establishment of environmentally sensitive areas to be off-limits to construction;
- Make good faith effort to take into account comments and input from interested parties;
- If resources cannot be avoided, devise strategies to minimize impacts, including construction monitoring;
- Conducting data recovery excavations for significant resources that cannot be avoided; and
- Recovery and repatriation of human remains per the Native American Graves Protection and Repatriation Act (NAGPRA).

Archaeological resources that are found to be significant on the basis of values other than or in addition to their information value will be subject to treatment measures that more appropriately reflect the character of those other values.

Staff has been involved in the implementation of contingency plans adopted in past siting cases, as well as in the implementation of PAs and finds that if they include the types of specific standards identified above, they can be effective in identifying and evaluating cultural resources and mitigating potential impacts to those resources. Staff anticipates that the PA will be complete prior to the decision on this application. Even without a final PA, staff is confident that a condition of certification that requires the process and standards identified above will ensure that all significant effects to cultural resources can be resolved or mitigated to a level that is less than significant.

Identification and Assessment of Direct Impacts on Ethnographic Resources and Recommended Mitigation

No NRHP- or CRHR-eligible ethnographic resources are presently known to be in the project area of analysis. Further refinements to determinations of the historical significance and to the extant assessments of the potential for visual effects to occur to other ethnographic resources known to be in the vicinity of the project area would help evaluate whether construction-related ground disturbance of the project would directly impact ethnographic resources that would qualify as historically significant cultural resources.

Identification and Assessment of Direct Impacts on Built-environment Resources and Recommended Mitigation

Whereas determinations regarding NRHP- or CRHR-eligibility of built-environment resources within the project area of analysis have not been completed, identification and assessment of impacts cannot be assessed at this time. Given the relatively complete investigation of that area and the dearth of historically significant built-environment resources found, it appears to be unlikely that the construction-related ground disturbance of the project area would directly impact built-environment resources that would qualify as historical resources under CEQA.

Identification and Assessment of Indirect Impacts and Recommended Mitigation

There is potential for indirect effects to sites in the exclusion area especially due to increased traffic during construction and/or visual effects as described above for cremation sites. It is also possible that project area grading could increase the amount of sheet washing and water runoff during heavy rainfall and indirectly cause damage to sites outside the project area. Consideration of a monitoring plan for those sites would be the foundation for mitigation, and additional measures could be developed through the PA consultation process.

Operation Impacts

Many impacts described above as part of construction also apply to the operation phase. During operation of the proposed power plant, repair of a buried utility or other buried infrastructure could require the excavation of a large hole. Such repairs have the potential to impact previously unknown subsurface archaeological resources in areas unaffected by any original trench excavation. The measures proposed under **CUL-1** for mitigating impacts to previously unknown archaeological resources during the construction of the plant and linear facilities would also serve to mitigate impacts from repairs occurring during operation of the plant.

Project Closure and Decommissioning

Re-excavation and removal of SunCatchers™ and ancillary facilities could impact cultural resources. Resolution of effects to resources will be determined in consultation with all the consulting parties and incorporated into the Programmatic Agreement.

C.3.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would be a 275 MW solar facility located within the boundaries of the proposed project as defined by SES. This alternative is analyzed because (1) it eliminates about 67% of the proposed project area so all impacts are reduced, especially those related to desert washes, biological resources, and cultural resources, and (2) it could transmit the power generated without requiring an upgrade to 65 miles of the existing 220 kV SCE Pisgah-Lugo transmission line.

The Reduced Acreage Alternative would consist of 11,000 SunCatchers with a net generating capacity of approximately 275 MW occupying approximately 2,600 acres of land. This alternative would retain 31% of the proposed SunCatchers and would affect 33% of the land of the proposed 850 MW project.

The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**. This area was designed to avoid sensitive cultural resources and areas that were mapped as occupied tortoise habitat (live tortoise and/or active burrows and sign).

Similar to the proposed project, the Reduced Acreage Alternative would transmit power to the grid through the SCE Pisgah Substation and would require infrastructure including water storage tanks, transmission line, road access, main services complex, and substation (SES 2008a). However, as stated above, the Reduced Acreage alternative would not require the 65-mile upgrade to the SCE transmission line. SCE would complete system upgrades within existing substation boundaries to accommodate the 275 MW, and the 220 kV transmission line would be used. The main services complex, primary water well, and substation and onsite transmission line for the Reduced Acreage Alternative would remain at the location proposed for the proposed project.

As stated above, the Reduced Acreage Alternative is evaluated in this SA/DEIS because it would substantially reduce the impacts of the project. Additionally, the Reduced Acreage Alternative would allow the applicant to demonstrate the success of the Stirling engine technology and construction techniques, while minimizing impacts to the desert environment. Such a limited or phased alternative was suggested in numerous scoping comments.

C.3.5.1 SETTING AND EXISTING CONDITIONS

Please refer to subsection C.3.4.1 in discussion of the proposed action. Whereas the setting and existing conditions of the Reduced Acreage alternative are the same as Phase 1 of the proposed project, the Reduced Acreage alternative would occupy only 31% of the proposed project area. The specific locations of SunCatchers for the Reduced Acreage alternative would avoid sensitive cultural and biological resources, as well as desert washes as part of the construction of a 275 MW solar facility within the proposed project area.

Regional Setting

The regional setting of the Reduced Acreage alternative is the same as Phase 1 of the proposed project. Please refer to subsection C.3.4.1 in discussion of the proposed action.

Environmental Setting

Please refer to “Environmental Setting” subsection C.3.4.1 for proposed action.

Cultural Setting

Please refer to “Cultural Setting” subsection C.3.4.1 for proposed action.

Cultural Resources Inventory

A records search was performed by URS. Please refer to the Cultural Resources Inventory for the proposed action. Seventeen (15) sites have been identified as part of the 25% re-survey and recorded in the project area of analysis for the alternative and are presented in Cultural Resources Table 9 below.

Cultural Resources Table 9
Cultural Resources Site in Reduced Acreage Alternative (25% Sample)

Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location
SGB-013 CA-SBR-13096	Lithic scatter	Prehistoric	Low	North Alluvial Fan
DRK-150 CA-SBR-13009	Lithic Scatter	Prehistoric	Moderate	South Inset fan
DRK-155H CA-SBR-13012H	Trash Scatter	Historic	Moderate	South Alluvial fan
DRK-166 CA-SBR-13015	Lithic Scatter/ Lithic Reduction	Prehistoric	Low	South Pisgah lava
DRK-170 CA-SBR-13018	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah lava
DRK-171 CA-SBR-13019	Lithic Scatter	Prehistoric	Low	South Pisgah lava
DRK-176/H CA-SBR-13023H	Lithic Scatter Trash Scatter	Prehistoric Historic	Moderate	South Axial channel
RAN-114 CA-SBR-13059	Lithic Scatter/Lithic Reduction	Prehistoric	Low	South Pisgah lava
RAN-163 CA-SBR-13071	Lithic Scatter/Lithic Reduction	Prehistoric	Very low	South
RAN-169 CA-SBR-13073	Lithic Scatter	Prehistoric	Moderate	South Alluvial fan
RAN-177 CA-SBR-13078	Lithic Scatter	Prehistoric	Moderate	South
SGB-112/H CA-SBR-13108H	Lithic Scatter/Lithic Reduction Historic Trash	Prehistoric Historic	Moderate	South Pisgah lava
SGB-114 CA-SBR-13109	Lithic Scatter	Prehistoric	Low	South Pisgah lava
SGB-118 CA-SBR-13110	Lithic Scatter	Prehistoric	Very low	South Pisgah lava
SGB-127 CA-SBR-13112	Lithic Scatter	Prehistoric	Low	South Pisgah lava

RAN-114, DRK170-171, DRK-166, SGB112H and the rest of the Pisgah Complex that is west of the Pisgah Crater Road appear to be only partially within the southern boundary line for the reduced acreage alternative

C.3.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

A. Identification analysis is based on the three following observations:

1. Whereas testing has not been completed, a subset of sites may qualify for the NRHP and CRHR.
2. Given the low quantity and density of cultural resources present, it may be possible to avoid known cultural resources by project construction.
3. The potential exists for buried archaeological deposits.

B. The alternative is anticipated to have the following effects/impacts:

1. Significant effect per NEPA.
2. Significant impact per CEQA.
3. Adverse effect per Section 106 of the NHPA.

When resource evaluations have been completed, impacts will be assessed. The observation and identification of 15 cultural resources thus far as part of the 25% re-survey suggests periodic use of the project landform in the past. Severity and extent of impacts would be reduced given the presence of fewer cultural resources within this alternative that is 31% the size of the proposed project. If impacts are deemed significant, mitigation measures would be stipulated and refined in a Programmatic Agreement negotiated among all consulting parties and executed by the BLM, as described above for the proposed Project.

C.3.5.3 CEQA LEVEL OF SIGNIFICANCE

The Reduced Acreage alternative would result in a reduction of impacts to cultural resources. It is presumed that this alternative could also result in significant impacts under CEQA. The implementation of a Programmatic Agreement is anticipated to reduce the severity of impacts to cultural resources to a level below significance under CEQA. Therefore, it is anticipated that this alternative would result in impacts that would be less than those of the proposed Project.

C.3.5.4 CUMULATIVE IMPACTS

This alternative would result in the conversion of 2,600 acres of undeveloped open space with an industrial utility use. When compared to the proposed action, this alternative would result in approximately 69% less land conversion to industrial uses. However, the cumulative effects of this amount of land conversion along with all other existing, planned, and proposed projects would result in adverse cumulative land conversion.

C.3.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed project. This alternative is analyzed because (1) it eliminates about 15% of the proposed project area so all impacts are reduced, and (2) it would not require use of any lands that were donated to BLM or acquired by BLM through the Land and Water Conservation Fund program. This alternative would be consistent with the May 27, 2009 BLM Interim Policy Memorandum (CA-2009-020) on donated and acquired lands. The Interim Policy Memorandum (CA-2009-020) states the following.

- *Lands acquired by BLM under donation agreements, acquired for mitigation/ compensation purposes and with LWCF funds, are to be managed as avoidance/exclusion areas for land use authorizations that could result in surface disturbing activities.*
- *Should BLM –California managers have use authorizations applications pending, or receive new applications on lands that meet the above criteria, they are required to notify the State Director and set up a briefing to address how to respond to those applications.*
- *Should managers have inquiries related to pre-application activities for any land use authorizations on lands that meet the above criteria, please notify applicants regarding the location of these lands as soon as possible and advise them to avoid these lands or provide details on how they would plan to operate or mitigate their project in a manner consistent with the values of the lands donated or acquired for conservation purposes.*

The Avoidance of Donated and Acquired Lands Alternative would contain approximately 28,800 SunCatchers with a net generating capacity of approximately 720 MW occupying approximately 7,050 acres of land. This alternative would retain 85% of the proposed SunCatchers and would affect 85% of the land of the proposed 850 MW project.

The boundaries of the Avoidance of Donated and Acquired Lands Alternative are shown in **Alternatives Figure 2**. The easternmost parcel of the alternative is bordered by LWCF acquired lands to the north, south, and west. Because this parcel could not be reached via project lands, access to this section would be limited to use of the existing transmission line access road that forms the eastern boundary of the parcel, therefore avoiding any new direct impacts to LWCF lands.

The Avoidance of Donated and Acquired Lands Alternative would transmit power to the grid through the SCE Pisgah Substation and would require infrastructure including water storage tanks, transmission line, road access, main services complex, and substation. Because the Avoidance of Donated and Acquired Lands Alternative would generate approximately 720 MW of power, it would require a 65-mile upgrade to the SCE Pisgah-Lugo transmission line. Note that the impacts of this transmission line upgrade are analyzed in Sections C and D of this SA/EIS. The main services complex, primary water well, and substation, and transmission line for the Reduced Acreage Alternative would be at the same locations as for the proposed project.

C.3.6.1 SETTING AND EXISTING CONDITIONS

This alternative would exclude donated and acquired lands located throughout the proposed project site, which would decrease the amount of land converted to an industrial use. Nonetheless, as this alternative would have the same outer project boundaries as the proposed action, the environmental setting would be the same as the proposed action.

Environmental Setting

Please refer to “Environmental Setting” subsection for proposed action.

Cultural Setting

Please refer to “Cultural Setting” subsection for proposed action.

Cultural Resources Inventory

A records search was performed by URS. Please refer to the Cultural Resources Inventory for the proposed action. Forty-four (44) sites have been identified as part of the 25% re-survey and recorded in the project area of analysis for the alternative and are presented in Table 10. Site descriptions are provided in Table 6.

Cultural Resources Table 10
Cultural Resources in Project Area of Analysis
for Avoidance of Donated and Acquired Lands Alternative (25% Sample)

Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location
KRM-003 CA-SBR-13029	Lithic Scatter	Prehistoric	Low	North Alluvial fan
KRM-028 CA-SBR-13032	Trail	Prehistoric	Very Low	North Alluvial fan
RAN-011 CA-SBR-13053	Lithic Scatter	Prehistoric	Moderate	North Alluvial fan
RAN-025 CA-SBR-13054	Lithic Scatter	Prehistoric	Very Low	North Alluvial fan
SGB-013 CA-SBR-13096	Lithic Scatter	Prehistoric	Low	North Alluvial fan
CA-SBR-6512/ CA-SBR-6513 (SGB-028)	Lithic Scatter/ Lithic Reduction/ Stone Mounds	Prehistoric	Low	South Inset fan
DRK-133 CA-SBR-13001	Lithic Scatter	Prehistoric	Low	South
DRK-140 CA-SBR-13005	Lithic Scatter	Prehistoric	Moderate	South Inset fan
DRK-150 CA-SBR-13009	Lithic Scatter	Prehistoric	Moderate	South Inset fan
DRK-155H CA-SBR-13012H	Trash Scatter	Historic	Moderate	South Alluvial fan
DRK-166 CA-SBR-13015	Lithic Scatter/ Lithic Reduction	Prehistoric	Low	South Pisgah lava

DRK-170 CA-SBR-13018	Lithic Scatter/ Lithic Reduction	Prehistoric	Low	South Pisgah lava
DRK-171 CA-SBR-13019	Lithic Scatter	Prehistoric	Low	South Pisgah lava
DRK-176/H CA-SBR-13023/H	Lithic Scatter Trash Scatter	Prehistoric Historic	Moderate	South Axial channel
DRK-182 CA-SBR-13026	Lithic Scatter/ Lithic Reduction	Prehistoric	Low	South
KRM-131	Lithic Scatter	Prehistoric	Very Low	Inset fan/Relict alluvial fan South
KRM-133	Lithic Scatter	Prehistoric	Very Low	Inset fan/Relict alluvial fan South
KRM-135 CA-SBR-13033	Lithic Scatter/ Lithic Reduction	Prehistoric	Very Low	Inset fan/Relict alluvial fan South
KRM-137 CA-SBR-13034	Lithic Scatter	Prehistoric	Very Low	Inset fan/Relict alluvial fan South
KRM-141 CA-SBR-13035	Lithic Scatter	Prehistoric	Low	South Inset fan/ Relict alluvial fan
KRM-153 CA-SBR-13036	Lithic Scatter	Prehistoric	Very Low	South Inset fan/ Relict alluvial fan
KRM-154	Lithic Scatter	Prehistoric	Very Low	South Inset fan/ Relict alluvial fan
KRM-170 CA-SBR-13041	Lithic Scatter/ Lithic Reduction/ Rock Feature	Prehistoric	Moderate	South Inset fan
LTL-009 CA-SBR-13043	Lithic Scatter/ Lithic Reduction	Prehistoric	Low	South Pisgah lava
RAN-107 CA-SBR-13057	Lithic Scatter	Prehistoric	Moderate	South Inset fan
RAN-110 CA-SBR-13058	Lithic Scatter	Prehistoric	Low	South Inset fan
RAN-114 CA-SBR-13059	Lithic Scatter/ Lithic Reduction	Prehistoric	Low	South Pisgah lava
RAN-154 CA-SBR-13069	Lithic Scatter	Prehistoric	Very Low	South Inset fan
RAN-155 CA-SBR-13070	Lithic Scatter/ Lithic Reduction	Prehistoric	Low	South Pisgah lava
RAN-163 CA-SBR-13071	Lithic Scatter/ Lithic Reduction	Prehistoric	Very Low	South
RAN-169 CA-SBR-13073	Lithic Scatter	Prehistoric	Moderate	South Alluvial fan
RAN-175 CA-SBR-13077	Lithic Scatter	Prehistoric	Low	South
RAN-177 CA-SBR-13078	Lithic Scatter	Prehistoric	Moderate	South

RAN-183 CA-SBR-13082	Lithic Scatter/ Lithic Reduction	Prehistoric	Very Low	South Pisgah lava
RSS-006 CA-SBR-13087	Lithic Scatter	Prehistoric	Low	South Pisgah lava
RSS-008 CA-SBR-13088	Lithic Scatter/ Lithic Reduction	Prehistoric	Low	South Pisgah lava
RSS-011 CA-SBR-13090	Lithic Scatter/ Lithic Reduction	Prehistoric	Low	South Pisgah lava
SGB-112/H CA-SBR-13108/H	Lithic Scatter/ Lithic Reduction Historic Trash	Prehistoric Historic	Moderate	South Pisgah lava
SGB-114 CA-SBR-13109	Lithic Scatter	Prehistoric	Low	South Pisgah lava
SGB-118 CA-SBR-13110	Lithic Scatter	Prehistoric	Very Low	South Pisgah lava
SGB-127 CA-SBR-13112	Lithic Scatter	Prehistoric	Low	South Pisgah lava
KRM-131 CA-SBR-13120	Lithic Scatter/ Lithic Reduction	Prehistoric	Very Low	South Inset fan
KRM-133 CA-SBR-13121	Lithic Scatter/ Lithic Reduction	Prehistoric	Low	South Inset fan
EJK-005 CA-SBR-13125	Lithic Scatter	Prehistoric	Low	South Relict alluvial fan

C.3.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

A. Identification analysis is based on the three following observations:

1. Whereas testing has not been completed, a subset of sites will qualify for the NRHP and CRHR.
2. Given the high quantity and density of cultural resources present, cultural resources cannot be completely avoided by project construction.
3. The potential exists for buried archaeological deposits.

B. The alternative is anticipated to have the following effects/impacts:

1. Significant effect per NEPA.
2. Significant impact per CEQA.
3. Adverse effect per Section 106 of the NHPA.

A PA would be drafted and negotiated among all consulting parties, including interested Tribes. The agreement would stipulate the development of treatment plans, including the refinement and definition of mitigation measures.

C.3.6.3 CEQA LEVEL OF SIGNIFICANCE

The Avoidance of Acquired and Donated Land alternative would result in a reduction of impacts to cultural resources. It is presumed that this alternative could also result in significant impacts under CEQA. The implementation of a Programmatic Agreement is anticipated to reduce the severity of impacts to cultural resources to a level below significance under CEQA. Therefore, it is anticipated that this alternative would result in impacts that would be less than those of the proposed Project.

C.3.6.3 CUMULATIVE IMPACTS

This alternative would result in the conversion of 7,050 acres of undeveloped open space with an industrial utility use. When compared to the proposed action, this alternative would result in approximately 15% less land conversion to industrial uses. However, the cumulative effects of this amount of land conversion along with all other existing, planned, and proposed projects would result in adverse cumulative land conversion.

C.3.7 NO ACTION ALTERNATIVE

There are three No Project/No Action Alternatives evaluated in this section, as follows:

C.3.7.1 NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on the Calico Solar Project Application and on CDCA Land Use Plan Amendment

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur.
- The land on which the project is proposed may or may not become available to other uses (including another solar project), depending on BLM's actions with respect to the amendment of the California Desert Conservation Area Plan.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no new ground disturbance. As a result, no loss or degradations to cultural resources from construction or operation of the proposed project would occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

If this project is not approved, renewable projects would likely be developed on other sites in the California Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are large solar and wind projects proposed on BLM land along the Interstate 40 corridor within a few miles of the Calico Solar Project site. In addition, there are currently over 70 applications for solar projects covering over 650,000 acres pending with BLM in California.

C.3.7.2 NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on Calico Solar Project and Amend the CDCA Land Use Plan to Make the Area Available for Future Solar Development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with a different solar technology. As a result, ground disturbance would result from the construction and operation of the facility providing different solar technology and would likely result in a loss or degradation to cultural resources. Different solar technologies require different amounts of grading and maintenance; however, it is expected that all solar technologies require some grading and ground disturbance. As such, this No Project/No Action Alternative could result in impacts to cultural resources similar to the impacts under the proposed project.

C.3.7.3 NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on the Calico Solar Project Application and Amend the CDCA Land Use Plan to Make the Area Unavailable for Future Solar Development

Under this alternative, the proposed the Calico Solar Project would not be approved by the Energy Commission and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no corresponding land disturbance. As a result, the cultural resources of the site are not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in impacts to cultural resources. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.3.8 PROJECT-RELATED FUTURE ACTIONS - CULTURAL RESOURCES AND NATIVE AMERICAN VALUES

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the SES Calico Solar project, and to identify mitigation measures that could lessen such impacts that a level that is not significant.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.3.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW

Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option.

Cultural Resources Overview. The Lugo-Pisgah project area is located in the western Mojave Desert where numerous large-scale inventory projects have been conducted. In part, these projects have defined a cultural chronology for the area that spans the last 12,000 years (SES 2008a). Ethnographically, the project area is centered on the traditional lands of the Serrano, a Numic speaking group related to the Shoshone. Between these earliest and latest Native American periods is a rich cultural history. The Mojave Desert is suggested to have been the area of principal point of origin for the migration of the Numic language group, which spread northeastward into the Great Basin and eventually the northern Colorado Plateau. Many of the distinctive projectile point types described for the Great Basin and Southwest culture areas may have originated in the broad geographic area of the Mojave Desert.

Native American history begins with the Clovis culture, the earliest substantively established cultural period in the Western Hemisphere and the only "classic" Paleoindian period represented in the project area. Dated from 10,000 to 8,000 B.C., the Clovis period is represented by distinctive spear points with a central flute or groove on either side of the point. These points are extremely well made and have been found in association with extinct Pleistocene megafauna. Because of the emphasis Clovis people placed on their hunting technology, researchers have tended to interpret Clovis as geared specifically towards big game hunting. In recent years this assumption has been challenged with increasing evidence towards a broader spectrum subsistence strategy (SES 2008a).

The transition from the Pleistocene to the Holocene is marked by significant environmental changes that resulted in equally significant changes in human settlement and subsistence strategies. The Lake Mojave Complex follows Clovis and subsumes several other named complexes, including the Western Pluvial Lakes Tradition and the San Dieguito Complex, among others. Again, the Mojave Complex is represented by a distinct projectile point that tapers to a rounded base. Dates of the complex are ca. 8000 to 6000 B.C. The period is associated with relatively wet conditions and periodic lake recharge in the region. Material culture for the period is dominated by a stone tool technology geared towards a forager-like subsistence strategy. Such a strategy reflects the frequently changing environmental conditions and patchy resources that would be available necessitating frequent settlement shifts.

Changing environmental conditions to more arid, present-day conditions, marks the transition to the Middle Holocene and the Pinto Complex, which overlaps slightly with the preceding Lake Mojave Complex, and persists to about 3000 B.C. There is broad similarity with the Lake Mojave Complex, especially in toolstone selection and overall technology; however, the Pinto Complex begins the first extensive use of milling tools presumed to reflect the intensification of vegetal processing. An emphasis towards plant resources probably reflects a more predictable biotic environment. The range of settlements across the landscape also suggests more predictable subsistence resources and characterizes the complex overall as spatially extensive.

A new complex has been recently defined based on archaeological work within the Twentynine Palms area (SES 2008a). Although acknowledged as spatially confined for the time being, future work will undoubtedly extend the range of the Deadman Lake Complex. The associated assemblage is described with contracting stemmed or lozenge-shaped projectile points, battered cobbles and core tools, biface technology, and milling stones. Preliminary dating places the complex from 7500 to 5200 B.C. An occupation hiatus is suggested for the period between 3000 and 2000 B.C. Population density was very low (based on known archaeological sites) and large-scale abandonment is presumed for the Mojave Desert. After 2000 B.C. is the Gypsum Complex, represented by well-known projectile point styles, including the contracting stemmed Gypsum, Elko series, and Humboldt series projectile point types. Few excavated components are known from the project area despite the wide settlement pattern represented by these distinctive projectile point styles.

Following the Gypsum Complex, by A.D. 200 the Rose Springs Complex marks the introduction of the bow and arrow technology and significant population increase (SES 2008a). Rose Spring projectile points are smaller and were presumably hafted as arrow points. Environmental conditions were wetter and cooler during this period allowing Rose Spring settlement patterns to shift back to the Mojave Desert. Material culture is diverse and extensive and is often found as well developed middens. Architecture is first recognized during this period including wickiups and pit houses. Obsidian procurement was emphasized, as well. Settlement patterns appear to have been oriented initially towards permanent streams and lake margins and by the end of the period, or about A.D. 1000, settlements shifted to more ephemeral water sources as large-body lakes began to desiccate. The persistence of the Medieval Climatic Anomaly may have stressed an already expanding population resulting in the end of the complex by A.D. 1100.

The Late Prehistoric period extends from the close of the Rose Springs Complex ca. A.D. 1100 and ends with the ethnographically described groups occupying the area at contact in the 16th century. It is during this period that Ancestral Puebloan groups are known to have exploited turquoise mines and probably interacted with resident Numic speaking Paiute and Shoshone groups. Numic material culture includes Desert Side-notched and Cottonwood Triangular projectile points, buff and brown ware ceramics, ornaments, milling tools, and rock art. Although interaction spheres have been posited for the region, no clear cultural partitioning is evident so far in the archaeological record despite the linguistic divergence. Obsidian procurement was greatly reduced in the southern and eastern portion of the Mojave Desert perhaps indicating increasing regionalization during this period. It is during this period that the postulated Numic expansion took place out of the Mojave Desert northeastward into the Great Basin. A return of warm and dry conditions, coupled with linguistic evidence, suggest this expansion began sometime before A.D. 1000 (SES 2008a).

Spanish settlement of southern California did not take place until the first mission was established in 1769. At the time, California had the highest Native American population in North America speaking over 300 dialects. The Serrano, a Shoshonean group, were the primary inhabitants of the project area. Serrano lived in large square communal houses and practiced an extensive trade network with the coast. Secularization of the Spanish missions in 1834 led to the development of large ranchos that extended into the interior from the coast. Ranchos often forced Native American groups into a form of indentured servitude. These closed, fortified communal settlements continued after non-Mexican immigrants entered the region. Upon statehood in 1850, industrialization began with the building of railroads, including the Atchison, Topeka & Santa Fe (AT&SF), mining, and the development of military installations (SES 2008a).

Potential Cultural Resources. To date, no formal file and literature review and no intensive cultural resources inventory has taken place in the area of potential effect (APE) along the Lugo-Pisgah ROW. SCE would conduct cultural surveys as part of its CPCN application and PEA that will be submitted to the CPUC for the 850 MW Full Build-Out. As such, the identification of affected cultural resources is limited to broad generalities until such time that an intensive cultural resources inventory can be completed.

Based on the cultural resources overview presented above, it can be expected that a number of prehistoric cultural resources would be identified during inventory for the proposed area of the 850 MW Full Build-Out upgrades. The 275 MW Early Interconnection upgrades would require substantially less ground disturbance and the chance of encountering cultural resources would be reduced. Likely locations for prehistoric archaeological sites include the edges of intermittent drainages, such as those that drain into Antelope Valley near the western end of the project area and ultimately the terraces above the Mojave River. East of the Mojave River it is expected that the number of prehistoric resources will decrease as the corridor extends across Apple and Fifteen-Mile Valleys. However, the many ephemeral drainages that bisect these areas are relict stream channels that could have archaeological sites in association. The margins of both Rabbit Lake and Lucerne Lake also have the potential to contain prehistoric resources. Sites along relict stream channels and desiccated lake margins could include prehistoric campsites and resource processing localities.

Potential historic resources include both the Pisgah and Panoche/Lugo substations, if more than 45-years old, and the 220 kV transmission line that is to be replaced by the new 500 kV line. If these resources meet the age criteria for consideration then a qualified architectural historian must document the resources on appropriate Department of Parks and Recreation (DPR) forms and assess the significance and potential impact to these resources. Other potential historic resources include the crossing of the AT&SF Railroad (two locations) and the California Aqueduct. Numerous other transmission lines would also be crossed.

C.3.8.2 ENVIRONMENTAL IMPACTS

Impacts to cultural resources are unknown pending a formal file and literature review and intensive inventory. Since the proposed 500 kV transmission line corridor would follow an existing ROW for much of its proposed length, it is possible that existing cultural resources have already been impacted. New construction would have the potential to adversely affect cultural resources from ROW/access road construction, blading, equipment storage, pole placement, substation expansion and line installation.

Ground disturbance, the presence of vehicles driving over the top of sites and the installation of new towers could damage archaeological resources. After the work area is defined and after archaeological and historic surveys are complete in any areas that have not been protocol-level surveyed previously by SCE, archaeological sites or historic resources within the built environment may be identified. Depending on when they were built, if the existing SCE 220 kV line or the Pisgah and Panoche/Lugo Substations are determined eligible for the National Register of Historic Places (NRHP), the upgrades and removal effort would result in an impact to historical resources. Other potential historic resources include the crossing of the AT&SF Railroad (two locations) and the California Aqueduct. Whether the impact is significant would need to be determined after the line, substations and/or other infrastructure are evaluated.

Some new lines would be installed in places where there previously were none, and some existing overhead lines would have structures retrofitted and replaced along existing lines. The trench for undergrounding for the Pisgah-Gale fiber optic cable (under the 275 MW Early Interconnection) would normally be excavated in an existing underground cable trench or in a new 600-foot-long trench near the SCE Pisgah Substation, and trenching would not come within 12 inches from any existing fence, wall, or outbuilding associated with an adjacent property. Therefore, there would be no potential to adversely impact the physical condition of existing above-ground cultural resources. The only potential to adversely impact existing above-ground cultural resources would arise from a change in the visual setting of the property due to the addition of taller poles or new poles, new overhead lines, and new substation equipment depending on the location in the project area.

Any potential for the project to impact cultural resources would be limited to undiscovered below-ground cultural deposits. It is possible that buried cultural deposits could be encountered during ground disturbing project activities including trenching for the installation of underground fiber optic cables, during ground disturbance associated with the removal or installation of transmission structures, or ground disturbance associated with the expansion at the Pisgah Substation. The 275 MW Early Interconnection upgrades would require substantially less ground disturbance than the 850 MW Full Build-Out, and the chance of impacting cultural resources would be reduced.

C.3.8.3 MITIGATION

During the CEQA/NEPA environmental permitting process, cultural resources sites would likely be identified and then would be avoided by vehicles and construction activities. After the construction area has been identified and after work for Section 106 has been completed, archaeological sites should be evaluated for eligibility for listing in the NRHP or California Register of Historic Resources (CRHR) if it appears that any would be affected by the project. Sites that have been evaluated as “not eligible” would warrant no further consideration and avoidance would not be required. Sites that have not been evaluated and sites that are considered “potentially eligible” should be treated as eligible resources pending formal evaluation. If found to meet age and significance criteria, the historic resources identified above, including the substations and the existing 220 kV transmission line, would require Level 1 Historic American Engineering Records (HAER) be completed in order to mitigate adverse effects. The crossing of the AT&SF railroad, other historic transmission lines, and the California Aqueduct would likely result in the determination of no adverse effect.

Data recovery should be conducted as a recommended mitigation measure for archaeological sites that are recommended as eligible to the CRHR or NRHP and would be impacted by the project. Monitoring of project-related excavation within an archaeological site is not appropriate mitigation and may destroy the site. SCE should comply with provisions of the National Historic Preservation Act and should consult with a California State Historic Preservation Officer regarding appropriate mitigation should any cultural materials be encountered during construction or other ground-disturbing activities.

In the event of a site discovery during project implementation, all work would stop in the immediate area in order to afford time for documentation, evaluation, and consultation between the lead federal agency, the California State Historic Preservation Officer (SHPO), and all consulting tribes if a discovery is aboriginal in origin. Consultation with the above entities would ensue regardless of whether the discovery is located on private or federal lands. If consultation determines that the discovery is eligible for the NRHP, a consideration of effects should be undertaken pursuant to 36 CFR 800.5 of the National Historic Preservation Act (NHPA, 1966, as amended). If consultation results in a determination of adverse effects to a historic property, mitigation measures would be proposed and implemented following consultation with the California SHPO, the lead federal agency, the Advisory Council on Historic Preservation (ACHP), and all consulting Tribes, if necessary. Avoidance would be the preferable mitigation measure in all instances.

C.3.8.4 CONCLUSION

While SCE would avoid effects to known cultural sites, it is possible that the corridors have sensitive cultural resources that could be affected. This Staff Assessment/EIS concludes that it would be possible to mitigate all impacts to cultural resources to less than a significant level through the Section 106 process and implementation of recommended measures that apply to cultural resources. Known sensitive areas would be avoided, construction activities would be monitored and other appropriate mitigation similar to the Conditions of Certification identified in the **Cultural Resources and Native American Values** section of the Staff Assessment/EIS would be implemented.

C.3.9 CUMULATIVE IMPACTS

Section B.3, Cumulative Scenario, provides detailed information on the potential cumulative solar and other development projects in the project area. Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis for the proposed project. In summary, these projects are:

- Renewable energy projects on BLM, State, and private lands, as shown on **Cumulative Figures 1 and 2** and in **Cumulative Tables 1A and 1B.** Although not all of those projects are expected to complete the environmental review processes, or be funded and constructed, the list is indicative of the large number of renewable projects currently proposed in California.
- Future development projects in the immediate Newbury Springs/Ludlow area are shown on **Cumulative Impacts Figure 3,** Newbury Springs/Ludlow **Existing and Future/Foreseeable Projects, and Cumulative Tables 2 and 3**. Table 2 presents

existing projects in this area and Table 3 presents future foreseeable projects in the Newbury Springs/Ludlow Area. Both tables provide the project names, types, locations and statuses

These projects are defined within a geographic area that has been identified by the Energy Commission and BLM as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all resource elements or environmental parameters. Most of these projects have, are, or will be required to undergo their own independent environmental review under CEQA and/or NEPA. Even if the cumulative projects described in Section B.3 have not yet completed the required environmental processes, they were considered in the cumulative impacts analyses in this SA/Draft EIS.

Geographic Scope of Analysis

The geographic area considered for cumulative impacts on cultural resources is the Calico Solar Project area (Newbury Springs/Ludlow area).

Effects of Past and Present Projects

For this analysis, the following projects or developments are considered most relevant to effects on cultural resources (refer also to Section B.3, Table 2):

Project	Location
Twentynine Palms Marine Corps Air Ground Combat Center (MCAGCC)	Morongo Basin (to the south of project site)
SEGS I and II	Near Daggett (17 miles west of project site)
CACTUS (formerly Solar One and Solar Two)	Near Daggett (to the west of project site)
Mine	2 miles west of project site along I-40
Mine	14 miles west of project site along I-40

Cultural resources in the geographic area have been impacted by past and currently approved projects as follows:

1. Because cultural resources are non-renewable, the removal or destruction of any resource results in a net loss of resources
2. Existing development in the Newbury Springs/Ludlow area and the surrounding areas has resulted in the removal or destruction of cultural resources, which has resulted in a net loss of resources in these areas

Effects of Reasonably Foreseeable Future Projects

Cultural resources are also expected to be affected by the following reasonably foreseeable future projects as follows (refer also to Section B.3, Table 3):

SES Solar Three (CACA 47702)
SES Solar Six (CACA 49540)
SCE Pisgah Substation Expansion

Pisgah-Lugo transmission upgrade
Twentynine Palms Expansion
Broadwell BrightSource (CACA 48875)
Wind project (CACA 48629)
Wind Project (CACA 48667)
Wind project (CACA 48472)
Twin Mountain Rock Venture
Solar thermal (CACA 49429)
Proposed National Monument (former Catellus Lands)
BLM Renewable Energy Study Areas
SES Solar Three (CACA 47702)
SES Solar Six (CACA 49540)
SCE Pisgah Substation Expansion
Pisgah-Lugo transmission upgrade
Twentynine Palms Expansion
Broadwell BrightSource (CACA 48875)
Wind project (CACA 48629)
Wind Project (CACA 48667)
Wind project (CACA 48472)
Twin Mountain Rock Venture
Solar thermal (CACA 49429)
Proposed National Monument (former Catellus Lands)
BLM Renewable Energy Study Areas

Contribution of the Calico Solar Project to Cumulative Impacts

Construction. The construction of the Calico Solar Project is expected to result in permanent adverse impacts related to the removal and/or destruction of cultural resources on the project site during ground disturbance and other construction activities. It is also expected that the construction of some or all of the foreseeable cumulative projects which are not yet built may also result in the permanent adverse impacts as a result of the removal and/or destruction of cultural resources on the sites for those projects. As a result, the construction of the Calico Solar Project and other foreseeable cumulative projects will contribute to permanent long term adverse impacts as a result of the removal and/or destruction of resources on those sites and an overall net reduction in cultural resources in the area.

Operation. During operation of the Calico Solar Project, cultural resources on and in the immediate vicinity of the project site may experience increased vandalism as a result of improved access to the project site, illegal collection of artifacts, and/or destruction of resources by vehicles traveling on the site. Similar impacts may also occur as a result of some or all of the cumulative projects, as more people come into this area associated with those new land uses. As a result, the Calico Solar Project and the other cumulative projects may contribute to a cumulative adverse impact on cultural resources as a result in increased access to the area and the potential for increased vandalism, illegal collection of artifacts, and/or destruction of resources during operation related activities.

Decommissioning. The decommissioning of the Calico Solar Project may result in adverse impacts to cultural resources as a result of ground disturbance, increased vandalism, illegal collection of artifacts, and/or destruction of resources by vehicles traveling on the site or during demolition and removal of the project facilities. Similar impacts are not anticipated as a result of most of the other cumulative projects as the removal of those land uses may not result in increased vandalism, illegal collection of artifacts, and/or destruction of resources by vehicles traveling on those sites or during demolition and removal of those land uses. As a result, decommissioning the Calico Solar Project is not anticipated to contribute to a cumulative adverse impact on cultural resources beyond the contribution of the project that would occur as a result of the construction and operation of the project.

C.3.10 COMPLIANCE WITH LORS

If the Condition of Certification (**CUL-1**) is properly implemented, the proposed Calico Solar Project would result in a less than significant impact under CEQA and resolve effects under Section 106 of the NHPA on known and newly found cultural resources. The project would therefore be in compliance with the applicable state laws, ordinances, regulations, and standards listed in Cultural Resources Table 1.

The County of San Bernardino's General Plan has general language promoting the county-wide preservation of cultural resources. The Condition of Certification requires specific actions not just to promote but to effect historic preservation and mitigate impacts to all cultural resources in order to ensure CEQA compliance. Consequently, if Calico Solar, LLC implements these conditions, its actions would be consistent with the general historic preservation goals of the County of San Bernardino.

C.3.11 NOTEWORTHY PUBLIC BENEFITS

Staff does not discern any public benefits in relation to cultural resources that would occur from the construction, operation, maintenance, or decommissioning of the proposed action that would reasonably be found to be noteworthy.

C.3.12 FACILITY CLOSURE

In the future, Calico Solar Project would experience either a planned closure or be unexpectedly (either temporarily or permanently) closed. When facility closure occurs, it must be done so that it protects the environment and public health and safety. A closure plan would be prepared by the project owner prior to any planned closure. To address unanticipated facility closure, an "on-site contingency plan" would be developed by the project owner and approved by the Energy Commission Compliance Project Manager (CPM). Facility closure requirements are discussed in more detail in the **General Conditions** section of this SA/DEIS. The decommissioning of the Calico Solar Project may result in adverse impacts to cultural resources as a result of ground disturbance, increased vandalism, illegal collection of artifacts, and/or destruction of resources by vehicles traveling on the site or during demolition and removal of the project facilities. Therefore, the protection of cultural resources in the event of either a planned or unplanned closure would be addressed in the development of the Programmatic Agreement.

C.3.13 PROPOSED CONDITION OF CERTIFICATION

CUL-1 The applicant shall be bound to abide, in total, to the terms of the programmatic agreement that the BLM is to execute under 36 CFR § 800.14(b)(3) for the proposed action. If for any reason, any party to the programmatic agreement were to terminate that document and it were to have no further force or effect for the purpose of compliance with Section 106 of the National Historic Preservation Act, the applicant would continue to be bound to the terms of that original agreement for the purpose of compliance with CEQA until such time as a successor agreement had been negotiated and executed with the participation and approval of Energy Commission staff.

Verification: Under the terms of the programmatic agreement, the applicant shall submit all documentation required by the agreement to the Compliance Project Manager (CPM) for review and approval.

C.3.14 CONCLUSIONS AND RECOMMENDATIONS

This cultural resources analysis concludes, on the basis of a 25% sample of the cultural resources inventory of the project area of analysis, that the Calico Solar Project would have significant effects on a presently unknown subset of approximately 139 known prehistoric and historical surface archaeological resources and may have significant effects on an unknown number of buried archaeological deposits, many of which may be determined historically significant under the provisions of a proposed programmatic agreement currently under development as part of the BLM’s Section 106 consultation process. The adoption and implementation of Condition of Certification **CUL-1** would reduce the potential impacts of the proposed action on these resources to less than significant under CEQA and would resolve effects under Section 106 of the NHPA, and would further ensure that the proposed action would be in conformity with all applicable LORS.

C.3.15 REFERENCES

The “(tn: 00000)” in a reference below indicates the transaction number under which the item is catalogued in the Energy Commission’s Docket Unit. The transaction number allows for quicker location and retrieval of individual items docketed for a case or is used for ease of reference and retrieval of exhibits cited in briefs and used at Evidentiary Hearings.

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SES 2008b – URS/B. Magdych (tn 49277). Application for Confidential Designation of Cultural Resources Technical Report, dated December 1, 2008. Submitted to CEC/Docket Unit on December 1, 2008.

SES 2009c – URS/R. Nixon (tn 50885). Repeated Application for Confidential Designation of Revised Cultural Resource Technical Report, dated April 6, 2009. Submitted to CEC/Docket Unit April 6, 2009.

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C.3.15 CULTURAL RESOURCES GLOSSARY

AFC	Application for Certification
ARMR	Archaeological Resource Management Report
CCS	Cryptocrystalline silicate (Cryptocrystalline silicates are rocks such as flint, chert, chalcedony, or jasper that contain a high percentage of silica (SiO^2), the primary compound that composes quartz.)
CEQA	California Environmental Quality Act
CHRIS	California Historical Resources Information System
Conditions	Conditions of Certification
CPM	Compliance Project Manager
CRHR	California Register of Historical Resources
CRM	Cultural Resources Monitor
CRR	Cultural Resource Report
CRS	Cultural Resources Specialist
DPR 523	Department of Parks and Recreation cultural resources inventory form
FAR	Fire-affected rock
FSA	Final Staff Assessment
Historical resource	A cultural resource, for the purpose of CEQA, listed in, or determined to be eligible for listing in, the California Register of Historical Resources (PRC § 21084.1). Subsumed in present analysis under “important historic and cultural aspects of our national heritage.”
Historic property	A cultural resource, for the purpose of Section 106, included in, or eligible for inclusion in the National Register of Historic Places (36 CFR § 800.16(l)(1). Subsumed in present analysis under “important historic and cultural aspects of our national heritage.”
HRMP	Historical Resources Management Plan
Important historic and cultural aspects of our national heritage	A broadly inclusive term for historically significant cultural resources that encompasses the concepts of “historical resource” and “historic property.”
LORS	Laws, ordinances, regulations, and standards
MCR	Monthly Compliance Report
MLD	Most Likely Descendent
NAHC	Native American Heritage Commission
NRHP	National Register of Historic Places

OHP	California Office of Historic Preservation
Programmatic agreement	An agreement document negotiated and drafted under Section 106 of the National Historic Preservation Act of 1969
Project area	The project site, the rights-of-way of all linear and other ancillary power facility features, construction laydown areas, and non-commercial borrow sites
Project area of analysis	The project area and all further areas in which the proposed project has the potential to directly or indirectly affect cultural resources
Project site	The principal proposed plant site parcel or main plant site of which the power block area and the solar thermal field would occupy the majority of that area
Proposed action	Equivalent in present analysis to “proposed project” and “undertaking.” The “proposed action” and other “alternative actions” are developed under NEPA to meet a specified purpose and need.
Proposed project	Equivalent in present analysis to “proposed action” and “undertaking.” A “project,” pursuant to 14 CCR § 15378, “means the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment.”
PSA	Preliminary Staff Assessment
SHPO	State Historic Preservation Officer
Staff	Energy Commission cultural resources technical staff
Undertaking	Equivalent in present analysis to “proposed action” and “proposed project.” An undertaking, pursuant to 36 CFR § 800.16(y), “means a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval.”
WEAP	Worker Environmental Awareness Program

Appendix A

SITE DESCRIPTIONS FOR THE 25% SAMPLE OF CULTURAL RESOURCES INVENTORY FOR THE CALICO SOLAR PROJECT

THE RECOMMENDATIONS PRESENTED IN THIS SECTION REGARDING ELIGIBILITY ARE ONLY THOSE OF THE CONTRACTOR, URS, AND DO NOT REFLECT OFFICIAL DETERMINATIONS

This Appendix contains the site descriptions that reflect resurveying approximately 25 percent (%) of the cultural resources sites that were included in the April 2009 revision of the Cultural Resources Technical Report. The California Energy Commission (CEC) and Bureau of Land Management (BLM) cultural resources staff decided that resurveying and collecting supplemental information for a 25% sample of the sites representative of geomorphic landforms would be needed to develop the Preliminary Staff Assessment/Draft Environmental Impact Statement (PSA/DEIS). CEC/BLM selected the 41 sites that would be included in the representative 25% sample.

Archaeologists for the Applicant prepared several sample revised site descriptions that were submitted to BLM/CEC staff for review and comment. The site descriptions in this volume were developed following the format and model of these sample revised site descriptions, including integration of the comments provided by BLM/CEC staff.

Archeologists for the Applicant are in the process of revisiting and collecting the supplemental information requested for the remaining cultural resources sites located on the Proposed Calico Solar Project (Project). This information will be incorporated into a final Cultural Resources Technical Report to be completed during the first quarter of 2010.The cultural resources site descriptions in this appendix have been organized in numeric order based on sitename/number. As stated before, the recommendations are those of proponent’s consultant, URS, and not CEC/BLM staff.

CA-SBR-13005

CA-SBR-13005, an amorphous-shaped complex lithic scatter covering a total surface area of 4,558 square meters, is located within the central portion of the Phase 2 area of the Calico Solar Project site. The site area is situated on a nearly level inset alluvial fan facing north northwest. An inset fan comprises the portion of the alluvial deposition in the southern Calico Solar Project area, which is confined between two or more erosional fan remnants (or older higher elevation landforms). These fan types may appear similar to the alluvial fan piedmont or a relict alluvial flat (but without dominant erosional features oriented east to west). Two channels of a northward trending wash transect the site. Poorly developed and poorly sorted desert pavement is present between channels, which is where most of the noted surface artifacts and Locus 1, situated at the southern site boundary, are located. Limited eolian deposits consist of minor accumulations of sand around vegetation, which covers less than 2% of the total site area. Site sediments are fine to medium grained sand with small to large sub-angular to sub-rounded pebbles and cobbles. Approximately 450 meters north of the site is the axial channel for the valley. Fan remnants, low north northwest trending hills, covered by well-developed desert pavement are 200 meters east and west of the site. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey.

As noted above, CA-SBR-13005 is an amorphous-shaped, sparse density complex lithic scatter that measures 63 meters north to south by 105 meters east to west; artifact density approximates one artifact per 58.43 square meters (based on GIS calculations). The lithic scatter is composed of 78 artifacts, primarily of red jasper and basalt and includes: lithic debitage, cores, bifaces, and an edge modified flake. One discrete locus with a higher density of jasper debitage specimens at the southern site boundary is interpreted to be single reduction locus. The overall condition of the site is good with two drainages trending north to south cutting through the site.

The major physical surface characteristic of this site is complex scatter containing flaked stone artifacts indicative of lithic reduction activities, including lithic debitage and cores; the site also contains formed flaked stone tools indicative of a wider range of activities beyond lithic reduction, such as bifaces and a unifacially modified flake. Of the 78 artifacts noted on the site surface, 46 are sparsely scattered within the site area, excluding those 32 artifacts noted at Locus 1 (see below). Of these 46 artifacts, 27 are jasper flakes (six primary flakes, eight secondary flakes, seven tertiary flakes, and six pieces of shatter), one white chert secondary flake, seven mustard chert flakes (two primary flakes, one secondary flake, one tertiary flake, and three pieces of shatter), one rhyolite secondary flake, two chalcedony/ chert flakes of unreported color (one secondary flake and one tertiary flake), two green chert flakes (one primary flake and one tertiary flake), and six point provenienced artifacts (three bifacially modified flakes [one of basalt, one of jasper, and one of cryptocrystalline silicate of unreported color], one unifacially modified jasper flake, and two jasper cores of unreported type).

Locus 1, at the southern site boundary, measures 5.6 meters north to south by 1.9 meters east to west and contains 32 red jasper flakes, including 13 primary flakes, six secondary flakes, eight tertiary flakes, and five pieces of shatter.

Although site recordation involved only an examination of the site surface, the potential for buried artifacts at CA-SBR-13005 is high due to reworking of the local sediments by the two northward trending washes that transect the site area. However owing to the active reworking of sediments, buried artifacts, if present, are in secondary disturbed contexts. As well, the likelihood of finding intact buried cultural use surfaces and features is low. Considering the artifact assemblage identified on the site surface which consists two cores, three bifacially modified flakes, one unifacially modified flake, and a large percentage of cortical debitage (21 primary and secondary flakes and nine pieces of shatter, or 30 of the 72 items [42%]), all of which are indicative of initial lithic reduction activities, it is highly likely that any artifacts present in disturbed subsurface contexts would mirror those artifact types identified on the site surface.

Based upon the cultural constituents and the physical context, archaeologists for the Applicant interpret this site as a sparse density complex lithic scatter with a single lithic reduction locality (Locus 1). The lithic materials appear to be derived from cobbles of toolstone quality found on site within the desert pavement surfaces, and the artifact types identified (cores, bifacially modified flakes, and a unifacially modified flake, preponderance of cortical debitage and shatter) reflect initial lithic reduction activities. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Additionally, the single discrete locus identified is composed of only one lithic material type (red jasper), which is interpreted as single reduction locus. Thus, the site appears to represent a minimum of one episode of initial lithic reduction and the production of expedient flake tools.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a specific period of prehistory or ethnohistory. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. As noted above, the site is situated on a nearly level inset alluvial fan facing north northwest. Two channels of a northward trending wash transect the site. Poorly developed and poorly sorted desert pavement is present between channels, which is where most of the noted surface artifacts and Locus 1, situated at the southern site boundary, are located. Also noted above, the potential for buried artifacts at CA-SBR-13005 is high due to reworking of the local sediments by the two washes that transect the site area. However, buried artifacts, if present, are in secondary contexts and the likelihood of finding intact buried cultural use surfaces and features is low. As well, considering the artifact assemblage identified on the site surface, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types identified on the site surface. Therefore, the data potential is considered exhausted through recordation of CA-SBR-13005.

CA-SBR-13009

CA-SBR-13009, an amorphous-shaped prehistoric lithic reduction scatter, is situated along the eastern edge of a large wash. The site covers a total surface area of 845 square meters within the central portion of the Phase 2 area of the Calico Solar Project site. The site is situated on a nearly level (1 degree slope) inset alluvial fan facing north northwest. An inset fan comprises the portion of the alluvial deposition in the southern Calico Solar Project area, which is confined between two or more erosional fan remnants (or older higher elevation landforms). These fan types may appear similar to the alluvial fan piedmont or a relict alluvial flat (but without dominant erosional features oriented east to west). A northward trending slightly incised wash forms the west boundary of the site. Medium to coarse sub-angular grains of sand and small pebbles moderately cover the surface suggesting wind erosion is actively affecting the surface by removing the finer fraction of the sediment. Limited eolian deposits consist of minor accumulations of sand around vegetation, which cover less than two percent of the total site area. Site sediments are fine to medium-grained sand. Approximately 220 meters north of the site is the axial channel for the valley. Fan remnants, low north northwest trending hills, covered by well-developed desert pavement, are 260 meters east and west of the site. The vegetation on site and within the surrounding area consists of the Creosote Bush Community; plant species observed on site include creosote bush (*Larrea tridentata*) and desert saltbush (*Atriplex polycarpa*).

This lithic reduction scatter measures 50 meters east to west by 33.5 meters north to south, and contains a total of 46 lithic artifacts (45 flakes and one core). Artifact density is moderate within the site area (one item per 18.4 square meters); no discrete concentrations of cultural materials or features were identified. The overall condition of the site is good, with no visible alterations except several active rodent burrows.

As noted above, this lithic reduction scatter contains 45 flakes (44 tertiary flakes and one secondary flake). Debitage material types include: 30 flakes of white chert, 10 jasper flakes, three chalcedony flakes, and two flakes of green rhyolite. Additionally, one unidirectional jasper core was identified that defines the extreme southern site boundary.

The potential for buried artifacts at this site is high; however, reworking of the local sediments by the wash suggests that buried artifacts are in a secondary disturbed context and the likelihood of finding intact surfaces and features is low.

Based upon the cultural constituents, archaeologists for the Applicant interpret this lithic reduction scatter as an early-to-late stage biface reduction locality. The prehistoric cultural assemblage is dominated by non-cortical tertiary flakes indicative of the various stages of biface reduction activities. However, because the debitage consists of a variety of cryptocrystalline silicate materials, as well as two flakes of rhyolite, and the debitage is widely scattered throughout the site area, it remains undetermined whether the cultural materials are the result of one or more episodes of early-to-late stage biface reduction. Additionally, due to the absence of any complete bifaces on site, it is probable that any finished tools or bifacial cores or blanks produced on site were carried to an off site location The surface manifestation of this site lacks artifacts with unique or temporally diagnostic characteristics that can be associated with any specific period of prehistory or ethnohistory. Additionally, this site cannot be associated with any distinctive or significant event, person, design, or construction, and the artifact distribution has been documented during the recordation process. Although the potential for buried artifacts at this site is high, due to reworking of the local sediments by the wash, any buried artifacts are likely in secondary and disturbed context, and the chances of finding intact surfaces and features is low. Therefore, the data potential is considered exhausted through recordation of CA-SBR-13009.

CA-SBR-13012H

CA-SBR-13012H, a sparse density, amorphous-shaped historical refuse scatter that also contains two historical/modern rock fire rings (or hearths. The site covers a total surface area of 1,497 square meters within the central portion of the Phase 2 area of the Calico Solar Project site. The site is situated on a nearly level (less than 1 degree slope), southwest-facing rise on a fan skirt in the lower alluvial fan piedmont in the vicinity of coalescing alluvial fans issuing from several gullies merging with the basin floor. The prominent gullies are located approximately 100 meters west and 200 meters east of the site; the axial channel for the basin is located 150 meters south. Two shallow gullies, one branching out into a small fan, transect the northern and southern thirds of the site. Site sediments are fine- to medium-grained sand with few small sub-rounded pebbles. Surface sediments have been slightly reworked by wind, and minor accumulations of sand occur at the base of some vegetation. An older erosional remnant fan, which consists of a series of ridges covered by a well developed desert pavement, is located south of the axial channel, and an alluvial flat is located approximately 200 meters southwest; the slope grades upward into the alluvial piedmont to the north and northeast. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*) and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey.

The site measures 77 meters north, northwest to south, southeast by a maximum of 48 meters east to west, and as noted above, contains an extremely sparse scatter of historical refuse, as well as two historical/modern surficial fire hearth features (i.e., Features 1 and 2). No discrete concentrations of historical materials were identified, and artifact density is low within the site area (one item per 38.4 square meters). The overall condition of the site is good, with no visible disturbances or alterations.

The historical refuse observed throughout the site area (39 items) appears to range in age from the 1880s to the 1930s or later (ca. 1950s). Historical materials observed include: one sanitary food can measuring 4 5/8" high by 4.0" diameter, one church key-opened sanitary can that measures 2 1/4" high by 4 1/4" diameter, one hole-in-cap lap seam can that measures 4.0" high by 2 3/4" diameter, one hole-in-cap crimp seam can that measures 4 11/16" high by 4.0" diameter, and one external friction lid measuring 5 1/8" diameter. Other cultural materials identified include: one Automatic Bottle Machine (ABM) made clear glass bottle, 13 square cut nails 2 1/2” in length, 12 barrel hoops with wire nails, two railroad track tie plates, and one green glass electrical insulator fragment. Additionally, five pieces of highly weathered milled lumber are present.

Two historical or modern surficial fire hearth features (Features 1 and 2) were also identified on site. Feature 1 is located within the northwestern site area, measures 36 inches north to south by 52 inches east to west (exterior dimensions), 18 inches in interior diameter, and is constructed of a roughly circular, singular course of 15 large sub-rounded metavolcanic cobbles. Feature 2 is located along the central eastern site boundary, measures 31 inches north to south by 36 inches east to west (exterior dimensions), 21 inches in interior diameter, and is constructed of a roughly circular, singular course of 11 medium sized sub-rounded metavolcanic cobbles. No artifacts or charcoal are present at either Feature 1 or Feature 2.

Generally speaking, the local depositional environment suggests that the potential for buried cultural deposits at the site is moderate to high, and buried features or surfaces may be intact as sheet wash and other low energy forms of deposition are common on the lower portions of the alluvial fan piedmont. However, no privy pits or other discrete features (e.g., structure remains or trash dumps) that could potentially contain subsurface cultural remains were identified on site. The nature and age of the cultural deposits identified (an extremely sparse scatter of historical refuse that appears to range in age from the 1880s to the 1930s or later [ca. 1950s], and two historical or modern surficial hearth features) would suggest that the potential for any significant cultural deposits in buried contexts on site is extremely low.

As noted above, the historical refuse on site appears to range in age from the 1880s to the 1930s or 1950s. Whether the two surficial hearths found on site are historical or modern could not be determined; however, there is no evidence to suggest that these features are prehistoric in origin. Artifacts for which general dates of manufacture could be determined include: sanitary cans, hole-in-cap cans, an ABM made bottle, square cut nails, and barrel hoops with wire nails. Sanitary cans were first mass-produced by the Sanitary Can Company in 1904, and in 1908 the American Can Company purchased and took over the four Sanitary Can Company manufacturing plants (IMACS User’s Guide 2001:471-6). Sanitary can production dominated can production in the western United States by 1911, but it took nearly 30 more years for it to gain complete control (Fike 1989:22). Additionally, one of the sanitary cans found on site was church key-opened, which indicates that it was opened after 1935 when the church key was first introduced (IMACS User's Guide 2001:471-6). Hole-in-cap cans were produced from 1840 to 1920, but were still being manufactured in small numbers into the 1950s (Goodman 2002). ABM made bottles date from 1904 onward (IMACS User's Guide 2001:472-14) and square cut nails were common until the 1880s when round wire nails began being machine-produced (Goodman 2002).

Due to the close proximity of CA-SBR-13012H to the former alignment of the AP/ATSF Railroad (i.e., CA-SBR-6693H; constructed from 1882 to 1883) and the nature and age of the cultural deposits identified, the archaeologists for the Applicant believe that some of the historical refuse noted on site is likely the result of random episodes of refuse disposal associated with the construction and/or maintenance of CA-SBR-6693H during the late 1800s and early-to-middle 1900s. However, the site is also located immediately south of a well-traveled dirt road, and some of the refuse may be the result of isolated episodes of refuse disposal by people traveling through the area along this road. Whether the two surficial hearths found on site are historical or modern could not be determined; however, there is no evidence to suggest that these features are prehistoric in origin.

Although the local depositional environment suggests that the potential for buried cultural deposits at the site is moderate to high, and buried features or surfaces may be intact as sheet wash and other low energy forms of deposition are common on the lower portions of the alluvial fan piedmont, no privy pits or other discrete features (e.g., structure remains, trash dumps) that could potentially contain subsurface cultural remains were identified on site. The nature and age of the cultural deposits identified would suggest that the potential for any significant cultural deposits in buried contexts on site is extremely low.

CA-SBR-13012H lacks historical artifacts with unique or temporally diagnostic characteristics that can be associated with any specific period of history. Additionally, this site cannot be associated conclusively with any distinctive or significant event, person, design, or construction, and the artifact distribution has been documented during the recordation process. Although the local depositional environment suggests that the potential for buried cultural deposits at the site is moderate to high, no privy pits or other discrete features (e.g., structure remains, trash dumps) that could potentially contain subsurface cultural remains were identified on site. The nature and age of the cultural deposits identified would suggest that the potential for any significant cultural deposits in buried contexts on site is extremely low. Therefore, the data potential is considered exhausted through recordation of CA-SBR-13012H.

CA-SBR-13015

CA-SBR-13015, an amorphous-shaped high density lithic reduction scatter covering a total surface area of 7,238 square meters, is located within the central portion of the Phase 2 area of the Calico Solar Project site. An erosional fan remnant is composed of hills and ridges that extend above, and are surrounded by, the other landforms in the southern portion of the Calico Solar Project site. They generally are composed of a summit with moderate- to well-developed desert pavement (due to both parent material and age) and erosional side slopes that generally lack pavement. Within the southern

Project area, these fan remnants are generally composed of a very old (Early–to-Middle Pleistocene) fanglomerate of cobbles and coarse gravels. Moderate- to well-developed desert pavement covers approximately 90% of the site, and consists of poorly sorted sub-angular to subrounded coarse sand grains, and pebbles and cobbles of cryptocrystalline silicates (e.g., jasper, chert, and chalcedony), basalt, and other volcanic materials. The continuity of the desert pavement is broken by shallow northwest trending gullies dissecting the fan. Most loci and artifacts tend to be located in areas where desert pavement is present. Limited eolian deposits, consisting of small coppice dunes and minor accumulations of sand around the base of vegetation and partially in-filled gullies, cover less than five percent of the site. Along the northern site boundary, the landform discontinuously transitions into an alluvial flat. South of the site the fan remnant extends as a series of low northwest aligned hills covered by moderate- to well-developed desert pavement and separated by similarly oriented washes and gullies. The axial channel for the valley, a 4- to 5-meter-wide west trending wash, is located 270 meters north of the site; prominent northwest trending wash, draining the remnant fan, is located 300 meters west. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*) and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey.

This high density lithic reduction scatter measures 150 meters north to south by 187 meters east to west, and contains a total of 449 prehistoric artifacts. Artifact density is moderate, with a calculated distribution of one artifact per 16 square meters. However, 22 discrete loci with higher concentrations of cultural materials, interpreted to be single reduction loci, do occur within the site area. The overall condition of this site is good with no alterations.

As noted above, this high density lithic reduction scatter contains 22 discrete reduction loci (i.e., Loci 1-22; see descriptions below) containing higher artifact densities; the remainder of the identified cultural materials are sparsely scattered between loci. In all, 449 artifacts observed on the site surface include: 11 formed tools (all point provenienced), 349 flakes, and 21 pieces of shatter within locus boundaries; six additional formed tools (also point provenienced), 82 flakes, and one piece of shatter are scattered between loci. The formed tools include: nine bifacial cores, three multi-directional cores, one exhausted core, one biface, and one edge-modified flake – all of red jasper. The two remaining tools are chalcedony and include a biface and bifacial core. Of the remaining 432 artifacts, 407 are red jasper, 14 are mustard chert, nine are chalcedony, and two are andesite. The jasper artifacts include 109 primary flakes, 190 secondary flakes, 88 tertiary flakes, and 20 pieces of shatter. The mustard chert artifacts include: seven primary flakes, six secondary flakes, and one piece of shatter. The chalcedony artifacts include three primary flakes, five secondary flakes, and one piece of shatter, while the andesite artifacts include one primary flake and one secondary flake.

Locus 1 is located in the northeastern corner of the site and measures 9.2 meters northeast to southwest by 6.7 meters northwest to southeast. Artifacts at Locus 1 include: one exhausted core, two primary flakes, seven secondary flakes, seven tertiary flakes, and two pieces of shatter – all of red jasper.

Locus 2 is located in the north-central portion of the site and measures 6.0 meters north to south by 3.9 meters east to west. Artifacts at Locus 2 include: one bifacial core, one primary flake, eight secondary flakes, and four tertiary flakes – all of red jasper.

Locus 3 is also located in the north-central portion of the site and measures 4.8 meters north to south by 2.3 meters east to west. Artifacts at Locus 3 include: one bifacial core, two primary flakes, four secondary flakes, and four pieces of shatter – all of red jasper.

Locus 4 is also located in the north-central portion of the site and measures 3.4 meters northwest to southeast by 1.3 meters northeast to southwest. Artifacts at Locus 4 include: six primary flakes, one secondary flake, and one tertiary flake – all of red jasper.

Locus 5 is located in the northwestern portion of the site and measures 13.6 meters northwest to southeast by 6.3 meters northeast to southwest. Artifacts at Locus 5 include: one multi-directional core, one unifacially edge-modified flake, 12 primary flakes, 23 secondary flakes, and 10 tertiary flakes – all of red jasper. One chalcedony secondary flake is also present within this locus.

Locus 6 is also located in the northwestern portion of the site and measures 6.5 meters north to south by 3.6 meters east to west. Artifacts at Locus 6 include: one multi-directional core fragment, two primary flakes, eight secondary flakes, 12 tertiary flakes, and three pieces of shatter – all of red jasper.

Locus 7 is located at the northern site boundary and measures 5.6 meters north to south by 3.2 meters east to west. Artifacts at Locus 7 include: one bifacial core, four secondary flakes and one piece of shatter – all of red jasper.

Locus 8 is located at the northwest corner of the site and measures 5.8 meters northwest to southeast by 2.5 meters northeast to southwest. Artifacts at Locus 8 include: four primary flakes, nine secondary flakes, five tertiary flakes, and one piece of shatter – all of red jasper.

Locus 9 is also located at the northwest corner of the site and measures 4.9 meters northwest to southeast by 2.7 meters northeast to southwest. Artifacts at Locus 9 include: two primary flakes, one secondary flake, seven tertiary flakes, and two pieces of shatter – all of red jasper.

Locus 10 is also located at the west-central site boundary and measures 2.4 meters northwest to southeast by 1.2 meters northeast to southwest. Artifacts at Locus 10 include: two primary flakes, eight secondary flake, one tertiary flake, and one piece of shatter – all of red jasper.

Locus 11 is located at the southwestern site boundary and measures 2.4 meters north to south by 5.4 meters east to west. Artifacts at Locus 11 include: one nearly complete biface, one bifacial core, six primary flakes, 12 secondary flakes, and eight tertiary flakes – all of red jasper. One chalcedony primary flake is also present within the locus boundaries.

Locus 12 is also located at the southwestern site boundary and measures 2.2 meters northeast to southwest by 1.3 meters northwest to southeast. Artifacts at Locus 12 include four primary flakes and five secondary flakes – all of red jasper.

Locus 13 is located at the southwest-central site boundary and measures 2.9 meters northwest to southeast by 0.7 meters northeast to southwest. Artifacts at Locus 13 include: one complete biface, three primary flakes, 12 secondary flakes, and one tertiary flake – all of red jasper.

Locus 14 is located at the southeastern site boundary and measures 3.9 meters northwest to southeast by 1.3 meters northeast to southwest. Artifacts at Locus 14 include: one bifacial core, two primary flakes, three secondary flakes, one tertiary flake, and one piece of shatter – all of red jasper.

Locus 15 is also located at the southeastern site boundary and measures 4.3 meters northeast to southwest by 0.9 meters northeast to southwest. Artifacts at Locus 15 include: seven primary flakes, six secondary flakes, and one piece of shatter – all of mustard chert. Jasper artifacts include three secondary flakes and three tertiary flakes.

Locus 16 is located at the western-central site boundary and measures 2.6 meters north to south by 3.8 meters east to west. Artifacts at Locus 16 include: two primary flakes, three secondary flakes, and one piece of shatter – all of chalcedony. Jasper artifacts include two primary flakes and seven secondary flakes.

Locus 17 is located at the south-central site boundary and measures 0.6 meters north to south by 1.1 meters east to west. Artifacts at Locus 17 include one primary flake and four secondary flakes – all of red jasper.

Locus 18 is also located at the south-central site boundary and measures 1.7 meters north to south by 2.1 meters east to west. Artifacts at Locus 18 include three primary flakes, six secondary flakes, and three tertiary flakes – all of red jasper.

Locus 19 is located in the northeastern corner of the site and measures 0.7 meters north to south by 1.7 meters east to west. Artifacts at Locus 19 include three primary flakes, six secondary flakes, and one piece of shatter – all of red jasper.

Locus 20 is also located in the northeastern corner of the site and measures 6.2 meters north to south by 10.9 meters east to west. Artifacts at Locus 20 include: six primary flakes, 12 secondary flakes, nine tertiary flakes, and one piece of shatter – all of red jasper.

Locus 21 is located in the northeastern site boundary and measures 4.4 meters north to south by 5.6 meters east to west. Artifacts at Locus 21 include: two primary flakes, eight secondary flakes, five tertiary flakes, and one piece of shatter – all of red jasper.

Locus 22 is located in the central portion of the site and measures 7.0 meters northwest to southeast by 2.1 meters northeast to southwest. Artifacts at Locus 22 include: one primary flake, 13 secondary flakes, one tertiary flake, and one piece of shatter – all of red jasper.

To summarize, a total of 349 pieces of debitage/shatter and 11 tools are located within the 22 loci. As noted above, six formed artifacts and 82 debitage items and one piece of shatter were identified between loci. The formed artifacts include three bifacial jasper cores, two multi-directional jasper cores, and one bifacial chalcedony core. Debitage items observed between loci include: 79 jasper flakes (43 primary flakes, 26 secondary flakes, and 10 tertiary flakes) and one piece of jasper shatter, two andesite flakes (one primary and one secondary), and one secondary flake of chalcedony.

The potential for buried artifacts is low as geologic sources indicate the fan remnant dates to the Early-to- Middle Pleistocene (Rogers 1967); however, artifacts associated with the surface pavement may be covered by eolian sands in limited areas (approximately five percent) of the site. However, considering the artifact assemblage identified on site which consists primarily of various types of cores and a large percentage of cortical debitage (342 of 432 debitage items, or 79%), all of which are indicative of initial lithic reduction activities, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified.

Based upon the cultural constituents and the physical context, archaeologists for the Applicant interpret this site as a lithic procurement and initial lithic reduction locality. The lithic materials appear to be derived from cobbles of toolstone quality found on site within the desert pavement surfaces, and the artifact types identified (primarily bifacial and multi-directional cores and a preponderance of cortical debitage) reflect initial lithic reduction activities. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Additionally, each of the 22 loci identified are composed primarily of only one type of lithic material (jasper, chert, or chalcedony); these are interpreted as single reduction loci. Thus, the site appears to represent a minimum of 22 episodes or localities of initial lithic reduction.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with any specific period of prehistory or ethnohistory. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, the artifact distribution has been documented during the recordation process. As noted above, CA-SBR-13015 is situated on the toe slope of a gently sloping erosional fan remnant facing north and northwest, moderate to well-developed desert pavement covers approximately 90% of the site, and most loci and artifacts tend to be located in areas where desert pavement is present. The potential for buried artifacts is low as geologic sources indicate the fan remnant dates to the Early-to-Middle Pleistocene (Rogers 1967), prior to human presence in the area. Artifacts associated with the surface pavement may be covered by eolian sands in limited areas (approximately five percent) of the site. However, considering that the artifact assemblage identified on site consists primarily of cores and a large percentage of cortical debitage (74.3% of the debitage identified), all of which are indicative of initial lithic reduction activities, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified. Therefore, the data potential is considered exhausted through recordation of CA-SBR-13015.

CA-SBR-13026

CA-SBR-13026, an amorphous-shaped sparse density lithic reduction scatter covering a total surface area of 5,435 square meters, is located within the southern central portion of the Phase 2 area of the Calico Solar Project site. The site is situated on a gently sloping (2 to 3 degree) toe slope of an erosional fan remnant facing west. The erosional fan remnant is composed of hills and ridges that extend above, and are surrounded by, the other landforms in the southern portion of the Calico Solar Project area. They generally are composed of a summit with moderate- to well-developed desert pavement (due to both parent material and age) and erosional side slopes that generally lack pavement. Within the southern project area, these fan remnants are generally composed of a very old (Early-to-Middle Pleistocene) fanglomerate of cobbles and coarse gravels. Poorly to moderate-developed desert pavement covers approximately 70% of the site, and consists of poorly sorted sub-angular to sub-rounded pebbles and cobbles of basalt, cryptocrystalline silicates, rhyolite, and metavolcanic materials. The continuity of the desert pavement is broken by shallow west and southwest trending gullies dissecting the surface. All loci and most artifacts tend to be located in areas where desert pavement is present. Limited eolian deposits consist of small accumulations of sand around the base of vegetation and partially in-filled gullies and cover less than five percent of the site area. Site sediments consist of fine to medium grained sand with sub-angular to sub-rounded pebbles and cobbles of the material types noted above. South of the site is an inset fan with braided west trending channels; small coppice dunes have formed on vegetation stabilized bars. The remnant fan extends both north and east and consists of low northwest trending eroded hills covered by a well-developed desert pavement. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey.

This sparse density lithic reduction scatter measures 130 meters north to south by 124 meters east to west, and contains a total of 90 prehistoric artifacts. Artifact density is low, with a calculated distribution of one artifact per 64.7 square meters. However, four discrete loci with higher concentrations of cultural materials, interpreted to be single reduction loci, do occur within the site area. The overall condition of this site is good with no alterations.

The major physical surface characteristic of this site is a lithic reduction scatter containing approximately 89 cryptocrystalline silicate (jasper and chalcedony), rhyolite, and metavolcanic artifacts, which include: 79 pieces of lithic debitage, seven cores, two tested cobbles, and one hammerstone. Of the 89 artifacts identified, 37 pieces of debitage and two cores occur within four discrete loci (i.e., Loci 1-4) with higher concentrations of artifacts situated on poorly to moderate-developed desert pavement surfaces; the remaining cultural materials identified occur outside of these designated loci.

Locus 1 is located along the central-western site boundary, measures 4.0 meters north to south by 4.0 meters east to west, and contains 10 red/pink/white banded jasper flakes (three primary flakes, two secondary flakes, and five tertiary flakes).

Locus 2 is located within the central-eastern site area, measures 5.0 meters north to south by 3.0 meters east to west, and contains 14 green rhyolite flakes (one primary flake, six secondary flakes, and seven tertiary flakes).

Locus 3 is located approximately 15 meters northeast of Locus 2, measures 2.2 meters north to south by 2.2 meters east to west, and contains seven jasper flakes (two primary flakes, one secondary flake, and four tertiary flakes) and one unidirectional jasper core.

Locus 4 is located near the southeastern site boundary approximately 20 meters south southeast of Locus 2, measures 1.6 meters north to south by 1.0 meter east to west, and contains six green rhyolite flakes (two primary flakes, three secondary flakes, and one tertiary flake) and one unidirectional rhyolite core.

Those artifacts identified outside of the designated loci (50 items) include: five cores (one bifacial jasper core, one jasper core [type unreported], two multi-directional chalcedony cores, and one multi-directional rhyolite core), one metavolcanic cobble hammerstone, two tested cobbles (one jasper and one red-white mottled cryptocrystalline silicate), and 42 lithic debitage items including 13 primary flakes (seven jasper, four cryptocrystalline silicate, one rhyolite, and one metavolcanic), 17 secondary flakes (nine jasper, seven cryptocrystalline silicate, and one metavolcanic), six tertiary flakes (three jasper, two cryptocrystalline silicate, and one agate), and six pieces of shatter (four jasper and two cryptocrystalline silicate).

The potential for buried artifacts is low as geologic sources indicate the fan remnant dates to the Early-to- Middle Pleistocene (Rogers 1967); however, artifacts associated with the surface pavement may be covered by eolian sands in limited areas (approximately five percent) of the site. However, considering the artifact assemblage identified on site, which consists of cores, tested cobbles, a hammerstone, and a large percentage of cortical debitage (50 of 79 debitage items, or 63.3%), all of which are indicative of initial lithic reduction activities, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified.

Based upon the cultural constituents and the physical context, archaeologists for the Applicant interpret this site as a sparse density lithic procurement and initial lithic reduction locality. The lithic materials appear to be derived from cobbles of toolstone quality found on site within the desert pavement surfaces. The artifact types identified (unidirectional, multi-directional, and bifacial cores, a hammerstone, and a preponderance of cortical debitage) reflect initial lithic reduction activities. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Additionally, all four loci identified comprised only one type of lithic material (either jasper or rhyolite), which are interpreted as single reduction loci. Thus, the site appears to represent a minimum of four episodes or localities of initial lithic reduction.

This site lacks artifacts with unique or temporally diagnostic characteristics and the material remains cannot be associated with a specific period of prehistory or ethnohistory. As noted above, CA-SBR-13026 is situated on a gently sloping toe slope of an erosional fan remnant facing west, poorly to moderate-developed desert pavement covers approximately 70% of the site, and all loci and most artifacts tend to be located in areas where desert pavement is present. The potential for buried artifacts is low as geologic sources indicate the fan remnant dates to the Early-to-Middle Pleistocene (Rogers 1967), prior to human presence in the area. Artifacts associated with the surface pavement may be covered by eolian sands in limited areas (approximately five percent) of the site. However, considering the artifact assemblage identified on site, which consists of cores, tested cobbles, a hammerstone, and a large percentage of cortical debitage (63.3% of the debitage identified), all of which are indicative of initial lithic reduction activities, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified. Therefore, the data potential is considered exhausted through recordation of CA-SBR-13026.

CA-SBR-13029

CA-SBR-13029, an amorphous-shaped, low density lithic reduction scatter covering a total surface area of 1,188 square meters, is located in the extreme northwestern corner of the western edge of the Phase 2 area of the Calico Solar Project site. The site is situated on a moderately dissected region of the uppermost portion of the alluvial fan piedmont. The alluvial fan piedmont is the large, gently sloping depositional feature that dominates the northern portion of the Calico Solar Project area; commonly referred to as a “bajada.” As a whole, this appears to be a much younger landform than those in the southern portion of the Calico Solar Project area. A mountain valley draining the Cady Mountains opens onto the fan 500 meters northeast and numerous active and abandoned channels are braided across the area. Specifically, the site is on a slightly elevated stabilized remnant of the fan, although likely not much older than the surrounding area. Within the site area, slope ranges from three to five percent with generally a southeastern aspect. Southeast trending braided washes bound the east and west side of the site and extend for several hundred meters in width. Site sediments are fine to medium grained sand with small to medium sub-angular pebbles and cobbles of cryptocrystalline silicates (e.g., jasper, chert, and chalcedony), basalt, and other volcanic materials. Evenly distributed, moderately sorted cobbles are scattered across the surface of much of the site. Limited eolian deposits consist of minor accumulations of sand at the base of vegetation, which covers no more than one percent of the site. The mountain valley is moderately large and continues for approximately 5 miles into the mountains; the piedmont descends gently to the southeast. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey.

CA-SBR-13029 is an amorphous-shaped, sparse density lithic reduction scatter that measures 53 meters north to south by 33 meters east to west; artifact density approximates one artifact per 74 square meters (based on GIS calculations). The site is composed of 16 pieces of debitage, including five secondary flakes and four tertiary flakes of red jasper, three secondary flakes and two tertiary flakes of mustard chert, and one secondary flake and one tertiary flake of white chert. No formed tools are present on the site surface. One highly weathered, unidentifiable large mammal long bone midsection was also observed on the site surface.

Although site recordation involved only an examination of the site surface, the potential for buried artifacts at this site is high. However, due to reworking of the local sediments by the wash, buried artifacts are likely in secondary disturbed context and the chances of finding intact surfaces and features is low.

Based upon the cultural constituents and the physical context, archaeologists for the Applicant interpret this site as a sparse density, lithic reduction scatter with only 16 debitage items present on the site surface derived from cobbles of red and brown jasper of toolstone quality found on site within the desert pavement surfaces. These types of sites are characterized by the presence of lithic debitage – indicating testing and initial production of flaked stone-tools; such as bifacial cores and scrapers. The presence of nine secondary flakes (red jasper, and white and mustard colored chert) and seven tertiary flakes of the same material types as the secondary flakes suggest that maintenance of tools of these material types may have occurred at the site. However, the tools were likely transported off site, as no formed tools were present on the site surface.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a specific period of prehistory or ethnohistory. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction. The artifact distribution has been documented during the recordation process. As noted above, the site is situated on a slightly elevated stabilized remnant on the uppermost portion of an alluvial fan piedmont fan. Although the potential for buried artifacts at this site is high, buried artifacts are likely in secondary disturbed context due to reworking of the local sediments by the wash; the chances of finding intact surfaces and features is low. Therefore, the data potential is considered exhausted through recordation of CA-SBR-13029.

CA-SBR-13032

CA-SBR-13032 is a prehistoric trail composed of four distinct segments that trend north northwest to south southeast (Segments 1 and 2); as the trail extends further west, it trends in almost an east to west direction (Segments 3 and 4). The site is situated in the east-central portion of the Phase 1 area of the Calico Solar Project site. The trail likely extends further to the east outside the Calico Solar Project site. The site is situated in a moderately dissected region of the upper portion of an alluvial fan piedmont near the mountain front and transects three or four major drainage systems. The alluvial fan piedmont is the large, gently sloping depositional feature that dominates the northern portion of the Calico Solar Project site, commonly referred to as a “bajada.” Several mountain valleys originating in the Cady Mountains open onto the piedmont uphill, or north northeast, of the site and are the source for a number of coalescing braided washes and their associated fans. Generally, the surface slopes 3 to 4 degrees, with a southwest aspect. The trail is most visible in areas where the site surface is densely covered by poorly sorted sub-angular cobbles and small boulders; however, much of the site does transect areas that are covered by more sorted pebbles and cobbles and even sand. Numerous channels cross the ground surface in the site area and have eliminated any manifestation of the trail system. Portions of the trail pass close to several basaltic or andesite inselburgs and generally follows the base of the mountains at a contour interval of +/- 2,430-40 feet above mean sea level.

Vegetation along the trail is part of the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Along the site area, observed vegetation includes: creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), desert saltbush (*Artiplex polycarpa*), teddy bear cholla (*Opuntia bigelovii*), pencil cholla (*Opuntia* sp.), and beavertail cactus (*Opuntia basilaris*), as well as bunch grasses that were unidentifiable during the archaeological survey.

The combined length of the four recorded segments at CA-SBR-13032 is 2,349 meters; all four trail segments range in width from 40 to 50 centimeters and are less than 5.0 centimeters deep. The trail follows a nearly level contour (noted above), crossing undulating terrain, with intact portions generally present on the higher terraced areas. Where seasonally wet washes transect the trail, evidence of the trail has been eliminated. The surface of the trail appears to be tamped with evidence of the manual cast-off of larger cobbles to either side; this is more evident on occasional terraces with rocky surfaces. It is likely that the trail continues both to the west northwest and east southeast; the eastern segment of the trail continues to the southeast outside the Calico Solar Project site. Extending from east to west, the Segments are numbered 1, 2, 3, and 4; Segment descriptions are provided below.

Segment 1 is 881 meters long, trending in a northwest to southeast direction along a moderate-developed desert pavement terrace. The segment is divided into 18 sub-Sections (1A-R) by seasonally wet washes. In some areas, the trail is slightly bermed along the sides where it transects the cobble pavement. One jasper secondary flake was noted adjacent to Trail Segment 1R. A faint side trail 11 meters long by 25 centimeters wide runs parallel along the southern portion of Trail Segment 1C of the main trail segment.

Segment 1 is the eastern-most trail segment recorded and likely extends further east outside the Calico Solar Project site.

Segment 2 is 249 meters long, trending in a west northwest to east southeast direction along developed desert pavement. The segment is divided into two sub-Sections (2A and B) due to natural erosion. The eastern portion of the trail segment is well defined as it passes over highly developed desert pavement; the central to western portions are less defined, but clearly visible from the correct angle (pavement is nonexistent or insipient). The sections of the trail located atop developed desert pavement areas are defined by larger cobbles; in non-pavement areas the ground surface has been tamped and subsequently filled with aeolian sands. Feature 2, composed of three courses of granitic cobbles, is located on the north side of Trail Segment 2A. Segment 2 is located west of Segment 1.

Segment 3 is 1,120 meters long, trending in an east to west direction along a moderate-developed desert pavement terrace. The segment is divided into seven sub-Sections (3A-G) by seasonally wet washes. In some areas, the trail is slightly bermed along the sides where it transects the cobble pavement. Feature 1, composed of three courses of granitic cobbles, is located on the south side of Trail Segment 3D; one secondary chalcedony flake was noted adjacent to Trail Segment 3A, and another secondary chalcedony flake was noted adjacent to Trail Segment 3D. Segment 3 is located west of Segment 2.

Segment 4 is 22 meters long, and also trends in an east to west direction along a moderate-developed desert pavement terrace. The segment is divided into five sub-Sections (4A-E) by seasonally wet washes. In some areas, the trail is slightly bermed along the sides where it transects the cobble pavement. A cluster of five white quartzite secondary flakes and a white quartzite biface were noted adjacent to Trail Segment 4A. Segment 4 is located west of Segment 3.

In addition to the trail itself, two cairn features (Features 1 and 2) are also present. Feature 1, composed of three courses of granitic cobbles, is located on the south side of Trail Segment 3D and measures 50 centimeters wide by 83 centimeters long and is 25 centimeters high. Feature 2, composed of three courses of granitic cobbles, is located on the north side of Trail Segment 2A and measures 50 centimeters wide by 60 centimeters long and is 20 high. With the exception of the eight artifacts described above, no additional prehistoric or historical artifacts were noted adjacent to the trail system.

The overall condition of the prehistoric trail that constitutes CA-SBR-13032 is poor because portions of the trail that travel through seasonally wet washes have been completely destroyed; other trail segments situated atop the terraced desert pavement surfaces are minimally impaired from natural erosion.

Based upon the cultural constituents and the physical context, CA-SBR-13032 is clearly a portion of a larger prehistoric trail system that transects the Calico Solar Project site. Features 1 and 2, the two rock cairns recorded at the site, are presumed to have functioned as “trail markers.” The few artifacts noted along the trail are likely the result of sporadic lithic reduction activities of those individuals who utilized the trail. It is of note that the only quartzite artifacts noted during the 25 percent Calico Solar site re-survey completed to address Data Request Number 97, are present at CA-SBR-13032, adjacent to Trail Segment 4A.

CA-SBR-13041

CA-SBR-13041 is an amorphous-shaped prehistoric complex lithic scatter covering a total surface area of 82,565 square meters within the northwestern quadrant of the Phase 1 area of the Calico Solar Project site. The northern site boundary is bordered by a dirt access road within a gas pipeline corridor approximately 40 meters to the north of CA-SBR-13041; a barbed wire fence borders and defines portions of the southern site boundary. The CA-SBR-13041 is situated on a gently sloping (1 to 3 degree slope) inset alluvial fan facing north northwest with a wide northwest trending wash and several isolated erosional fan remnants. The inset alluvial fan comprises the portion of the alluvial deposition in the southern Calico Solar Project site, which is confined between two or more fan remnants (or older higher elevation landforms). These fan types may appear similar to the fan piedmont or the alluvial flat (but without dominant erosional features oriented east to west). The erosional fan remnant includes the hills and ridges that extend above, and are surrounded by, the other landforms in the southern portion of the Calico Solar Project site. They generally are composed of a summit with moderate- to well-developed desert pavement (due to both parent material and age) and erosional side slopes that generally lack pavement. Within the southern Calico Solar Project site, these fan remnants are generally composed of a very old (Early-to-Middle Pleistocene) fanglomerate of cobbles and coarse gravels.

Active channels of the wash are located east and west of the site and have been modified and incised due to the changes in local hydrology from the construction of Interstate 40. In the southwest corner of the site an erosional fan remnant dominates a portion of the fan. The fan remnant consists of low ridges covered by a well developed desert pavement, separated by north trending gullies. A similar, yet, lower formation is located in the northeast corner of the site. A wash consisting of a network of braided channels transects the remainder of the site. Portions of the wash are covered with a moderately sorted and poorly to moderate-developed desert pavement broken by occasional channels in-filled with eolian sediments. Limited eolian deposits consist of small coppice dunes and minor accumulations of sand around the base of vegetation and cover less than five percent of the site. Loci and most artifacts identified at the site tend to be located in areas where desert pavement is present. In addition to the two gullies east and west of the site, a west trending wash draining the erosional fan remnant is approximately 80 meters north and the axial channel for the valley is located 1,400 meters north. Fan remnants, consisting of a series of older low ridges and gullies covered with moderate- to well-developed desert pavement are located between 700 and 1,000 meters northeast, east, south, and west of the site.

Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*), white bursage or burrobush (*Ambrosia dumosa*), and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey.

CA-SBR-13041 is a sparse density complex lithic scatter measuring 535 meters east to west by 260 meters north to south and composed of nine discrete lithic reduction loci; a sparse scatter of lithic debitage, battered stone, and flaked stone tools is present between loci. Covering a surface area of 82,565 square meters, artifact density is one artifact per 110 square meters (based on GIS calculations). A total of 753 artifacts were observed on the site surface, including 63 formed artifacts that were point provienced and mapped (Artifacts #s 1-48 [Artifact #27 includes two cores; Artifact #25 includes three cores]). Of the 63 point provienced artifacts, 19 artifacts assigned formal Artifact Numbers (including Artifact #25 [Artifacts #s 1-48 are fully described in Table 2-1, Descriptions of Artifacts from CA-SBR-41 given Formal Artifact Numbers]) are located within designated loci (Loci 2, 3, 5, 6, 7, and 9); an additional six tools are also located within designated loci but were not given formal Artifact Numbers (there are 25 total formed artifacts mapped within the loci). Thirty additional artifacts are mapped outside designated locus boundaries and were assigned formal Artifact Numbers; eight additional tools are also located outside designated locus but were not given formal Artifact Numbers (there are 38 total formed artifacts located outside the designated loci). The total 63 formed tools observed site wide include: 32 red jasper cores, four mustard chert cores, and two chert cores of unreported color (38 total cores); seven red jasper edge-modified flakes (seven total edge-modified flakes); eight red jasper bifaces/fragments, one mustard chert biface/fragment, and one grey banded chert biface/fragment (10 total bifaces/fragments); one rhyolite hammerstone and one andesite hammerstone (2 total hammerstones); two red jasper flake tools and one brown/tan chert flake tool (three total flake tools); one grey chert uniface; one red jasper scraper; and one red jasper utilized flake.

The remaining artifacts observed on the site surface include: 690 flakes/shatter specimens, including 531 red jasper flakes/shatter specimens, 71 mustard chert flakes/shatter specimens, 69 brown/tan chert flakes/shatter specimens, eight white chert flakes/shatter specimens, eight red/white banded chert flakes/shatter specimens, and three green chert flakes/shatter specimens. The jasper flakes/shatter specimens include: 120 primary flakes, 236 secondary flakes, 98 tertiary flakes, and 77 pieces of shatter. The mustard chert flakes/shatter specimens include: nine primary flakes, 21 secondary flakes, 32 tertiary flakes, and nine pieces of shatter. The brown/tan chert flakes/shatter specimens include: 11 primary flakes, 30 secondary flakes, 17 tertiary flakes, and 11 pieces of shatter. The white chert flakes/shatter specimens include four primary flakes and four secondary flakes. The red/white banded chert flakes/shatter specimens include four primary flakes and four secondary flakes. The green chert flakes/shatter specimens include: one secondary flake, one tertiary flake, and one piece of shatter. One cleared rock circle feature (Feature 1) is also present in the northeastern corner of Locus 5. Locus descriptions are provided below.

Locus 1 is located in the northwestern corner of the site and measures 6.0 meters north to south by 11.4 meters east to west. Artifacts at Locus 1 include: three primary flakes, three secondary flakes, two tertiary flakes, and two pieces of shatter – all of red jasper. One tertiary flake of mustard chert and one piece of chalcedony shatter are also present at Locus 1.

Locus 2 is also located in the northwestern portion of the site and measures 4.4 meters north to south by 3.7 meters east to west. Artifacts at Locus 2 include three primary flakes and four secondary flakes – all of red jasper. Artifacts 12 and 13 are also located in Locus 2.

Locus 3 is located at the west-central site boundary and measures 9.5 meters north to south by 11.8 meters east to west. Artifacts at Locus 3 include: one primary flake, five secondary flakes, 19 tertiary flakes, and two pieces of shatter – all of mustard chert. Red jasper artifacts include two secondary flakes and one piece of shatter. Artifacts 43 and 44 are also located in Locus 3.

Locus 4 is located along the barbed wire fence line at the southwestern portion of the site and measures 7.4 meters north to south by 7.9 meters east to west. Artifacts at Locus 4 include 17 tertiary flakes and seven pieces of shatter – all of mustard chert. The brown/tan chert artifacts at Locus 4 include one primary flake and one piece of shatter; one red jasper secondary flake is also present.

Locus 5 is located in the southwestern corner of the site and measures 15 meters north to south by 28 meters east to west. Artifacts at Locus 5 include: 15 primary flakes, 12 secondary flakes, three tertiary flakes, and five pieces of shatter – all of red jasper. The brown/tan chert artifacts at Locus 5 include two primary flakes, one secondary flake, and two pieces of shatter. Other artifacts at Locus 5 include one rhyolite primary flake, one mustard chert primary flake, and one white chert primary flake; Artifact 42, a jasper core and a CCS core not assigned formal Artifact Numbers, and the Feature 1 rock circle are also present at Locus 5.

Locus 6 is located in the northern, west central site area and measures 29 meters northeast to southwest by 11 meters northwest to southeast. Both red jasper flakes/shatter and brown/tan chert flakes/shatter are present at Locus 6. The red jasper artifacts include: seven primary flakes, 19 secondary flakes, two tertiary flakes, and 12 pieces of shatter. The brown/tan chert artifacts include: three primary flakes, 11 secondary flakes, nine tertiary flakes, and two pieces of shatter. Artifacts 23 and 40, and a jasper core not assigned a formal Artifact Number are also present at Locus 6.

Locus 7 is located in the north-central site area and measures 6.0 meters north to south by 11.5 meters east to west. Artifacts at Locus 7 include: 12 primary flakes, eight secondary flakes, 22 tertiary flakes, and 12 pieces of shatter – all of red jasper. Two primary and one secondary flakes of mustard chert, as well as Artifacts 24 and 25 are also present at Locus 7.

Locus 8 is located at the south-central site boundary and measures 11 meters north to south by 11 meters east to west. Artifacts at Locus 8 include: three primary flakes, four secondary flakes, one tertiary flake, and one piece of shatter – all of red jasper.

Locus 9, the largest locus at CA-SBR-13041, is located in the east-central portion of the site and measures 32 meters north to south by 265 meters east to west. Locus 9 also contains the most diverse lithic material types and formed tools of all nine loci. Red jasper artifacts include: 10 primary flakes, 105 secondary flakes, 29 tertiary flakes, and 14 pieces of shatter. Brown/tan artifacts include: one primary flake, 14 secondary flakes, four tertiary flakes, and five pieces of shatter. Green chert artifacts include: one primary flake, eight secondary flakes, one tertiary flake, and one piece of shatter. Gray chert artifacts include two secondary flakes and three tertiary flakes. The red/white chert artifacts include a primary flake and a tertiary flake. Artifacts 29, 30, 34, 35, 36, 37, 38, and 39, as well as two jasper cores and a gray banded chert core not assigned formal Artifact Numbers are also present at Locus 9.

In areas of the washes that transect the northeastern and northwestern portions of the site, the potential for buried artifacts is high; however, due to reworking of the local sediments by the wash, buried artifacts are apt to be in secondary disturbed context and the likelihood of finding intact surfaces and features is low. The potential for buried artifacts on the fan remnants is low as geologic sources indicate the fan remnant dates to the Early-to-Middle Pleistocene. Intact desert pavement may be covered by eolian deposits on less than five percent of the site. Considering that the artifact assemblage identified on site consists primarily of cores (39 total cores), or 62% of the formed tools) and cortical flakes/shatter (530 total cortical flakes/shatter), or 77% of the debitage/shatter assemblage), all of which are indicative of early stage lithic reduction activities, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified.

Based upon the cultural constituents and the physical context, archaeologists for the Applicant interpret this site as a lithic procurement and early stage lithic reduction locality. The lithic materials appear to be derived from cobbles of toolstone quality found on site within the desert pavement surface. The artifact types identified (unidirectional, multi-directional, and bifacial cores, and a preponderance of cortical debitage and shatter) reflect early stage lithic reduction activities. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). The presence of bifaces, a scraper, a utilized flake, a flake tool, and a uniface also suggests that later stage reduction activities were also undertaken at the site.

Because CA-SBR-13041 lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with any specific period of prehistory or ethnohistory. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and the artifact distribution has been documented during the recordation process. As noted above, CASBR-13041 is situated on a gently sloping (1 to 3 degree slope) inset alluvial fan facing north northwest with a wide northwest trending wash and several isolated erosional fan remnants. Although the potential for buried artifacts at this site is high in the areas of active washes, reworking of the local sediments by the washes suggests that buried artifacts are in secondary disturbed context, and the likelihood of finding intact surfaces or features is low. Additionally, considering that the artifact assemblage identified on site consists primarily of cores and a large percentage of cortical flakes and shatter (39 of 47 debitage items, or approximately 83.3%), all of which are indicative of initial lithic reduction activities, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified.

As a result, CA-SBR-13041, as a stand-alone or individual resource, is recommended not eligible for the National Register of Historic Places, and is not a historic property pursuant to the National Register or a historical resource per the California Register of Historic Resources under any of the criteria for eligibility. In addition, CA-SBR-13041 is not considered a contributor to an existing or proposed archaeological district or landscape. No further cultural resources management of this resource is recommended.

CA-SBR-13053

CA-SBR-13053 is an amorphous-shaped moderate density c lithic reduction scatter situated near the toe of the Cady Mountains approximately 1,617 meters south of the northern Project area of potential effect (APE) and 1,477 meters north northeast of the Project’s Proposed Main Services Complex. The site covers a total surface area of 641 square meters within the northwestern portion of the Phase 1 area of the Calico Solar Project site. The site is located in the uppermost portions of the alluvial fan piedmont on the eastern toe slope of a remnant hill; the hill constitutes the non-buried portions of a spur ridge extending from the Cady Mountains to the north. The alluvial fan piedmont is the large, gently sloping depositional feature that dominates the northern portion of the Calico Solar Project area; commonly referred to as a “bajada.” As a whole, this appears to be a much younger landform than those in the southern portion of the Calico Solar Project area. A larger and higher remnant hill is located 100 meters north. Within the site area, slope ranges from 4 to 6 degrees with a generally southeastern aspect. A south trending braided wash bounds the eastern end of the site, and extends for several hundred meters further to the east. Additional remnant hills and the southern termini of south trending spur ridges extending from the Cady Mountains are located both east and west of the site area. Site sediments are fine to medium grained sand with small to large sub-angular pebbles and cobbles of cryptocrystalline silicates (e.g., jasper, chert, and chalcedony), basalt, and other volcanic materials. Evenly distributed, moderately sorted cobbles are scattered across the surface of much of the site. Limited eolian deposits consist of small coppice dunes forming around the base of vegetation, and the accumulation of sand at the base of the hill in the form of a small sand sheet; these eolian deposits cover no more than five percent of the site. Vegetation on site and within the surrounding area consists of the Creosote Bush Community; plant species observed on site include creosote bush (*Larrea tridentata*), white bursage or burrobush (*Ambrosia dumosa*), as well as bunch grasses that were unidentifiable during survey.

This lithic reduction scatter measures a maximum of 82 meters east to west by 45 meters north to south, and contains a total of 37 prehistoric artifacts (36 flakes and one biface fragment), the majority of which (30 items, or 81%) are concentrated within the western site area within an area designated as Locus 1. Artifact density at CA-SBR-13053 is moderate, with a calculated distribution of one artifact per 17.3 square meters. The overall condition of the site is good with no visible disturbances or alterations; minimal evidence of off-highway vehicle (OHV) activity is present to the north northwest of the site.

Locus 1 is located within the western site area, and measures 10.5 meters north to south by 9.0 meters east to west. Artifacts identified within Locus 1 include one point provenienced chalcedony biface fragment and 29 flakes (four chalcedony secondary flakes, 24 chalcedony tertiary flakes, and one tertiary flake of moss agate).

Those artifacts observed outside of the Locus 1 (seven items) include five chalcedony flakes (one primary and four tertiary), one jasper tertiary flake, and one chert tertiary flake.

The potential for buried artifacts at this site is high; however, due to reworking of the local sediments by the wash, buried artifacts are likely in secondary disturbed context, and the chances of finding intact surfaces and features is low.

Based upon the cultural constituents, archaeologists for the Applicant interpret this moderate density lithic reduction scatter as an early-to-late stage biface reduction locality. The site's lithic assemblage consists of a single biface fragment and 36 flakes, 86% of which are non-cortical tertiary flakes indicative of early-to-late stage biface reduction activities. Because the majority of lithic materials found within this lithic reduction scatter (91.9%) are of the same stone material (chalcedony), the site appears to represent one single episode or locality of early-to-late stage biface reduction. The lack of complete bifaces on site suggests that any finished tools, bifacial cores, or blanks produced on site were carried to an offsite location.

The surface manifestation of this site lacks artifacts with unique or temporally diagnostic characteristics that can be associated with a specific period of prehistory or ethnohistory. Additionally, this site cannot be associated with any distinctive or significant event, person, design, or construction, and the artifact distribution has been documented during the recordation process. Although the potential for buried artifacts at this site is high, due to reworking of the local sediments by the wash, any buried artifacts are likely in secondary and disturbed context, and the chances of finding intact surfaces and features is low. Therefore, the data potential is considered exhausted through recordation of CA-SBR-13053.

CA-SBR-13054

CA-SBR-13054 is an amorphous-shaped high density lithic reduction scatter covering a total surface area of 345 square meters near the toe of the Cady Mountains within the northeastern portion of the Phase 1 area of the Calico Solar Project site. The site is situated on a gently sloping (3 to 4 degree slope) south facing small erosional remnant fan in an active wash emanating from the Cady Mountains in the upper portions of the alluvial fan piedmont. The erosional fan remnant involves the hills and ridges that extend above, and are surrounded by, the other landforms in the southern portion of the Calico Solar Project area. They generally are composed of a summit with moderately- to well-developed desert pavement (due to both parent material and age) and erosional side slopes that generally lack pavement.

Within the southern Calico Solar Project site, these fan remnants are generally composed of a very old (Early-to-Middle Pleistocene) fanglomerate of cobbles and coarse gravels. The alluvial fan piedmont is the large, gently sloping depositional feature that dominates the northern portion of the Calico Solar Project site; commonly referred to as a “bajada.” As a whole, this appears to be a much younger landform than those in the southern portion of the Calico Solar Project site.

Older erosional fan remnants are located east and west flanking the wash; spur ridges terminate several hundred meters north upslope of the older fan remnants. Moderate-developed very poorly sorted desert pavement consisting of angular to sub-angular clasts ranging in size from pebbles to small boulders covers most of the site; clasts of toolstone quality materials (i.e., cryptocrystalline silicates) are present within the pavement. The continuity of the desert pavement is broken by several small south trending shallow gullies transecting the eastern portion of the site. Subsurface sediments are gravelly, fine to coarse sands. Most artifacts tend to be located within areas where pavement is present. South of the site, the alluvial fan piedmont continues and multiple coalescing fans are present east and west where mountain canyons open onto the piedmont. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*), white bursage or burrobush (*Ambrosia dumosa*), and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey.

This high density lithic reduction scatter measures 29 meters north to south by 33 meters east to west, and contains a total of 50 prehistoric lithic artifacts. Artifact density is moderate, with a calculated distribution of one artifact per 7.0 square meters. However, no discrete concentrations of cultural materials occur within the site area. The overall condition of this site is good with no alterations.

The major physical surface characteristic of this site is a lithic reduction scatter containing approximately 50 cryptocrystalline silicate (jasper and chalcedony) artifacts, which include: 47 pieces of jasper debitage (two primary flakes, six secondary flakes, eight tertiary flakes, and 31 pieces of shatter), two jasper cores (one bifacial core and one multi-directional core), and one chalcedony unidirectional core.

The potential for buried artifacts at this site is high; however, reworking of the local sediments by the wash suggests that buried artifacts are in secondary disturbed context, and the likelihood of finding intact surfaces and features is low. Additionally, considering that the artifact assemblage identified on site consists primarily of cores and a large percentage of cortical flakes and shatter (39 of 47 debitage items, or approximately 83.3%), all of which are indicative of initial lithic reduction activities, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified.

Based upon the cultural constituents and the physical context, archaeologists for the Applicant interpret this site as a high density lithic procurement and initial lithic reduction locality. The lithic materials appear to be derived from cobbles of toolstone quality found on site within the desert pavement surface. The artifact types identified (unidirectional, multi-directional, and bifacial cores, and a preponderance of cortical debitage and shatter) reflect initial lithic reduction activities. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the vast majority of the lithic materials found within this lithic reduction scatter (98%) are of the same stone material (jasper), the site appears to represent one single episode or locality of initial lithic reduction.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with any specific period of prehistory or ethnohistory. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and documentation of the artifact distribution has been conducted during the recordation process. As noted above, CA-SBR-13054 is situated on a gently sloping (3 to 4 degree slope) south facing small remnant fan in an active wash, moderate-developed desert pavement covers most of the site area, and most artifacts tend to be located within areas where pavement is present. Although the potential for buried artifacts at this site is high, reworking of the local sediments by the wash suggests that buried artifacts are in secondary disturbed context, and the likelihood of finding intact surfaces or features is low. Additionally, considering that the artifact assemblage identified on site consists primarily of cores and a large percentage of cortical flakes and shatter (39 of 47 debitage items, or approximately 83.3%), all of which are indicative of initial lithic reduction activities, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified. Therefore, the data potential is considered exhausted through recordation of CA-SBR-13054.

CA-SBR-13059

CA-SBR-13059 is an amorphous-shaped sparse density complex lithic scatter, covering a total surface area of 45,365 square meters, located along the southern boundary within the southwestern quadrant of the Phase 2 area of the Calico Solar Project site. The site is situated on the toe slope of a nearly level erosional fan remnant facing northwest. The erosional fan remnant constitutes the hills and ridges that extend above, and are surrounded by, the other landforms in the southern portion of the Calico Solar Project site. They generally are composed of a summit with moderate- to well-developed desert pavement (due to both parent material and age) and erosional side slopes that generally lack pavement. Within the southern Calico Solar Project site, these fan remnants are generally composed of a very old (Early-to- Middle Pleistocene) fanglomerate of cobbles and coarse gravels. Moderate- to well-developed desert pavement covers approximately 70% of the site and consists of moderately sorted sub-angular to subrounded coarse sand grains, and pebbles and cobbles of cryptocrystalline silicates (e.g., jasper, chert, and chalcedony), basalt, and other volcanic materials. The continuity of the desert pavement is broken by shallow northwest trending gullies dissecting the fan. Most loci and artifacts tend to be located in areas where desert pavement is present. Limited eolian deposits consisting of small coppice dunes and minor accumulations of sand around the base of vegetation and partially in-filled gullies cover less than five percent of the site surface. Along the northern site boundary, the landform discontinuously transitions into an alluvial flat. South of the site the fan remnant extends as a series of low northwest aligned hills covered by moderate- to well-developed desert pavement and separated by similarly oriented washes and gullies. The axial channel for the valley, a 4- to 5-meter-wide west trending wash, is located 300 meters north of the site. A prominent northwest trending wash draining the fan remnant forms the western boundary of the site.

Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*), white bursage or burrobush (*Ambrosia dumosa*), and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey.

CA-SBR-13059 is a sparse density complex lithic scatter measuring 380 meters north northwest to south southeast by 363 meters east to west, covering a total surface area of 45,365 square meters; artifact density approximates one artifact per 66 square meters (based on GIS calculations). The site includes 34 discrete concentrations of lithic materials with a higher artifact density (see loci descriptions below). Observed artifacts at CA-SBR-13059 total 692, including 25 cores and tools with Formal Artifact Numbers within designated loci, an additional 14 items with Formal Artifact Numbers are located outside designated locus boundaries (see Table 2-2 for a complete description of these artifacts). An additional two tested cobbles and one biface fragment without Formal Artifact Numbers are located within locus boundaries (Locus 15 and Locus 10, respectively), while an additional 11 core tools (10 red jasper and one mustard jasper – all of unreported core type) and four tested cobbles without Formal Artifact Numbers are located outside locus boundaries. The remaining 636 artifacts are debitage items, including flakes of red jasper, mustard and red jasper, chalcedony, mottled chert, and green chert; of these, 554 pieces of debitage and 26 pieces of shatter are located within designated locus boundaries; 56 pieces of debitage are located outside designated locus boundaries.

The debitage assemblage located within locus boundaries includes: 131 primary flakes, 185 secondary flakes, 109 tertiary flakes, and 23 pieces of shatter – all of red jasper; 23

primary flakes, 48 secondary flakes, 28 tertiary flakes and one piece of shatter – all of mustard and red jasper; five primary flakes, seven secondary flakes, eight tertiary flakes and one piece of shatter – all of chalcedony; and five primary flakes, two secondary flakes, three tertiary flakes and one piece of shatter – all of an unreported color of chert (total number of 554 flakes, and a total number of 26 shatter). The debitage assemblage located outside locus boundaries include: 22 primary flakes, 22 secondary flakes, and three tertiary flakes – all of red jasper; two primary flakes and four secondary flakes of chalcedony; two tertiary flakes of green chert; and one basalt secondary flake (total of 56 flakes).

The overall condition of the site is fair. The area is a popular location for rock hounding and there is a prospect pit at the extreme northwestern corner of the site; Locus 6 also appears to represent a looter's discard pile.

As noted above, 34 discrete loci with higher artifact density are present on the site; description of these are provided below.

Locus 1, located in the northeastern portion of the site, measures 1.8 meters north northwest to south southeast by 0.8 meters east northeast to west southwest and includes five secondary flakes, and one tertiary flake—all of red jasper.

Locus 2, also located in the northeastern portion of the site, measures 5.3 meters northeast to southwest by 1.7 meters northwest to southeast and includes six primary flakes and nine secondary flakes—all of red jasper. Artifact 34 is also present.

Locus 3, also located in the northeastern portion of the site, measures 2.3 meters northwest to southwest by 1.3 meters northwest to southeast and includes three primary flakes, seven secondary flakes, and five tertiary flakes—all of chalcedony. One primary flake and two tertiary flakes of red jasper are also present.

Locus 4, also located in the northeastern portion of the site, measures 11.9 meters northwest to southeast by 8.7 meters northeast to southwest and includes: nine primary flakes, 11 secondary flakes, five tertiary flakes, and one piece of shatter—all of red jasper. Artifact 32 is also present.

Locus 5, located in the east-central portion of the site, measures 8.4 meters north to south by 2.6 meters east to west and includes: seven primary flakes, 10 secondary flakes, and four tertiary flakes—all of red jasper. Artifacts 35 and 36 are also present.

Locus 6, located at the extreme southeastern corner of the site, measures 1.0 meter north to south by 1.0 meter east to west and includes core fragments of an unreported type and 13 pieces of mustard and red jasper material; Artifact 5 is also present. Given the very small size of the locus and the fact that all the noted lithic materials are situated in a deflated pile, Locus 6 appears to represent a looter's discard pile.

Locus 7, located at the very northern site boundary in the northeastern corner of the site, measures 4.3 meters northeast to southwest by 3.0 meters northwest to southeast and includes: three primary flakes, five secondary flakes, and five tertiary flakes—all of red jasper. Artifact 3 is also present.

Locus 8, located in the central portion of the site, measures 3.9 meters north to south by 3.7 meters east to west and includes 13 secondary flakes and seven tertiary flakes—all of red jasper. Artifacts 8 and 16 are also present.

Locus 9, also located in the central portion of the site, measures 3.5 meters north to south by 2.1 meters east to west and includes 10 secondary flakes, four tertiary flakes, and three pieces of shatter—all of red jasper.

Locus 10, located in the west-central portion of the site, measures 4.1 meters north to south by 3.6 meters east to west and includes three primary flakes, three secondary flakes, and seven tertiary flakes—all of red jasper. Artifact 12 is also present.

Locus 11, also located in the west-central portion of the site, measures 2.9 meters north to south by 3.0 meters east to west and includes five primary flakes and four secondary flakes—all of mustard jasper.

Locus 12, located in the east-central portion of the site, measures 2.7 meters north to south by 0.7 meters east to west and includes three primary flakes, four secondary flakes, and three tertiary flakes—all of red jasper. Artifact 19 is also present.

Locus 13, located at the northern site boundary in the northwestern corner of the site, measures 14 meters north to south by 6.8 meters east to west and includes: 17 primary flakes, 11 secondary flakes, 15 tertiary flakes, and three pieces of shatter—all of red jasper.

Locus 14, also located at the northern site boundary in the northwestern corner of the site, measures 7.2 meters northeast to southwest by 3.5 meters northwest to southeast and includes: seven primary flakes, four secondary flakes, six tertiary flakes, one piece of shatter—all of red jasper. Artifacts 30 and 31 are also present.

Locus 15, also located at the northern site boundary in the northwestern corner of the site, measures 5.6 meters north to south by 2.7 meters east to west and includes four secondary flakes, one tertiary flake, one piece of shatter—all of an unreported color of chert.

Locus 16, located at the very southern site boundary in the western portion of the site, measures 3.7 meters northwest to southeast by 1.5 meters northeast to southwest and includes one primary flake, two secondary flakes, and one tertiary flake—all of red jasper. One primary flake and three secondary flakes of chalcedony are also present, as well as Artifact 39.

Locus 17, located at the extreme western edge of the site, measures 14 meters north to south by 31 meters east to west and includes: 18 primary flakes, 17 secondary flakes, five tertiary flakes, and one piece of shatter—all of red jasper. One additional primary flake of chalcedony is also present, as well as Artifacts 13, 14, and 15.

Locus 18, also located at the extreme western edge of the site, measures 4.7 meters north to south by 7.0 meters east to west and includes: nine primary flakes, 14 secondary flakes, eight tertiary flakes, and two pieces of shatter—all of red jasper.

Locus 19, located at the extreme eastern edge of the site, measures 2.4 meters northwest to southeast by 1.5 meters northeast to southwest and includes two primary flakes, five secondary flakes, and three tertiary flakes—all of red jasper.

Locus 20, also located at the extreme eastern edge of the site, measures 2.7 meters north to south by 3.2 meters east to west and includes two primary flakes, six secondary flakes, four tertiary flakes, and one piece of shatter—all of red jasper.

Locus 21, located in a dense concentration of loci at the east-central edge of the site, measures 2.5 meters north to south by 2.3 meters east to west and includes nine primary flakes, five secondary flake, and three tertiary flakes—all of red jasper. Artifact 17 is also present.

Locus 22, also located in a dense concentration of loci at the east-central edge of the site, measures 8.9 meters northeast to southwest by 9.0 meters northwest to southeast and includes nine primary flakes, 10 secondary flakes, five tertiary flakes, and one piece of shatter—all of red jasper.

Locus 23, also located in a dense concentration of loci at the east-central edge of the site, measures 3.2 meters northeast to southwest by 2.7 meters northwest to southeast and includes 12 primary flakes, 19 secondary flakes, and 13 tertiary flakes—all of red jasper.

Locus 24, also located in a dense concentration of loci at the east-central edge of the site, measures 1.4 meters north to south by 2.4 meters east to west and includes five primary flakes, two secondary flakes, two tertiary flakes, one piece of shatter—all of assorted CCS of unreported color.

Locus 25, also located in a dense concentration of loci at the east-central edge of the site, measures 9.6 meters north to south by 7.6 meters east to west and includes four primary flakes, 11 secondary flakes, and eight tertiary flakes—all of mustard and red jasper. Artifact 21 is also present.

Locus 26, also located in a dense concentration of loci at the east-central edge of the site, measures 3.0 meters north to south by 6.6 meters east to west and includes seven primary flakes, 10 secondary flakes, three tertiary flakes, and one piece of shatter—all of mustard and red jasper. Artifacts 22 and 23 are also present.

Locus 27, also located in a dense concentration of loci at the east-central edge of the site, measures 4.7 meters northwest to southeast by 2.4 meters northeast to southwest and includes three primary flakes, four secondary flakes, and four tertiary flakes—all of mustard and red jasper. Artifact 24 is also present.

Locus 28, also located in a dense concentration of loci at the east-central edge of the site, measures 3.0 meters northeast to southwest by 1.7 meters northwest to southeast and includes three primary flakes, 10 secondary flakes, and 10 tertiary flakes—all of mustard and red jasper.

Locus 29, also located in a dense concentration of loci at the east-central edge of the site, measures 4.0 meters north to south by 4.7 meters east to west and includes six primary flakes, 13 secondary flakes, and three tertiary flakes—all of mustard and red jasper.

Locus 30, also located in a dense concentration of loci at the east-central edge of the site, measures 4.7 meters northeast to southwest by 4.6 meters northwest to southeast and includes nine primary flakes, seven secondary flakes, one tertiary flake, and four pieces of shatter—all of red jasper. Artifacts 25 and 26 are also present.

Locus 31, located at the very southeastern site boundary, measures 1.6 meters north to south by 9.5 meters east to west and includes three primary flakes, four secondary flakes, four tertiary flakes, and three pieces of shatter—all and red jasper. Artifacts 28 and 29 are also present.

Locus 32, located at the very northern site boundary in the northeastern corner of the site, measures 5.6 meters north to south by 3.1 meters east to west and includes two primary flakes, three flakes, and four tertiary flakes—all of red jasper.

Locus 33, also located at the very northern site boundary in the northeastern corner of the site, measures 1.4 meters north to south by 1.0 meter east to west and includes three primary flakes and two secondary flakes—all of chalcedony.

Locus 34, located at the east-central site boundary, measures 1.6 meters north to south by 5.6 meters east to west and includes six primary flakes, six secondary flakes, and four tertiary flakes—all of red jasper.

The potential for buried artifacts at CA-SBR-13059 is low, as geologic sources indicated the erosional fan remnant dates to the Early-to-Middle Pleistocene. Although portions of the fan surface and desert pavement may be covered by eolian deposits or the gully fan at the southern side of the site, only five percent of the site surface is covered by these deposits. Considering that the artifact assemblage identified on site consists primarily of cores (total number of 32, or 64% of the formed artifacts), six tested cobbles, 26 shatter, and a preponderance of cortical debitage (total of 404, or 73% of the debitage assemblage), it appears that early stage lithic reduction was the primary activity undertaken at the site. The presence of bifaces and 148 tertiary flakes of various lithic material types also suggests that later stage reduction activities were also undertaken at the site. Thus, based on the artifact assemblage and the low potential for buried cultural deposits in the five percent of the site surface covered by eolian deposits or the gully fan at the southern side of the site, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified.

Based upon the cultural constituents and the physical context, archaeologists for the Applicant interpret this site as a complex lithic scatter composed primary of cores and cortical debitage and shatter that are derived from cobbles of toolstone quality found on site within the desert pavement surface. The artifact types identified (multi-directional and bifacial cores, and a preponderance of cortical debitage and shatter) reflect early stage lithic reduction activities. Such artifacts indicate percussion (hard-hammer and/or softhammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). The presence of bifaces and 148 tertiary flakes also suggests that later stage reduction activities were also undertaken at the site.

CA-SBR-13059 lacks artifacts with unique or temporally diagnostic characteristics. As noted above, the potential for buried artifacts at CA-SBR-13059 is low, and although portions of the fan surface and desert pavement may be covered by eolian deposits or the gully fan at the southern side of the site, only five percent of the site surface is covered by these deposits. Additionally, considering that the artifact assemblage identified on site consists primarily of cores and a large percentage of cortical flakes and shatter, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified.

CA-SBR-13069

CA-SBR-13069, an amorphous-shaped, moderate density lithic reduction scatter covering a total surface area of 323 square meters, is located at the western edge of the Phase 2 area of the Calico Solar Project site. The site is situated on a fan remnant within a nearly level inset alluvial fan facing west northwest. This fan remnant is an earlier surface within the fan prior to the active channel down-cutting in its current course and abandoning this portion of the inset fan; it is much younger than the erosional fan remnant. The alluvial fan piedmont is the large, gently sloping depositional feature that dominates the northern portion of the Calico Solar Project site; commonly referred to as a “bajada.” As a whole, this appears to be a much younger landform than those in the southern portion of the Calico Solar Project site.

Older and more elevated fan remnants are located both north and south of the site, bounding the inset fan. The main channel of a west northwestward trending wash is located 150 meters south of the site. Moderately developed and moderately sorted desert pavement covers the entire surface area of the site, suggesting this portion of the alluvial fan is temporarily stabilized. Desert pavement continues east and west, broken by small gullies and small drainage features. A short slope near the southern boundary of the site is moderately dissected by small short gullies. Below the slope, south of the site, is the currently active portion of the inset fan. Site sediments are fine to medium-grained sand with small to large subangular to sub-rounded pebbles and cobbles. Approximately one-half mile northwest is the axial channel for the valley. The toe slopes of older fan remnants are located both north and south of the site and are covered by well-developed desert pavement. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey.

CA-SBR-13069 is an amorphous-shaped, moderate density lithic reduction scatter that measures 37 meters east to west by 41 meters north to south; artifact density approximates one artifact per 20.2 square meters (based on GIS calculations). The site contains one lithic reduction locus (Locus 1) measuring 3.2 meters northeast to southwest by 1.0 meter northwest to southeast which is composed of three primary flakes and six secondary flakes of red jasper; two primary and five secondary flakes of red jasper are located outside of Locus 1 boundaries. Total observed artifacts at CA-SBR-13069 include five primary and 11 secondary flakes of red jasper; no formed tools were observed at CA-SBR-13069.

Although site recordation involved only an examination of the site surface, the potential for buried artifacts at this site is relatively low as the local landform has stabilized; however, if buried artifacts are present, reworking of the local sediments by the wash suggest that the artifacts would be in secondary disturbed contexts, and the likelihood of finding intact buried cultural use surfaces and features is low.

Based upon the cultural constituents and the physical context, archaeologists for the Applicant interpret this site as a moderate density, lithic reduction scatter with a single lithic reduction locality (Locus 1) with higher artifact densities than the site as a whole. The lithic materials appear to be derived from cobbles of red jasper of toolstone quality found on site within the desert pavement surfaces. The flakes types identified (cortical debitage) reflect initial lithic reduction activities. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Thus, the site appears to represent a minimum of one episode of initial lithic reduction. Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a specific period of prehistory or ethnohistory. As noted above, the site is situated on a fan remnant within a nearly level inset alluvial fan that is bounded by older and more elevated fan remnants. Moderately developed and moderately sorted desert pavement covers the entire surface area of the site, suggesting this portion of the alluvial fan is temporarily stabilized. As noted above, the potential for buried artifacts at this site is relatively low as the local landform has stabilized. Nonetheless, if buried artifacts are present, reworking of the local sediments by the wash suggest that the artifacts would be in disturbed secondary contexts and the likelihood of finding intact buried cultural use surfaces and features is low. Therefore, the data potential is considered exhausted through recordation of CA-SBR-13069.

CA-SBR-13071

CA-SBR-13071, an amorphous-shaped, moderate density lithic reduction scatter covering a total surface area of 5,363 square meters. It is located within the central portion of the Phase 2 area of the Calico Solar Project site. The site is situated on the toe slope of a nearly level (1 degree slope) erosional fan remnant facing northwest. The erosional fan remnant constitutes the hills and ridges that extend above, and are surrounded by, the other landforms in the southern portion of the Calico Solar Project site. They generally are composed of a summit with moderate- to well-developed desert pavement (due to both parent material and age) and erosional side slopes that generally lack pavement. Within the southern Project area, these fan remnants are generally composed of a very old (Early-to-Middle Pleistocene) fanglomerate of cobbles and coarse gravels. Moderate- to well-developed desert pavement covers approximately 70% of the site and consists of poorly sorted sub-angular to subrounded coarse sand grains, and pebbles and cobbles of cryptocrystalline silicates (e.g., jasper, chert, and chalcedony), basalt, and other volcanic materials. The continuity of the desert pavement is broken by shallow northwest trending gullies dissecting the fan. Most loci and artifacts tend to be located in areas where desert pavement is present. Limited eolian deposits consisting of small coppice dunes and minor accumulations of sand around the base of vegetation and partially in-filled gullies cover less than five percent of the site. Along the northern site boundary, the landform discontinuously transitions into an alluvial flat. South of the site, the fan remnant extends as a series of low northwest aligned hills covered by moderate- to well-developed desert pavement, and separated by similarly oriented washes and gullies.

One such gully terminates at the southern boundary of the site forming a small gully fan covering the older remnant surface. The axial channel for the valley, a four- to five-meter-wide, west-trending wash, is located 250 meters north of the site. A prominent northwest trending wash, draining the remnant fan, is located 400 meters southwest. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey.

This sparse density lithic reduction scatter measures 160 meters east to west by 75 meters north to south, and contains a total of 211 prehistoric artifacts. Artifact density is moderate, with a calculated distribution of one artifact per 26 square meters. However, nine discrete loci with higher concentrations of cultural materials, interpreted to be single reduction loci, do occur within the site area. The overall condition of this site is fair; off-highway vehicle (OHV) disturbance and plowing/disking activities are evident within a small area in the northeastern portion of the site, southwest of Locus 1.

As noted above, the major physical surface characteristic of this site is a moderate density lithic reduction scatter containing approximately 211 artifacts (199 jasper artifacts, seven basalt artifacts, four chalcedony artifact, and one chert artifact). These items include: 190 pieces of lithic debitage, eight cores (two unidirectional cores, four bifacial cores, and two multi-directional cores), and 13 tested cobbles. Of the 211 artifacts identified, 141 items occur within locus boundaries (i.e., Loci 1-09), including 127 pieces of lithic debitage, nine tested cobbles, and five cores. Loci 2-9 are situated on moderate- to well-developed desert pavement surfaces; Locus 1 is located on a portion of the alluvial flat that occurs discontinuously along the northern site boundary. Formed tools assigned formal artifact numbers located within locus boundaries include Artifact 2 at Locus 1; Artifact 3 at Locus 4; Artifact 4 at Locus 5; Artifact 5 at Locus 6; Artifact 7 at Locus 7); formed tools assigned formal artifact numbers located outside designated locus boundaries include three jasper cores (one bifacial, one unidirectional, and one multi-directional [Artifact Nos. 1, 6, and 8]). Of the remaining 203 non-tool artifacts, 195 are jasper, six are basalt, one is chalcedony, and one is chert. The jasper artifacts include 58 primary flakes, 72 secondary flakes, 45 tertiary flakes, eight pieces of shatter, and 12 tested cobbles. The basalt artifacts include two secondary flakes, and four tertiary flakes. The chalcedony artifact is a tested cobble and the chert artifact is a secondary flake.

Those artifacts identified outside of the designated loci (70 items) include: three jasper cores (one bifacial, one unidirectional, and one multi-directional; Artifact Nos. 1, 6, and 8, four tested cobbles (three jasper and one chalcedony), and 63 jasper flakes (24 primary flakes, 13 secondary flakes, and 26 tertiary flakes). Loci descriptions are provided below.

Locus 1 is located along the extreme northeastern site boundary, measures 3.0 meters north to south by 1.6 meters east to west, and contains one bifacial core (Artifact No. 2;

broken into two pieces), one primary flake, five secondary flakes, five tertiary flakes, and one piece of shatter – all of red jasper.

Locus 2 is located within the southeastern site area approximately 48 meters south of Locus 1, measures 2.9 meters north to south by 1.3 meters east to west, and contains one primary flake, two secondary flakes, and one tested cobble – all of red jasper.

Locus 3 is also located within the southeastern site area approximately 14.5 meters southwest of Locus 2, measures 2.0 meters north to south by 1.3 meters east to west, and contains two primary flakes, three secondary flakes, and one tertiary flake – all of red jasper.

Locus 4 is also situated within the southeastern site area approximately 13 meters north northeast of Locus 3 and 12 meters northwest of Locus 2, measures 1.1 meters north to south by 1.8 meters east to west, and contains one unidirectional core (Artifact No. 3), one primary flake, three secondary flakes, one tertiary flake, and one tested cobble – all of red jasper.

Locus 5 is located within the central site area along the northern edge of a desert pavement surface approximately 34 meters west northwest of Locus 4, measures 1.6 meters north to south by 1.8 meters east to west, and contains one multi-directional core (Artifact No. 4), three primary flakes, one secondary flake, four tertiary flakes, and one tested cobble – all of red jasper.

Locus 6 is also located within the central site area approximately 12 meters due west of Locus 5, measures 11.2 meters north to south by a maximum of 6.3 meters east to west, and contains one bifacial core (Artifact No. 5), two primary flakes, 13 secondary flakes, two tertiary flakes, and two tested cobbles – all of red jasper.

Locus 7 is located within the western portion of the site approximately 18 meters west of Locus 6, measures 13.0 meters north to south by 10.2 meters east to west, and contains one bifacial core (Artifact No. 7), 14 primary flakes, seven secondary flakes, and two tested cobbles, all of red jasper, as well as two secondary, four tertiary flakes, and one tested cobble of basalt.

Locus 8 is located near the western site boundary approximately 24 meters west of Locus 7, measures 5.8 meters north to south by 10.8 meters east to west, and contains six primary flakes, 14 secondary flakes, eight tertiary flakes, and three pieces of shatter, all of red jasper, as well as one secondary chert flake.

Locus 9 is located along the extreme western site boundary approximately 26 meters southwest of Locus 8, measures 2.4 meters north to south by 1.2 meters east to west, and contains seven primary flakes, five secondary flakes, four tertiary flakes, and four pieces of shatter – all of red jasper.

The potential for buried artifacts is low as geologic sources indicate the fan remnant dates to the Early-to- Middle Pleistocene (Rogers 1967); however, artifacts associated with the surface pavement may be covered by eolian sands in limited areas (less than five percent) of the site. However, considering the artifact assemblage identified on site, which consists of cores, tested cobbles, and a large percentage of cortical debitage/shatter (127 of 183 debitage items, or 68%), all of which are indicative of early stage lithic reduction activities, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified.

Based upon the cultural constituents and the physical context, archaeologists for the Applicant interpret this site as a lithic procurement and early stage lithic reduction locality. The lithic materials appear to be derived from cobbles of toolstone quality found on site within the desert pavement surfaces. The artifact types identified (unidirectional, multi-directional, and bifacial cores, tested cobbles, and a preponderance of cortical debitage) reflect initial lithic reduction activities. Such artifacts indicate percussion (hardhammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Additionally, all nine loci identified comprised primarily only one type of lithic material (jasper), and are interpreted as single reduction loci. Thus, the site appears to represent a minimum of nine episodes or localities of initial lithic reduction.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a specific period of prehistory or ethnohistory. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction. Analysis of artifact distribution has been accounted for during the recordation process. As noted above, CA-SBR- 13071 is situated on a gently sloping toe slope of an erosional fan remnant, moderate- to well-developed desert pavement covers approximately 70% of the site, and eight of the nine loci. Most artifacts tend to be located in areas where desert pavement is present. The potential for buried artifacts is low as geologic sources indicate the fan remnant dates to the Early-to-Middle Pleistocene (Rogers 1967), prior to human presence in the area. Artifacts associated with the surface pavement may be covered by eolian sands in limited areas (less than five percent) of the site; however, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified. Therefore, the data potential is considered exhausted through recordation of CA-SBR-13071.

CA-SBR-13073

CA-SBR-13073 is an oblong-shaped, complex lithic scatter that covers a total surface area of 884 square meters. The site is located within the central portion of the Phase 2 area of the Calico Solar Project site. The site is located at the intersection of the basin floor and the toe slope of the alluvial fan piedmont issuing from the Cady Mountains north of the Project site. West trending, slightly incised channels transect the area approximately 100 meters north and south of the site; the axial channel for the valley is located 375 meters west. Site sediments are silty fine to medium grain alluvial sand. The alluvial fan piedmont rises to the northeast, north, and east of the site. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey. One dead teddy bear cholla (*Opuntia bigelovii*) is also present on site.

This complex lithic scatter measures 26 meters north to south by 50 meters east to west, and contains a total of 37 prehistoric artifacts (one complete biface, three biface fragments, one edge-modified flake tool, and 32 debitage items), the majority of which (30 items) are concentrated within the central and eastern site area designated as Locus 1. Artifact density at CA-SBR-13073 is moderate, with a calculated distribution of one artifact per 23.9 square meters. The overall condition of the site is good, with no visible alterations.

Locus 1 is located within the central and eastern site area, and measures 16.0 meters north to south by 27.5 meters east to west. Artifacts identified within Locus 1 include: one complete chalcedony biface, two chalcedony biface fragments, one unifacially edge-modified chalcedony flake tool, 25 pieces of chalcedony debitage (22 tertiary flakes, one secondary flake, and two pieces of shatter), and one jasper tertiary flake.

Those artifacts observed within 30 meters and outside of the locus consist of one chalcedony biface fragment, four jasper flakes (one secondary flake and three tertiary flakes), and two chalcedony flakes (one secondary and one tertiary).

The potential for buried artifacts at CA-SBR-13073 is high, as sheet wash and eolian reworking of surface sediments may have buried portions of the site. These lower energy processes may have preserved features or intact surfaces as well.

Based upon the cultural constituents, archaeologists for the Applicant interpret this complex lithic scatter as an early-to-late stage biface reduction locality. The cultural constituents of this site consist primarily of complete and broken chalcedony bifaces, and chalcedony tertiary flakes. Because the majority of lithic materials found within this complex lithic scatter are of the same primary stone material (chalcedony) that is a constituent with material in the surrounding area, the site appears to represent one single episode or locality of early-to-late stage biface reduction.

Although the surface manifestation of this site lacks artifacts with unique or temporally diagnostic characteristics that can be associated with a specific period or prehistory of ethnohistory, there is a high potential for subsurface archaeological deposits within the site area. Because of that potential for subsurface archaeological deposits at CA-SBR-13073, it is recommended that additional limited subsurface testing and artifact analysis be conducted in order to ascertain whether such deposits are present within the site area before the final determination of eligibility can be made. The limited test should be designed to evaluate: (1) the presence of subsurface artifacts or features; (2) the presence of temporally diagnostic artifacts or datable material such as obsidian or charcoal; (3) the integrity of any buried cultural deposits; and (4) the diversity of artifacts that could contribute information about lithic reduction activities at this location.

CA-SBR-13078

CA-SBR-13073 is an amorphous-shaped, moderate density lithic reduction that covers a total surface area of 1,358 square meters. The site is located within the central portion of the Phase 2 area of the Calico Solar Project site, and is situated near the toe slope of an erosional fan remnant and alluvial flat developed along the southern side of the axial channel for the valley. The site surface slopes gently (3 to 5 degrees) with a northwestern aspect. Medium to course sub-angular grains of sand and small pebbles moderately cover the surface suggesting wind erosion is actively affecting the surface by removing the finer fraction of the sediment. Site sediments consist of unconsolidated fine to medium grained alluvial sand. Limited eolian deposits consist of small coppice dunes and cover roughly 10% of the site. The west trending axial channel for the valley is 230 meters north of the site. The erosional fan remnant, which consists of low desert pavement covered hills containing pebbles and cobbles of toolstone quality materials (e.g., cryptocrystalline silicates), rises and extends to the south. Shallow northwest trending gullies draining the fan remnant pass 100 meters east and west of the site. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community, which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey.

This moderate density lithic reduction scatter measures 80 meters east to west by 25 meters north to south, and contains a total of 64 prehistoric artifacts (all debitage items). The majority of the debitage (41 items, or 64%) are concentrated within the western site area, within an area designated as Locus 1.

Artifact density at CA-SBR-13078 is moderate, with a calculated distribution of one artifact per 20.3 square meters. The overall condition of the site is good with no visible alterations.

Locus 1 is located within the western site area, and measures 13.8 meters east to west by 12.0 meters north to south. Artifacts identified within Locus 1 include five chalcedony secondary flakes, 31 chalcedony tertiary flakes, and five tertiary flakes of red jasper.

Those artifacts observed within 30 meters and outside of the locus include two secondary and 16 tertiary flakes of chalcedony, and five tertiary flakes of yellow/brown jasper.

The potential for buried artifacts at CA-SBR-13078 is low as geologic sources indicate the fan remnant dates to the Early-to-Middle Pleistocene (Rogers 1967); however, artifacts associated with the surface may be covered by eolian sands within limited portions of the site area.

Based upon the cultural constituents, archaeologists for the Applicant interpret this sparse lithic reduction scatter as an early-to-late stage biface reduction locality. The cultural constituents of this site include 67 flakes, the vast majority of which (60 items, or 89.6%) are tertiary flakes indicative of early-to-late stage biface reduction. Because the majority of lithic materials found within this lithic reduction scatter are of the same stone materials (chalcedony and jasper) that are constituents of the erosional fan remnant rising to the south of the site area, the site appears to represent one single episode or locality of early-to-late stage biface reduction. The lack of bifaces on site suggests that once produced, these tools/cores were carried off site.

The surface manifestation of this site lacks artifacts with unique or temporally diagnostic characteristics that can be associated with a specific period of prehistory or ethnohistory. Additionally, the potential for buried artifacts is low as geologic sources indicate the fan remnant dates to the Early-to-Middle Pleistocene (Rogers 1967), prior to human presence in the area. Artifacts associated with the surface scatter may be covered by eolian sands in limited areas (approximately 10%) of the site. However, considering the identified artifact assemblage consists only of lithic debitage items (primarily tertiary flakes indicative of early-to-late stage biface reduction), it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified. Therefore, the data potential is considered exhausted through recordation of CA-SBR-13078.

CA-SBR-13082

CA-SBR-13082 is an amorphous-shaped sparse density lithic reduction scatter that also contains two rock cluster features of unknown function and age. The site covers a total surface area of 3,098 square meters within the central portion of the Phase 2 area of the Calico Solar Project site. The site is situated on the summit of a north northwest trending ridge that is part of an older erosional fan remnant. The surface is nearly level in the central portion of the site and slopes moderately steeply (10 degree slope) to the east and west. The entire site surface is covered by a moderate- to well-developed desert pavement consisting of poorly sorted sub-angular to subround pebbles and cobbles of cryptocrystalline silicates (e.g., jasper, chert, and chalcedony), basalt, and other volcanic materials. All loci and artifacts are located in areas where desert pavement is present. East of the site, a rilled surface slopes down to the axial channel for the valley, and west of the site moderately incised gullies cut the slope and divide the area into several sub-ridges, which are also covered by a moderate- to well-developed desert pavement. Limited eolian deposits, consisting of minor accumulations of sand around the base of vegetation, covers less than two percent of the site. The axial channel for the valley is located 200 meters east of the site and 400 meters north of the site as it curves around the base of the ridge. The erosional fan remnant continues west and south broken by inset fans associated with a major north trending drainage. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*).

This sparse density lithic reduction scatter measures 160 meters north northwest to south southeast by a maximum of 31 meters east to west, and contains a total of 96 prehistoric artifacts. Artifact density is low, with a calculated distribution of one artifact per 32.3 square meters. However, two discrete loci with higher concentrations of cultural materials do occur within the site area. The overall condition of this site is good with no alterations.

The major physical surface characteristic of this site is a lithic reduction scatter containing approximately 96 cryptocrystalline silicate (jasper and chert) artifacts, including 86 pieces of lithic debitage, eight cores, and two tested cobbles. Two rock cluster features (i.e., Features 1 and 2) of unknown age and function were also identified on site. Of the 96 artifacts and two features identified, 48 pieces of debitage, four cores, and Feature 2 occur within two discrete loci (i.e., Loci 1 and 2) with higher concentrations of artifacts; the remainder of the cultural materials identified (38 pieces of debitage, four cores, and two tested cobbles) and Feature 1 (which serves as site datum) occur outside of these designated loci.

Locus 1 is located in the northeastern portion of the site, measures approximately 15 meters north to south by 8.7 meters east to west, and contains three multi-directional cores, one bifacial core, 28 primary flakes, three secondary, and two tertiary flakes, all of jasper.

Locus 2 is located along the central-western site boundary approximately 30 meters southwest of Locus 1, measures 5.8 meters east to west by 3.9 meters north to south, and contains 15 pieces of jasper debitage (two primary flakes, nine secondary flakes, one tertiary flake, and three pieces of shatter).

Cultural materials identified outside of Loci 1 and 2, within the general site area (44 items) include: two unidirectional jasper cores, two multi-directional jasper cores, two tested jasper cobbles, 33 jasper debitage items (18 primary flakes, six secondary flakes, five tertiary flakes, and four pieces of shatter), and five debitage items of chert (two primary flakes, two secondary flakes, and one piece of shatter).

As noted above, two rock cluster features of unknown function and age were also identified on site. Feature 1 is located within a non-locus site area near the central-western site boundary, measures 1.86 meters east to west by 2.0 meters north to south and 0.37 meters in height, and is constructed of one to two courses of metavolcanic rocks ranging from approximately 5.0 to 28 centimeters in diameter. Feature 2 is located in the northeastern site area along the central-western boundary of Locus 1, measures approximately 0.75 meters in diameter and 0.27 meters high, and is also constructed of one to two courses of metavolcanic rocks ranging from 4.0 to 26 centimeters in diameter. None of the rocks comprising Features 1 and 2 are fire-altered, and no charcoal or other organic residues were noted in association with these features.

The potential for buried artifacts at CA-SBR-13082 is low, as geological sources indicate the fan remnant dates to the early-to-middle Pleistocene, and minor eolian deposits consisting of small coppice dunes cover less than two percent of the site area.

Based upon the cultural constituents and the physical context, archaeologists for the Applicant interpret this site as a sparse density lithic procurement and initial lithic reduction locality. The lithic materials appear to be derived from cobbles of toolstone quality found on site within the desert pavement surfaces, and the artifact types identified (unidirectional, multi-directional, and bifacial cores, tested cobbles, and a preponderance of cortical debitage) reflect initial lithic reduction activities. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Additionally, both loci identified include only one type of lithic material (jasper), and are interpreted as single reduction loci. Thus, the site appears to represent a minimum of two episodes or localities of initial lithic reduction. The age and function of the two rock cluster features identified remains undetermined; however, none of the metavolcanic rocks that constitute Features 1 and 2 are fire-altered, and no charcoal or other organic residues were noted in association with these features.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with any specific period of prehistory or ethnohistory. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and the artifact distribution has been documented during the recordation process. As noted above, CA-SBR-13082 is situated on the summit of a north northwest trending ridge that is part of an older erosional fan remnant. The entire site surface is covered by a moderate- to well-developed desert pavement, and all loci and artifacts are located in areas where desert pavement is present. The potential for buried artifacts is low, as geologic sources indicate the fan remnant dates to the early-to-middle Pleistocene, prior to human presence in the area. Artifacts associated with the surface pavement may be covered by eolian sands in limited areas (less than two percent) of the site. However, considering the artifact assemblage identified on site which consists cores, tested cobbles, and a large percentage of cortical debitage (79% of the debitage identified), all of which are indicative of initial lithic reduction activities, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified. Therefore, the data potential is considered exhausted through recordation of CA-SBR-13082.

CA-SBR-13096

CA-SBR-13096, a sparse, amorphous-shaped prehistoric lithic reduction scatter covers a total surface area of 200 square meters near the extreme southwestern corner of the Phase 1 area of the Calico Solar Project site. The site is situated on a nearly level (less than 1 degree slope), southwest-facing rise on a fan skirt in the lower alluvial fan piedmont between two gullies merging with the basin floor; the gullies are located approximately 200 meters east and west of the site, and the axial channel for the basin is located 380 meters south. The alluvial fan piedmont is the large, gently sloping depositional feature that dominates the northern portion of the Calico Solar Project site; commonly referred to as a “bajada.” As a whole, this appears to be a much younger landform than those in the southern portion of the Calico Solar Project site. The general area around the site is fairly stable and shows little evidence of major fluvial erosion. Site sediments are fine- to medium-grained sand with few small sub-rounded pebbles. Surface sediments have been slightly reworked by wind, and minor accumulations of sand occur at the base of some vegetation. An older erosional remnant fan, which consists of a series of ridges covered by a well developed desert pavement, is located south of the axial channel, and an alluvial flat is located approximately 1,000 meters west; the slope grades upward into the alluvial piedmont to the north and east. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey.

This high density lithic reduction scatter measures 36 meters north to south by 17 meters east to west, and contains a total of 16 lithic debitage items of chalcedony, jasper, and chert; no formed tools, discrete concentrations of cultural materials, or features were identified. Artifact density is high within the site area (one item per 12 square meters). The overall condition of the site is good, with no visible disturbances or alterations.

As noted above, this lithic reduction scatter contains 16 lithic debitage items of chalcedony, jasper, and chert. Artifacts observed include one chalcedony secondary flake, 11 chalcedony tertiary flakes, and two pieces of chalcedony shatter. The remaining two artifacts include one secondary flake of red jasper and one secondary flake of chert.

The potential for buried artifacts at the site is moderate to high, and buried features or surfaces may be intact as sheet wash and other low energy forms of deposition are common on the lower portions of the alluvial fan piedmont.

Based upon the cultural constituents, archaeologists for the Applicant interpret this moderate to high density lithic reduction scatter as an early-to-late stage biface reduction or tool maintenance locality. The prehistoric cultural assemblage is dominated by non-cortical tertiary flakes indicative of the various stages of biface reduction or tool maintenance activities. The limited quantity of artifacts and the dominance of chalcedony debitage (87.5 percent of the assemblage) suggest that the cultural assemblage is the result of one short term episode of early-to-late stage biface reduction or tool maintenance.

Additionally, due to the absence of any finished tools, bifacial cores, or preforms on site, it is probable that any finished tools produced on site were carried to an off site location.

Although the surface manifestation of this site lacks artifacts with unique or temporally diagnostic characteristics that can be associated with any specific period of prehistory or ethnohistory, there is a high potential for subsurface archaeological deposits within the site area. There is potential for subsurface archaeological deposits at CA-SBR-13096.

CA-SBR-13125/H

CA-SBR-13125/H is an amorphous-shaped low density multiple activity area that covers a total surface area of 2,828 square meters. The site is located near the extreme western end of the Phase 2 area of the Calico Solar Project site, and is situated on a nearly level (1 degree slope) relict alluvial flat, which dominates the general area. The relict alluvial flat landform dominates the western part of the southern portion of the Calico Solar Project site, and can be distinguished from other relict landforms in the southern area by a nearly flat, low lying surface that is cut by numerous braided and anastomatizing channels/gullies. These channels are dominantly oriented in the same direction as the major east-west trending axial channel that transects the Calico Solar Project area. Between these small channels/gullies tend to be bars of intact desert pavement (indicating a relative antiquity for the landform and thus use of the term “relict”). A braided series of west trending channels transect the southern portion of the site, as well as the area immediately south. A braided series of west trending channels transect the southern portion of the site, as well as the area immediately south. Moderate-developed desert pavement made up of sub-angular to sub-rounded pebbles and a few small cobbles covers most of the site area. Limited eolian deposits consisting of small coppice dunes cover less then 10% of the site. West of the site, the landform transitions into a more recent alluvial flat with less developed desert pavement. The axial channel for the valley is splayed across most of the valley floor as a complex network of braided channels.

Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey. Most of the dense vegetation is growing within the braided series of west trending channels that transect the southern portion of the site, as well as the area to the immediate south.

This multiple activity area measures 122 meters east to west by a maximum of 52 meters north to south, and contains both a sparse prehistoric lithic reduction scatter and a sparse historical refuse scatter. No discrete concentrations of prehistoric or historical materials or features were identified, and artifact density is low within the site area (one item per 64.2 square meters). The overall condition of the site is good, with no visible alterations.

The prehistoric component consists of a sparse lithic reduction scatter that includes 17 flakes (seven jasper, five chert, and five chalcedony) scattered widely throughout the site area. The debitage assemblage is dominated by tertiary biface thinning flakes; only one secondary flake of jasper was observed. Several of the chert flakes exhibit a lustrous, waxy texture suggestive of heat treatment.

The historical refuse observed is also scattered widely throughout the site area, appears to date from the early-to-middle 1900s, and includes various types of metal cans (12), fragments of highly weathered milled lumber (12), and iron straps (three). Can types include: three church key opened (post-1935: IMACS User's Guide 2001:471-6) beverage cans, six single-serving-sized sanitary foods cans (post 1904: IMACS User's Guide 2001:471-6; Fike 1989:22), both rotary and bayonet opened, two one-pound dry goods cans with external friction lids, and one rectangular spice can lid. The further character of the historical artifacts found within CA-SBR-13125/H is unreported.

The potential for buried artifacts at CA-SBR-13125/H is moderate due to the age of the landform; however, reworking of the local sediments by the wash suggests that buried artifacts are in secondary disturbed context and the likelihood of finding intact surfaces or features is low. Artifacts associated with the surface pavement may be covered by eolian sands in very limited portions of the site.

Based upon the cultural constituents, archaeologists for the Applicant interpret the prehistoric component of the site as a sparse density early-to-late stage biface reduction locality. The prehistoric cultural constituents consist 17 flakes of jasper, chert, and chalcedony. This debitage assemblage is dominated by tertiary biface thinning flakes; only one secondary flake of jasper was identified. Several of the chert flakes exhibit a lustrous, waxy texture suggestive of the heat treatment of these materials. However, because the debitage consists of a variety of cryptocrystalline silicate materials and the flakes are so widely scattered throughout the site area, it remains undetermined whether the debitage is the result of one or more episodes of early-to-late stage biface reduction. Additionally, due to the absence of complete or broken bifaces on site, it should not be discounted that artifacts within this locality may have been collected and used elsewhere.

The historical refuse scatter identified on site appears to date from the early-to-middle 1900s, and includes: three church key opened beverage cans, six single-serving-sized sanitary foods cans (both rotary and bayonet opened), two one-pound dry goods cans with external friction lids, one rectangular spice can lid, 12 fragments of highly weathered milled lumber, and three iron straps. The further character of the historical artifacts found within CA-SBR-13125/H is unreported. Church key opened cans date from 1935 and thereafter (IMACS User's Guide 2001:471-6). Sanitary cans were first mass-produced by the Sanitary Can Company in 1904, and in 1908 the American Can Company purchased and took over the four Sanitary Can Company manufacturing plants (IMACS User's Guide 2001:471-6). Sanitary can production dominated can production in the western United States by 1911, but it took nearly 30 more years for it to gain complete control (Fike 1989:22).

Due to the close proximity of the Old National Trails Highway to CA-SBR-13125/H and the fact that the historical refuse is widely scattered throughout the site area, the archaeologists for the Applicant believe that the historical refuse is the result numerous random episodes of refuse disposal associated with use of the Old National Trails Highway during the early-to-middle 1900s. Conceivably, many of these items (particularly the cans) may also have been re-deposited from their primary disposal location and dispersed throughout the site area by water or high winds.

LSA disagrees with the statement by the consultant for the applicant that "The surface manifestation of this site lacks artifacts with unique or temporally diagnostic characteristics that can be associated with a specific period of prehistory or history, The potential for buried artifacts at this site is moderate due to the age of the landform, the reworking of the local sediments by the wash suggests that buried artifacts will be in secondary disturbed context, and the likelihood of finding intact surfaces or features is low. Artifacts associated with the surface pavement may be covered by eolian sands in limited portions (less than 10%) of the site; however, it is highly likely that any artifacts buried within these coppice dunes would mirror those artifact types already identified. Therefore, the data potential is considered exhausted through recordation of CA-SBR-13125/H."

CA-SBR-13349/H

In October 2009, archaeological site CA-SBR-13108/H was re-examined as part of the Calico Solar Project. Additional artifacts were discovered between this site and CA-SBR-13087, -13109, -13110, -13112, P-36-014803, P-36-014854, and P-36014857. As a result of the survey, these sites were combined to form combined site CA-SBR-13349/H. CA-SBR-13108 was originally described as a multi-component site measuring 356 meters north to south by 440 meters east to west. The prehistoric component contained 208 cryptocrystalline silicate and metavolcanic artifacts including primary, secondary, and tertiary flakes and cores, core tools, a flake tool, and a biface fragment. The historical component contained approximately 1,000 artifacts including bottle glass, cans, ceramic tableware, and construction items. CASBR-13087 was originally described as a discrete prehistoric lithic scatter, measuring 25 meters north to south by 9.0 meters east to west, containing six jasper primary and secondary flakes. CA-SBR-13109 was originally described as a prehistoric site, measuring 56 meters north to south and 129 meters east to west, containing 27 jasper and basalt artifacts (flakes, a bifacial tool, a core tool, and a metate fragment). CA-SBR-13110 was originally described as a discrete prehistoric lithic scatter, measuring 24 meters north to south and 12 meters east to west, containing 11 chert and chalcedony flakes. CA-SBR-13112 was originally described as a discrete prehistoric lithic scatter, measuring 84 meters north to south and 40 meters east to west, containing 15 jasper flakes and one metavolcanic utilized flake. P-36-014803 was originally described as an isolate consisting of one brown cryptocrystalline silicate flake. P-36-014854 was originally described as an isolate consisting of two jasper flakes, one chalcedony flake, and one jasper core. P-36-014857 was originally described as an isolate consisting of five red cryptocrystalline silicate flakes.

Combined Site CA-SBR-13349/H is an amorphous-shaped multiple activity area that covers a total surface area of 147,855 square meters. The site is located within the southwestern portion of the Phase 2 area of the Calico Solar Project site. The site is situated on a nearly level erosional fan remnant. The erosional fan remnant constitutes the hills and ridges that extend above, and are surrounded by, the other landforms in the southern portion of the Calico Solar Project area. They generally are composed of a summit with moderately- to well-developed desert pavement (due to both parent material and age) and erosional side slopes that generally lack pavement. Within the southern Project area, these fan remnants are generally composed of a very old (Early-to-Middle Pleistocene) fanglomerate of cobbles and coarse gravels. The slope is one to two percent and faces east. The site surface is covered by a moderate- to well-developed desert pavement consisting of poorly sorted sub-angular to sub-rounded pebbles and cobbles of cryptocrystalline silicates (e.g., jasper, chert, and chalcedony), basalt, and other volcanic materials. Bar and swale surface morphology is common throughout the site and is recognized as a series of alternating elongate low mounds of coarser material separated by elongate shallow depressions of finer material. This landscape type is typically the result of mass wasting during the formation of a fan remnant rather than erosional bar and channel topography common in washes. The continuity of the pavement is broken by small west trending gullies and small drainage features. Limited eolian deposits consist of small coppice dunes and in-filled gullies that cover less than eight percent of the site. Site sediments generally consist of fine to medium grained sand with poorly sorted sub-rounded to subangular pebbles and cobbles. A small braided wash in the northern portion of the site forms one of the upper branches of the axial channel for the valley. The remnant fan that the site rests upon extends east and west for several hundred meters in both directions. The Pisgah lava flow is evident 100 meters to the south, although an isolated lava mass is located within the site boundaries, and isolated boulders from this formation are scattered throughout the site area. At the base of the lava flow, a narrow sand sheet is evident.

Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*) and desert saltbush (*Artiplex polycarpa*).

This multiple activity area measures 495 meters northwest to southeast by 915 meters northeast to southwest, and contains both a prehistoric complex lithic and ground stone scatter and a historical refuse scatter. This multi-component site contains a total of 1,985 prehistoric and historical artifacts, five historical features, and 49 loci where higher concentrations of prehistoric artifacts were identified; artifact density is low within the site area (one artifact per 75 square meters). The overall condition of the site is fair, with off-highway vehicle (OHV) activity observed in the surrounding area, as well as evidence of bulldozing activity on the eastern portion of the site for electrical tower access roads.

The prehistoric component is a complex lithic and ground stone scatter with a total of 1,333 artifacts. Artifacts include: 848 jasper flakes (183 primary, 372 secondary, 136 tertiary, 105 shatter, and 52 unreported type), 409 cryptocrystalline silicate flakes (77 primary, 196 secondary, 68 tertiary, 67 shatter, and one unreported type), 15 chalcedony flakes (two primary, eight secondary, three tertiary, and two unreported), 24 chert flakes (five primary, seven secondary, two tertiary, and 10 unreported), four basalt flakes (one primary, two tertiary, and one shatter), 16 cores (jasper and cryptocrystalline silicate), five bifaces (jasper and cryptocrystalline silicate), two jasper edge modified flakes, one jasper flake tool, one granitic basalt metate, and eight tested cobbles. The prehistoric component also contains 41 areas with a higher concentration of artifacts (Loci 7, 9-25, and 27-49). Nearly 74% of prehistoric artifacts (or 984 prehistoric items) are within the loci.

The historical component is a widespread refuse scatter composed of a minimum of 652 artifacts, including bottle and jar glass fragments, ceramic tableware fragments, various food and beverage cans, various paint and oil cans, machine and automobile parts, miscellaneous metal items (i.e., wire, banding, mesh), and construction debris (i.e., concrete, brick, lumber, asphalt). The historical component also contains eight areas with a higher concentration of artifacts (Loci 1-6, 8, 26) and seven features. Both loci and features are described below.

Feature 1 is located within the central-southern portion of the site, measures 4 inches by 4 inches by 5 feet tall, and consists of a single wood fencepost with a rock base.

Feature 2 is located within the central portion of the site, approximately 140 meters north of Feature 1. Feature 2 measures roughly 50 feet in diameter, and consists of a circular rock feature constructed of approximately 500 stones. The phrase “Pisgah 2077-30” is spelled out in stones within the feature.

Feature 3 is located within the central portion of the site, approximately 6.0 meters west of Feature 2. Feature 3 is a metal windsock stand measuring approximately 20 feet tall and constructed of two-inch metal tubing. The base of the windsock is composed of wood with a wire tie down.

Feature 4 is located within the northeastern portion of the site, approximately 350 meters northeast of Feature 3. Feature 3 measures 18 inches north to south by 31 inches east to west and 8 inches high, and consists of a rock cluster composed of six small to large metavolcanic boulders. The boulders are arbitrarily placed in a cluster, revealing no apparent form.

Feature 5 is located along the eastern site boundary, approximately 100 meters south of Feature 4. Feature 5 measures 17.5 inches north to south by 19.5 inches east to west and 6.25 inches high, and consists of a rock cluster composed of 15 metavolcanic and basalt angular and rounded cobbles.

Feature 6 is located along the eastern site boundary, approximately 2.0 meters north of Feature 5. Feature 6 measures approximately 45 feet northeast to southwest by 33 feet northwest to southeast and consists of a concrete pad with metal bolts along the sides.

Feature 7 is located within the western portion of the site, approximately 568 meters southwest of Feature 6. Feature 6 was not measured and consists of a rock cluster composed of approximately 20 metavolcanic cobbles.

Of the 1,985 prehistoric and historical artifacts identified, 1150 artifacts occur within 49 discrete loci (i.e., Loci 1-49) with higher concentrations of artifacts situated on moderate-developed desert pavement surfaces; the remaining cultural materials identified occur outside of these designated loci.

Locus 1 is located within the southern portion of the site, measures 61 meters north to south by 24 meters east to west, and contains a minimum of 29 historical artifacts, including: metal items (wire, pipe, 1/2" braided cable, mattress springs, two 50 gallon drums, five gallon container, paint cans, fruit and juice cans, church key opened cans [post 1935: IMACS User's Guide 2001:471-6]), car items (metal oil filter, large rubber tire, rubber hose, gas tank, car frame, trunk door), railroad items (metal spike and square plate, wooden ties), wooden items (stakes, slats), construction debris (red ceramic tile, concrete, asphalt, red brick), and various brown and green glass bottle fragments; one with "I (in oval)" on the base (Owens Illinois Glass Co., since 1954: Toulouse 1971:403) and one with L" on the base (Latchford Glass Co., since 1957: Toulouse 1971:316).

Locus 2 is located within the southern portion of the site, approximately 3.0 meters west of Locus 1. Locus 2 measures 30 meters north to south by 18 meters east to west, and contains a minimum of six historical artifacts, including: lumber, glass, paint cans, chicken wire, a metal spool, and concrete.

Locus 3 is located within the central portion of the site, approximately 106 meters north of Locus 2. Locus 3 measures 6.5 meters north to south by 7.0 meters east to west, and contains a minimum of 31 historical artifacts, including: metal items (wire, banding, mesh, paint cans, approximately 25 hole-in-top cans and church key opened cans [post 1935: IMACS User's Guide 2001:471-6], ceramic tile, and a glass jar finish with lid fragment).

Locus 4 is located within the central portion of the site, approximately 30 meters north of Locus 3. Locus 4 measures 12 meters north to south by 45 meters east to west, and contains a minimum of 13 historical artifacts, including: a rock cairn (one course of basalt stones), metal items (wire, sheet metal, paint cans, paint thinner cans, mesh, drum lids), industrial ceramic artifact (hollow, square, and chambered), and colorless glass liquor bottle fragments.

Locus 5 is located within the central portion of the site, approximately 46 meters west of Locus 4. Locus 5 measures 5.0 meters north to south by 6.0 meters east to west, and contains a minimum of seven historical artifacts, including: metal items (banding, mesh, wire, paint cans, insulator), and ceramic piping and tile.

Locus 6 is also located along the central-western site boundary, approximately 43 meters southwest of Locus 5. Locus 6 measures 8.0 meters north to south by 13 meters east to west, and contains a minimum of 61 historical artifacts, including wire mesh and more than 60 fragments of red brick with “Davidson” on them.

Locus 7 is located within the central-northern portion of the site, approximately 74 meters northeast of Locus 6. Locus 7 measures 21 meters north to south by 44 meters east to west, and includes: 98 jasper flakes (38 primary, 35 secondary, three tertiary, and 22 shatter), six cryptocrystalline silicate flakes (one primary, four secondary, and one tertiary), and one chalcedony secondary flake.

Locus 8 is located within the northeastern portion of the site, approximately 270 meters northeast of Locus 7. Locus 8 measures 10 meters northeast to southwest by 5.0 meters northwest to southeast, and contains a minimum of 10 historical artifacts, including: metal items (wire, banding, cans, juice cans), automobile items (brake pads, metal oil cans, battery), brown and clear glass fragments, and several pieces of lumber (wooden two-by-fours).

Locus 9 is located along the northwestern site boundary, approximately 290 meters southwest of Locus 8. Locus 9 measures 2.0 meters north to south by 1.5 meters east to west, and includes 21 cryptocrystalline silicate flakes (four primary, 15 secondary, and two shatter).

Locus 10 is located within the western portion of the site, approximately 286 meters southwest of Locus 9. Locus 10 measures 2.5 meters north to south by 3.0 meters east to west, and includes seven jasper flakes (one primary, four secondary, and two shatter).

Locus 11 is located within the southern portion of the site, approximately 283 meters southeast of Locus 10. Locus 11 measures 1.0 meter north to south by 1.0 meter east to west, and includes five jasper flakes (unreported type).

Locus 12 is also located within the southern portion of the site, approximately 22 meters west of Locus 11. Locus 12 measures 18 meters northwest to southeast by 10.5 meters northeast to southwest, and includes: nine jasper flakes (seven secondary, one tertiary, and one shatter), 14 cryptocrystalline silicate flakes (one primary, nine secondary, three tertiary, and one shatter), and one cryptocrystalline silicate multi-directional core in two pieces.

Locus 13 is located along the southern site boundary, approximately 28 meters southwest of Locus 12. Locus 13 measures 9.0 meters northwest to southeast by 16.5 meters northeast to southwest, and includes: 26 jasper flakes (six primary, 14 secondary, and six tertiary), one tested metavolcanic cobble, and one unifacial core.

Locus 14 is located within the southern portion of the site, approximately 40 meters north of Locus 13. Locus 14 measures 3.0 meters northwest to southeast by 1.0 meter northeast to southwest, and includes: 17 cryptocrystalline silicate flakes (three primary, nine secondary, two tertiary, and three shatter) and three chalcedony flakes (one primary, one secondary, and one tertiary).

Locus 15 is located along the southern site boundary, approximately 38 meters southwest of Locus 14. Locus 15 measures 1.5 meters north to south by 2.0 meters east to west, and includes nine jasper flakes (four primary, two secondary, and three tertiary) and one jasper unifacial core.

Locus 16 is located within the southern portion of the site, approximately 36 meters northwest of Locus 15. Locus 16 measures 1.5 meters north to south by 1.5 meters east to west, and includes 10 jasper flakes (five primary, three secondary, one tertiary, and one shatter) and four cryptocrystalline silicate flakes (two primary and two secondary).

Locus 17 is located along the eastern site boundary, approximately 547 meters northeast of Locus 16. Locus 17 measures 2.0 meters north to south by 1.5 meters east to west, and includes six chert flakes (four secondary and two tertiary).

Locus 18 is located within the northern portion of the site, approximately 336 meters west of Locus 17. Locus 18 measures 5.0 meters north to south by 4.0 meters east to west, and includes 10 cryptocrystalline silicate flakes (one primary, seven secondary, and two tertiary), one jasper secondary flake, and one jasper biface preform.

Locus 19 is located along the northern site boundary, approximately 22 meters northeast of Locus 18. Locus 19 measures 2.0 meters north to south by 4.0 meters east to west, and includes 21 cryptocrystalline silicate flakes (three primary, 13 secondary, four tertiary, and one shatter) and one jasper primary flake.

Locus 20 is located within the northern portion of the site, approximately 39 meters southwest of Locus 19. Locus 20 measures 7.0 meters north to south by 6.5 meters east to west, and includes 11 jasper flakes (one primary, four secondary, four tertiary, and two shatter).

Locus 21 is located along the northern site boundary, approximately 38 meters northwest of Locus 20. Locus 21 measures 5.5 meters north to south by 3.5 meters east to west, and includes 13 jasper flakes (six primary, six secondary, and one tertiary).

Locus 22 is also located along the northern site boundary, approximately 10 meters west of Locus 21. Locus 22 measures 7.0 meters north to south by 3.5 meters east to west, and includes 20 jasper flakes (nine primary, eight secondary, one tertiary, and two shatter).

Locus 23 is located within the northern portion of the site, approximately 19 meters west of Locus 22. Locus 23 measures 7.5 meters north to south by 10.5 meters east to west, and includes nine jasper flakes (two primary, six secondary, and one shatter) and four cryptocrystalline silicate flakes (one primary, one secondary, one tertiary, and one shatter).

Locus 24 is located along the central-western portion of the site, approximately 178 meters southwest of Locus 23. Locus 24 measures 28 meters northwest to southeast by

28 meters northeast to southwest, and includes 25 jasper flakes (unreported type) and two jasper cores of unreported type.

Locus 25 is located along the northeastern site boundary, approximately 400 meters northeast of Locus 24. Locus 25 measures 9.0 meters northwest to southeast by 4.0 meters northeast to southwest, and includes 13 jasper flakes (one primary, 10 secondary, one tertiary, and one shatter), one cryptocrystalline silicate secondary flake, and one jasper multi-directional core (Artifact No.-6).

Locus 26 is located along the northern site boundary, approximately 82 meters northwest of Locus 25. Locus 26 measures 9.0 meters north to south by 13 meters east to west, and contains a minimum of 26 historical artifacts, including: a single row of six power pole planks (16 feet long by 10 inches diameter), a single-serve sanitary fruit/vegetable can (rotary opened), two 32 ounce multi-serve sanitary fruit/vegetable cans (rotary opened), a one pound dry goods external friction can, more than 20 fragments of colorless glass from a single jar with “Duraglas (in script)” on the heel (Owens Illinois Glass Co., since 1940: Toulouse 1971:170), and a colorless drinking glass with engraved pink and orange floral designs.

Locus 27 is located within the northern portion of the site, approximately 212 meters southwest of Locus 26. Locus 27 measures 1.5 meters north to south by 1.0 meter east to west, and includes seven jasper flakes (three primary and four shatter).

Locus 28 is located along the central-southern site boundary, approximately 280 meters southwest of Locus 27. Locus 28 measures 12 meters north to south by 8.0 meters east to west, and includes: 25 jasper flakes (five primary, 16 secondary, and four tertiary), four cryptocrystalline silicate flakes (two primary, one secondary, and one tertiary), and one jasper unifacial core in two pieces.

Locus 29 is located along the northeastern site boundary, approximately 490 meters northeast of Locus 28. Locus 29 measures 1.0 meter northwest to southeast by 3.0 meters northeast to southwest, and includes 11 cryptocrystalline silicate flakes (one primary, four secondary, two tertiary, and four shatter).

Locus 30 is located along the central-southern site boundary, approximately 460 meters southwest of Locus 29. Locus 30 measures 8.0 meters northwest to southeast by 12.5 meters northeast to southwest, and includes four jasper flakes (one secondary, two tertiary, and one shatter) and 39 ryptocrystalline silicate flakes (two primary, 18 secondary, 10 tertiary, and nine shatter).

Locus 31 is also located along the central-southern site boundary, approximately 10 meters northeast of Locus 30. Locus 31 measures 8.0 meters north to south by 4.5 meters east to west, and includes: 11 jasper flakes (one primary, four secondary, four tertiary, and two shatter), eight cryptocrystalline silicate flakes (four primary, three secondary, and one tertiary), and one cryptocrystalline silicate multidirectional core.

Locus 32 is also located along the central-southern site boundary, approximately 6.0 meters southeast of Locus 31. Locus 32 measures 4.5 meters north to south by 5.0

meters east to west, and includes 36 jasper flakes (five primary, 23 secondary, three tertiary, and five shatter).

Locus 33 is located within the southern portion of the site, approximately 22 meters north of Locus 32. Locus 33 measures 11.5 meters northwest to southeast by 4.5 meters northeast to southwest, and includes: 12 jasper flakes (one primary, seven secondary, and four tertiary), 11 cryptocrystalline silicate flakes (two primary, eight secondary, and one tertiary), and one jasper unifacial core.

Locus 34 is located within the central-southern portion of the site, approximately 10 meters north of Locus 33. Locus 34 measures 3.0 meters north to south by 2.0 meters east to west, and includes eight jasper flakes (one primary, six secondary, and one shatter) and eight chert flakes (five primary and three secondary).

Locus 35 is also located within the central-southern portion of the site, approximately 52 meters east of Locus 34. Locus 35 measures 2.0 meters north to south by 3.0 meters east to west, and includes 15 jasper flakes (two primary, nine secondary, two tertiary, and two shatter) and one jasper bifacial core.

Locus 36 is also located within the central-southern portion of the site, approximately 4.0 meters north of Locus 35. Locus 36 measures 3.0 meters northwest to southeast by 1.5 meters northeast to southwest, and includes 14 cryptocrystalline silicate flakes (one primary, six secondary, three tertiary, and four shatter).

Locus 37 is also located within the central-southern portion of the site, approximately 84 meters east of Locus 36. Locus 37 measures 6.0 meters northwest to southeast by 3.0 meters northeast to southwest, and includes 12 jasper flakes (seven primary, three secondary, and two shatter).

Locus 38 is located along the eastern site boundary, approximately 86 meters southeast of Locus 37. Locus 38 measures 6.0 meters northwest to southeast by 3.0 meters northeast to southwest, and includes 12 jasper flakes (one primary, seven secondary, one tertiary, and three shatter).

Locus 39 is located within the central portion of the site, approximately 194 meters northwest of Locus 38. Locus 39 measures 3.0 meters north to south by 3.0 meters east to west, and includes 11 jasper flakes (one primary, six secondary, two tertiary, and two shatter) and one cryptocrystalline silicate primary flake.

Locus 40 is also located within the central portion of the site, approximately 20 meters southwest of Locus 39. Locus 40 has unreported dimensions, and includes 11 jasper flakes (four primary, four secondary, and three tertiary).

Locus 41 is also located within the central portion of the site, approximately 35 meters northwest of Locus 40. Locus 41 measures 4.0 meters north to south by 4.0 meters east to west, and includes 11 cryptocrystalline silicate flakes (three primary, four secondary, three tertiary, and one shatter) and one piece of jasper shatter.

Locus 42 is also located within the central portion of the site, approximately 10 meters west of Locus 41. Locus 42 measures 2.5 meters north to south by 3.0 meters east to west, and includes 32 cryptocrystalline silicate flakes (four primary, 18 secondary, two tertiary, and eight shatter) and one cryptocrystalline silicate bifacial core.

Locus 43 is also located within the central portion of the site, approximately 20 meters west of Locus 42. Locus 43 measures 3.5 meters northwest to southeast by 11.5 meters northeast to southwest, and includes 52 cryptocrystalline silicate flakes (six primary, 18 secondary, four tertiary, and 24 shatter).

Locus 44 is also located within the central portion of the site, approximately 9.0 meters west of Locus 43. Locus 44 measures 3.0 meters north to south by 14.5 meters east to west, and includes 72 jasper flakes (10 primary, 33 secondary, 20 tertiary, and nine shatter) and 15 cryptocrystalline silicate flakes (two primary, six secondary, four tertiary, and three shatter).

Locus 45 is also located within the central portion of the site, approximately 17 meters northeast of Locus 44. Locus 45 measures 2.0 meters north to south by 2.0 meters east to west, and includes nine jasper flakes (two primary, three secondary, two tertiary, and two shatter).

Locus 46 is located within the central-southern portion of the site, approximately 72 meters southwest of Locus 45. Locus 46 measures 1.5 meters north to south by 1.5 meters east to west, and includes 16 cryptocrystalline silicate flakes (five primary, seven secondary, three tertiary, and one shatter).

Locus 47 is located along the southwestern site boundary, approximately 92 meters southwest of Locus 46. Locus 47 measures 5.0 meters north to south by 3.0 meters east to west, and includes: 14 jasper flakes (one primary, nine secondary, three tertiary, and one shatter), 19 cryptocrystalline silicate flakes (four primary, eight secondary, and seven tertiary), and two basalt tertiary flakes.

Locus 48 is also located along the southwestern site boundary, approximately 35 meters north of Locus 47. Locus 48 measures 7.0 meters north to south by 6.0 meters east to west, and includes 85 jasper flakes (eight primary, 39 secondary, 19 tertiary, and 19 shatter).

Locus 49 is located along the northwestern site boundary, approximately 172 meters northeast of Locus 48. Locus 49 measures 3.0 meters north to south by 5.0 meters east to west, and includes 15 cryptocrystalline silicate flakes (three primary, six secondary, two tertiary, and four shatter) and one cryptocrystalline silicate multi-directional core.

A total of 469 historical artifacts were observed outside of the loci. The following inventory of artifacts includes 300 fragments of bottle glass in various colors (brown, cobalt, colorless, aqua, green, olive, amethyst), five fragments of colorless glass from a single Mason jar, 10 fragments of brown glass from a single alcohol bottle embossed with “FEDERAL LAW PROHIBITS SALE OR REUSE OF THIS BOTTLE” on body (1933-1964: Munsey 1970:126) and “MTC” on base (Thatcher Manufacturing Company, 1900 to present: Toulouse 1971:496), one amber bottle, 15 porcelain tableware fragments, 20 whiteware plate fragments, eight “pop top” bimetal cans, 18 single-serve (six to 20 ounce) sanitary fruit/vegetable cans (14 rotary opened and four bayonet opened), five multi-serve (over 25 ounces) sanitary fruit/vegetable cans (four rotary opened and one P38 opened with solder pin through crimped side seam), four matchstick filler cans all single ring embossed (2 5/16”D × 4 6/16”H), one hole-in-top can (2 10/16”D × 4 4/16”H) bayonet opened, eight church key opened beverage cans (post 1935: IMACS User’s Guide 2001:471-6), three eight to 12 ounce rectangular meat cans with side key-strip opening, three six to eight ounce oval fish tines (rotary opened), one sanitary can (2 15/16”D × 4 9/16”H) knife punched opened with “Sanitary” stamped on the base, two one-pound external friction coffee cans, one 16 to 32 ounce paint can (key-strip, pull to lift), four aerosol spray cans, two one-gallon buckets, two large pour spout gasoline cans, two oil can lids, one oil pan, one five gallon corrugated recycled drum (holes punched in side), two church key opened quart sized oil cans embossed with “MFD / BY / STANDARD / OIL / COMPANY / OF / CALIFORNIA // WESTERN / OPERATIONS / INC. // S.A.E. // 10W // SAN FRANCISCO” on the top of the can, one piece of iron railroad equipment with attached circuit board components with placard that reads “Type C / MAGNETIC / CONTACTOR / W (over oval in circle) / (7-21-26) / From 30 CS (in rectangle)”, one light fixture (9 1/2”D), one kerosene lamp/heater with tag that reads “Hastings 114”, four fragments of sheet metal, three iron brackets, and more than 40 fragments of milled wood in various sizes.

In total, 349 prehistoric artifacts were observed outside the loci, including: 246 jasper flakes (57 primary, 102 secondary, 46 tertiary, 19 shatter, and 22 of unreported type), 63 cryptocrystalline silicate flakes (20 primary, 29 secondary, 12 tertiary, one shatter, and one of unreported type), 11 chalcedony flakes (one primary, six secondary, two tertiary, and two of unreported type), two basalt flakes (one primary and one shatter), 10 chert flakes of unreported type, one jasper unifacial core, two cryptocrystalline silicate cores, four jasper and cryptocrystalline silicate bifaces, two jasper edge modified flakes, one granitic basalt metate, and seven tested cobbles (five jasper and two cryptocrystalline silicate). The potential for subsurface deposits on the fan remnant is low, as geologic sources indicate the fan remnant dates to the Early-to-Middle Pleistocene (Rogers 1967); however, intact desert pavement may be covered by eolian deposits in a small portion of the site. Nonetheless, considering the site types, a complex lithic and ground stone scatter and historical refuse scatter, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified.

Two historical features appear to be related to the military use of the Mojave Desert as a training area. Feature 2 is a circular rock feature with the phrase “Pisgah 2077-30” spelled out in stones within the feature. The rock alignment is in the vicinity of the Pisgah Substation and Pisgah railroad siding, and the number “2077” likely refers to the elevation of the area. The rock alignment was possibly used as an aerial observation point for military planes, including those that were taking aerial photographs for mapping. Feature 3 is a metal windsock stand, which is consistent with the military use of the area.

An aviation runway, composed of two rock alignments running parallel to each other in an east west direction, partially bisects this combined site. The runway is presumed to be associated with this site, specifically with Features 2 and 3.

No temporally diagnostic historical artifacts were found near any of the seven features. The remaining five features (a fence post, a concrete pad, and three rock clusters), not associated with military use, could not be dated or associated with any specific historical time period. Given the structure of the three rock clusters (Features 4, 5 and 7), it is noteworthy that they cannot be definitively determined to be historic in age. The site is situated within a large recreational area which is frequently used by OHVs. It is possible that the stone clusters are modern in age and perhaps were expediently placed to provide visible landmarks to facilitate navigation.

Based upon the cultural constituents, archaeologists for the Applicant interpret the prehistoric component of this multiple activity site as a lithic procurement and initial lithic reduction locality where limited resource processing activities occurred. The lithic materials appear to be derived from cobbles of toolstone quality found on site within the desert pavement surfaces, and the artifact types identified (unifacial, bifacial, and multi-directional cores, tested cobbles, edge modified flakes, early stage bifaces, and a preponderance of cortical debitage) reflect early stage biface reduction. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Due to the presence of a ground stone artifact (metate), it appears that limited resource procurement and/or processing was also occurring within the site area.

The historical refuse scatter identified on site appears to date from early 1930s to late 1950s, and includes: bottle and jar glass fragments, ceramic tableware fragments, various food and beverage cans, various paint and oil cans, machine and automobile parts, miscellaneous metal items (i.e., wire, banding, mesh), and construction debris (i.e., concrete, brick, lumber, asphalt). Church key opened cans date from 1935 and thereafter (IMACS User's Guide 2001:471-6). Bottles embossed with "FEDERAL LAW PROHIBITS SALE OR REUSE OF THIS BOTTLE" date from 1933-1964 (Munsey 1970:126). Bottles embossed with "Duraglas (in script)" date from 1940 (Toulouse 1971:170). One bottles dates since 1954 (Toulouse 1971:403) and another bottle since 1957 (Toulouse 1971:316). Though manufacture dates can be determined for some of the artifacts present at combined site CA-SBR-13349/H, the time between the initial use/consumption of the artifacts and their ultimate disposal cannot be known. Therefore, the specific date of their disposal cannot be reliably determined.

Due to the close proximity of the National Trails Highway (crosses through the site), to combined site CA-SBR-13349/H and the fact that the historical refuse scatter is widely spread throughout the site area, the archaeologists for the Applicant believe that the historical refuse is the result of numerous random episodes of refuse disposal associated with travel on the Old National Trails Highway during the early 1930s and to the construction of the Pisgah substation and transmission lines from 1938 to 1940. More recent refuse dating from the mid-to-late 1950s may be attributed to steady OHV use of the area.

This site lacks prehistoric artifacts with unique or temporally diagnostic characteristics, and the material remains cannot be associated with a specific period of prehistory or ethnohistory. Documentation of the artifact distribution has been conducted during the recordation process. Combined site CA-SBR-13349/H is situated on a nearly level erosional fan remnant composed of moderate- to well-developed desert pavement consisting of poorly sorted sub-angular to sub-rounded pebbles and cobbles. This geomorphic landform indicates an Early-to-Middle Pleistocene (Rogers 1967) period of formation and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits.

CA-SBR-13350

In October 2009, archaeological sites CA-SBR-13033, -13034, -13036, -13120, and -13121 were reexamined as part of the Calico Solar Project. Additional artifacts were discovered between these sites and CA-SBR-13035, P-36-014697, P-36-014698, P-36-014699, P-36-014700, P-36-014701, P-36-014702, P- 36-014703, P-36-014704, and P-36-014708. As a result of the survey, these sites were combined to form CA-SBR-13350. CA-SBR-13033 was originally described as a prehistoric site, measuring 313 meters north to south by 416 meters east to west, containing 763 cryptocrystalline silicate (chert, chalcedony, and jasper) artifacts including primary, secondary, and tertiary flakes, cores, and bifaces. CA-SBR-13034 was originally described as a discrete prehistoric lithic scatter, measuring 35 meters north to south by 14 meters east to west, containing five chalcedony flakes and one jasper flake. CA-SBR-13035 was originally described as a discrete prehistoric lithic scatter, measuring 59 meters northwest to southeast by 9.0 meters northeast to southwest, containing 44 cryptocrystalline silicate flakes. CA-SBR-13036 was originally described as a discrete prehistoric lithic scatter, measuring 158 meters north to south by 60 meters east to west, containing 50 primary, secondary, and tertiary flakes, and two bifaces. CA-SBR- 13120 was originally described as a prehistoric site, measuring 25 meters north to south by 121 meters east to west, containing 20 cryptocrystalline silicate chert and chalcedony artifacts including primary, secondary, and tertiary flakes, cores, a biface, and an edge modified flake. CA-SBR-13121 was originally described as a prehistoric site, measuring 125 meters north to south by 397 meters east to west, containing 135 cryptocrystalline silicate (chert, chalcedony, and jasper) artifacts including primary, secondary, and tertiary flakes, cores, bifaces, and assayed cobbles. P-36-014697 was originally described as an isolate consisting of four flakes (chalcedony and jasper). P-36-014698 was originally described as an isolate consisting of one chalcedony tertiary flake. P-36-014699 was originally described as an isolate consisting of one chalcedony secondary flake. P-36-014700 was originally described as an isolate consisting of one chert tertiary flake. P-36-014701 was originally described as an isolate consisting of four flakes (chalcedony and chert). P-36-014702 was originally described as an isolate consisting of three chalcedony flakes. P-36-014703 was originally described as an isolate consisting of three flakes (chalcedony and chert). P-36-014704 was originally described as an isolate consisting of one chalcedony secondary flake. P-36-014697 was originally described as an isolate consisting of three flakes (chalcedony and jasper). While CA-SBR-13037, a trending trail or footpath of possible prehistoric origin, is located 4 meters north of the northwestern boundary of this site, it is not included with the abovementioned sites. However, it should be noted that this trail or footpath (CA-SBR-13037) is likely associated with combined site CA-SBR-13350.

Combined Site CA-SBR-13350 is a complex lithic scatter that covers a total surface area of 168,706 square meters. The site is located within the southwestern portion of the Phase 2 area of the Calico Solar Project site. The site is situated on an alluvial flat, or flood plain, formed along two major north and northeast trending tributaries of the axial channel draining the valley. The alluvial flat landform dominates the western part of the southern portion of the Calico Solar Project area, and can be distinguished from other landforms in the southern area by a nearly flat, low lying surface that is cut by numerous braided and anastomatizing channels/gullies. These channels are dominantly oriented in the same direction as the major axial channel (see above) that crosses the project area. Between these small channels/gullies tend to be bars of poorly developed desert pavement. This landform is largely found adjacent to the axial channel. Due to the construction of I-40, the hydrology of this area has been altered and caused the incising of the primary channels transecting the site. Recent overbank deposits cover portions of the site surface. Poorly sorted and poorly to moderate-developed desert pavement is common throughout the site area as discontinuous concentrations separated by small north and northeast trending gullies and shallow drainage features. Site sediments are fine to medium grained silty sand with sub-angular to sub-rounded pebbles and cobbles of cryptocrystalline silicates (e.g., jasper, chert, and chalcedony), basalt, and other volcanic materials. The Pisgah lava flow forms the western boundary of the site and sand sheet development is evident along the base of the flow. Limited eolian deposits consisting of small coppice dunes and in-filled channels cover less than five percent of the site. North of the site is the relict alluvial flat formed along the axial channel for the valley which consists of a series of west trending braided and anastomatizing channels separated by bars of moderate- to well developed desert pavement. The potential for buried artifacts at this site is high; however, due to reworking of the local sediments by the wash, buried artifacts are likely in secondary disturbed context and the chances of finding intact surfaces and features is low.

Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*), desert saltbush (*Artiplex polycarpa*), and silver cholla (*Opuntia* sp.).

This complex lithic scatter measures 1,220 meters northwest to southeast by 520 meters northeast to southwest, and contains a total of 1,416 prehistoric artifacts including: 1,113 chalcedony flakes (152 primary, 558 secondary, 329 tertiary, 21 biface thinning, and 53 shatter), 172 chert flakes (22 primary, 65 secondary, 66 tertiary, three biface thinning, and 16 shatter), 66 jasper flakes (three primary, 24 secondary, 22 tertiary, and 17 biface thinning), five rhyolite flakes (one primary and four secondary), one metavolcanic primary flake, 12 chert bifaces, 19 chalcedony bifaces, two jasper bifaces, six chert cores, three chalcedony cores, one jasper core, one chert edge modified flake, one chalcedony edge modified flake, four utilized flakes (three chalcedony and one jasper), one jasper flaked cobble tool, one jasper preform, two chalcedony preforms, one chalcedony scraper, one chalcedony hammerstone, and four chalcedony tested cobbles. Artifact density at CA-SBR-13073 is low, with a calculated distribution of one artifact per 119.14 square meters. The overall condition of the site is fair to poor due to heavy grading along the southern boundary (CALTRANS R.O.W [Interstate 40] fence).

Of the 1,416 artifacts identified, 124 artifacts occur within seven discrete loci (i.e., Loci 1-7) with higher concentrations of artifacts; the remaining cultural materials identified occur outside of these designated loci. Loci 1, 2, 3, and 4 are situated within the floodplain, while Loci 5, 6, and 7 are located along the western boundary of the site next to the Pisgah lava flow.

Locus 1 is located along the southwestern site boundary, measures 1.5 meters north to south by 1.5 meters east to west, and includes 13 chalcedony flakes (five primary, three tertiary, and five shatter), and one chert unifacial core.

Locus 2 is also located along the southwestern site boundary, approximately 96 meters west of Locus 1. Locus 2 measures 10.9 meters north to south by 17 meters east to west, and includes 16 chalcedony flakes (one primary, five secondary, six tertiary, and four shatter) and one chalcedony edge modified flake.

Locus 3 is also located along the southwestern site boundary, approximately 46 meters east of Locus 2. Locus 3 measures 6.8 meters north to south by 7.1 meters east to west, and includes 10 chalcedony flakes (two primary, four secondary, one tertiary, and three shatter), and one chalcedony biface.

Locus 4 is located along the central-southern site boundary, approximately 580 meters west of Locus 3. Locus 4 measures 2.0 meters north to south by 1.5 meters east to west, and includes 15 chert flakes (five primary, four secondary, and six shatter).

Locus 5 is located along the western site boundary, approximately 300 meters northwest of Locus 4. Locus 5 measures 7.0 meters north to south by 4.0 meters east to west, and includes: 22 jasper flakes (two secondary, seven tertiary, and 13 biface thinning), 21 chalcedony flakes (one primary, four secondary, seven tertiary, four biface thinning, and five shatter), three chert flakes (one secondary and two tertiary), one rhyolite secondary flake, and one jasper biface.

Locus 6 is located within the southwestern site boundary, approximately 152 meters southeast of Locus 5. Locus 6 measures 8.0 meters northeast to southwest by 2.0 meters northwest to southeast, and includes 14 chalcedony flakes (one primary, seven secondary, five tertiary, and one shatter).

Locus 7 is located along the northwestern site boundary, approximately 368 meters northwest of Locus 6. Locus 7 measures 12 meters north to south by 4.0 meters east to west, and includes two chalcedony preforms and three chalcedony biface fragments.

In total, 1,292 prehistoric artifacts were observed outside the loci, including 1,039 chalcedony flakes (142 primary, 538 secondary, 307 tertiary, 17 biface thinning, and 35 shatter), 154 chert flakes (17 primary, 60 secondary, 64 tertiary, three biface thinning, and 10 shatter), 44 jasper flakes (three primary, 22 secondary, 15 tertiary, and four biface thinning), four rhyolite flakes (one primary and three secondary), one metavolcanic primary flake, 12 chert bifaces, 15 chalcedony bifaces, one jasper biface, five chert cores, three chalcedony cores, one jasper core, one chert edge modified flake, four utilized flakes (three chalcedony and one jasper), one jasper flaked cobble tool, one jasper preform, one chalcedony scraper, one chalcedony hammerstone, and four chalcedony tested cobbles.

The potential for buried artifacts at some portions of this site is high. Loci 1, 2, 3, and 4 have the highest potential for buried artifacts, as they are within the floodplain; however, due to reworking of the local sediments by the wash, buried artifacts are likely in disturbed secondary context and the chances of finding intact surfaces and features is low. The site is situated primarily on an alluvial flat or floodplain and is highly disturbed.

Based upon the cultural constituents and the physical context, archaeologists for the Applicant interpret this site as a lithic procurement and lithic reduction locality. The lithic materials appear to be derived from cobbles of toolstone quality found on site within the desert pavement surfaces, and the artifact types identified (unidirectional, bifacial, and multi-directional cores, tested cobbles, edge modified flakes, utilized flakes, bifaces, a hammerstone, and primary, secondary, tertiary, and biface thinning flakes) reflect early-to-late stage biface reduction. Such artifacts indicate percussion (hard-hammer and/or softhammer) and pressure reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994).

Because this site lacks prehistoric artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a specific period of prehistory or ethnohistory. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and the artifact distribution has been documented during the recordation process. While the potential for buried artifacts at some portions of this site is high, due to reworking of the local sediments by the wash, buried artifacts are likely in secondary disturbed context and the chances of finding intact surfaces and features is low. In addition, combined site CA-SBR-13350 is situated primarily on an alluvial flat or flood plain and is highly disturbed. Therefore, data potential is considered exhausted through recordation of combined site CA-SBR-13350.

CA-SBR-13441

In October 2009, archaeological sites CA-SBR-13057 and CA-SBR-13058 were resurveyed as part of the Calico Solar Project. Additional artifacts were discovered between the two site boundaries, and as a result of the survey, these sites were combined to form combined site CA-SBR-13441. CA-SBR-13057 was originally described as a discrete prehistoric lithic scatter, measuring 64 meters east to west by 37 meters north to south, containing seven flakes and one core. CA-SBR-13058 was originally described as a discrete prehistoric lithic scatter, measuring 28 meters east to west by 80 meters north to south, containing 11 flakes and two cores (one of which is in two pieces).

Combined Site CA-SBR-13441 is an amorphous-shaped low density lithic reduction scatter and covers a total surface area of 2,842 square meters.

The site is located within the southern central portion of the Phase 2 area of the Calico Solar Project site. The site is situated on a nearly level inset alluvial fan facing northwest. The inset fan comprises the portion of the alluvial deposition in the southern Calico Solar Project area, which is confined between two or more fan remnants (or older higher elevation landforms). The fan types may appear similar to the alluvial fan piedmont or the alluvial flat (but without dominant erosional features oriented east to west). The alluvial fan piedmont is the large, gently sloping depositional feature that dominates the northern portion of the Calico Solar Project area; commonly referred to as a “bajada.” As a whole, this appears to be a much younger landform than those in the southern portion of the Calico Solar Project area. The alluvial flat is similar to the relict alluvial flat landform (see below), but younger, with less developed pavement and less dissected, and will largely be found adjacent to the axial channel (see below). The relict alluvial flat landform dominates the western part of the southern portion of the Calico Solar Project area, and can be distinguished from other relict landforms in the southern area by a nearly flat, low lying surface that is cut by numerous braided and anastomatizing channels/gullies. Between these small channels/gullies tend to be bars of intact desert pavement (indicating a relative antiquity for the landform and thus use of the term “relict”).

The main channel of a northwestward trending wash is located several meters southwest of the site. Poorly developed and poorly sorted desert pavement covers portions of the site in an irregular patchy pattern, suggesting portions of the alluvial fan are temporarily stable. Most artifacts tend to be located within areas where pavement is present. Site sediments are silty fine to medium grained sand with small to large sub-angular to sub-rounded pebbles and cobbles. Approximately 1 mile north of the site, the wash merges with the axial channel for the valley. East and west of the site bounding the inset alluvial fan are fan remnants; low northwest trending hills covered by a well-developed desert pavement. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey.

This lithic reduction scatter measures 267 meters northwest to southeast by 62 meters northeast to southwest, and contains a total of 64 prehistoric artifacts. Artifact density at combined site CA-SBR- 13441 is low, with a calculated distribution of one artifact per 44.40 square meters. The overall condition of this site is fair. However due to its location, the area is prone to flash flooding, so sediments are generally unstable.

The major physical surface characteristic of this site is a lithic reduction scatter containing approximately 64 cryptocrystalline silicate (jasper, chalcedony, and chert), rhyolite, and agate artifacts, which include: 46 red jasper flakes (nine primary, 20 secondary, 11 tertiary, and six shatter), two rhyolite secondary flakes, one mustard cryptocrystalline silicate secondary flake, three yellow chalcedony/chert flakes (one secondary and two tertiary), four brown chalcedony/chert flakes (one primary, two secondary, and one tertiary), one agate primary flake, and seven multi-directional jasper cores.

The potential for buried artifacts at this site is high; however, reworking of the local sediments by the wash suggests that buried artifacts are in secondary disturbed context. As well, the likelihood of finding intact surfaces and features is low.

Based upon the cultural constituents and the physical context, archaeologists for the Applicant interpret this site as a low density lithic reduction scatter. The lithic materials appear to be derived from cobbles of toolstone quality found on site within the desert pavement surfaces, and the artifact types identified (multi-directional cores and debitage consisting of primary, secondary, and tertiary flakes) reflect lithic reduction activities. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction

(Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone material (jasper) that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent one single reduction locality or episode.

This site lacks artifacts with unique or temporally diagnostic characteristics and the material remains cannot be associated with a specific period of prehistory or ethnohistory. Analysis of the artifact distribution has been accounted for during the recordation process. As mentioned above, combined site CA-SBR-13441 is situated on a nearly level inset alluvial fan. The potential for buried artifacts at this site is high; however, reworking of the local sediments by the wash suggests that buried artifacts are in secondary disturbed context. As well, the likelihood of finding intact surfaces and features is low. Considering the artifact assemblage identified on site, consisting of cores and debitage, which are indicative of lithic reduction activities, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified. Therefore, the data potential is considered exhausted through recordation of combined site CA-SBR-13441.

CA-SBR-13442

In October 2009 archaeological sites CA-SBR-13001 and CA-SBR-13043 were re-examined as part of the Calico Solar Project. Additional artifacts were discovered between the two site boundaries, and as a result of the survey, these sites were combined to form CA-SBR-13442. CA-SBR-13001 was originally described as a discrete sparse density complex lithic scatter, measuring 33 meters northeast to southwest by 29 meters northwest to southeast, containing six flakes, one hammerstone, and a flaked cobble tool. CA-SBR-13043 was originally described as a discrete prehistoric lithic scatter, measuring 207 meters east to west by 44 meters north to south, containing 84 flakes, one edge modified flake and six loci with higher concentrations of artifacts.

Combined site CA-SBR-13442 is an amorphous-shaped sparse density complex lithic scatter that covers a total surface area of 9,971.3 square meters. The site is located within the central portion of the Phase 2 area of the Calico Solar Project site. The site is situated on the toe slope of a nearly level (1º slope) erosional fan remnant facing west northwest. The erosional fan remnant is composed of hills and ridges that extend above, and are surrounded by, the other landforms in the southern portion of the Calico Solar Project area. They generally are composed of a summit with moderately- to well-developed desert pavement (due to both parent material and age) and erosional side slopes that generally lack pavement. Within the southern Calico Solar Project area, these fan remnants are generally composed of a very old (Early-to-Middle Pleistocene) fanglomerate of cobbles and coarse gravels. Moderately developed desert pavement covers approximately 40% of the site and consists of poorly sorted sub-angular to sub-rounded pebbles and cobbles. The continuity of the desert pavement is broken by shallow west trending gullies dissecting the slope. Loci and most artifacts tend to be located in areas where desert pavement is present. Limited eolian deposits consist of small coppice dunes and minor accumulations of sand around the base of vegetation and in-filling gullies and cover less than two percent of the site. Approximately 500 meters north of the site is the axial channel for the valley and 100 meters west is a north trending wash. The fan remnant on which the site is located continues for 1,000 meters east and 450 meters north and is dissected by numerous shallow gullies; a second fan remnant is present 500 meters west. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*) and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey.

This sparse density lithic reduction scatter measures 40 meters north to south by 283 meters east to west, and contains a total of 108 prehistoric artifacts. Artifact density at combined site CA-SBR-13442 is low, with a calculated distribution of one artifact per 92.32 square meters. However, six discrete loci with higher concentrations of cultural materials interpreted to be single reduction loci do occur within the site area. The overall condition of this site is good with no visible alterations.

The major physical surface characteristic of this site is a lithic reduction scatter containing approximately 108 cryptocrystalline silicate jasper artifacts and basalt artifacts, which include: 97 pieces of lithic debitage (70 primary, 24 secondary, two tertiary, and one shatter), seven jasper cores, two jasper tested cobbles, one basalt flaked cobble tool, and one basalt hammerstone. Of the 108 artifacts identified, 90 artifacts occur within six discrete loci (i.e., Loci 1-6) with higher concentrations of artifacts situated on moderately developed desert pavement surfaces; the remaining cultural materials identified occur outside of these designated loci.

Locus 1 is located along the central-northwestern site boundary, measures 1.3 meters north to south by 0.7 meters east to west, and contains seven red cryptocrystalline silicate jasper flakes (four primary, two secondary, and one tertiary), and two red cryptocrystalline silicate jasper bifacial cores.

Locus 2 is located along the central-southern site boundary, approximately 45 meters southeast of Locus 1. Locus 2 measures 1.5 meters north to south by 2.0 meters east to west, and contains six red cryptocrystalline silicate jasper flakes (two primary and four secondary) and one red cryptocrystalline silicate jasper bifacial core.

Locus 3 is located along the central-northern site boundary, approximately 40 meters northeast of Locus 2. Locus 3 measures 6.9 meters northeast to southwest by 3.1 meters southeast to northwest, and contains 12 red cryptocrystalline silicate jasper flakes (11 primary and one secondary) and one red cryptocrystalline silicate jasper bifacial core.

Locus 4 is located along the central-southwestern site boundary, approximately 47 meters southeast of Locus 3. Locus 4 measures 2.4 meters north to south by 3.6 meters east to west, and contains 13 red cryptocrystalline silicate jasper flakes (10 primary and three secondary).

Locus 5 is located along the southwestern site boundary, approximately 60 meters southeast of Locus 4. Locus 5 measures 1.6 meters north to south by 2.8 meters east to west, and contains 33 red cryptocrystalline silicate jasper flakes (28 primary and five secondary), one red cryptocrystalline silicate jasper unidirectional core, and one red cryptocrystalline silicate jasper bifacial core.

Locus 6 is also located along the southwestern site boundary, approximately 22 meters northeast of Locus 5. Locus 6 measures 2.6 meters north to south by 4.2 meters east to west, and contains 13 red cryptocrystalline silicate jasper flakes (11 primary and two secondary).

Those artifacts observed outside of the loci consist of 13 red cryptocrystalline silicate jasper flakes (four primary, seven secondary, one tertiary, and one shatter), two jasper tested cobbles, one basalt hammerstone, one basalt flaked cobble tool, and one jasper bifacial core. The further character of artifacts associated with this site is reported on DPR 523 series forms under a confidential filing.

The potential for buried artifacts is low as geologic sources indicate the fan remnant dates to the Early-to- Middle Pleistocene (Rogers 1967); however, artifacts associated with the surface pavement may be covered by eolian sands in limited areas (approximately two percent) of the site. However, considering the artifact assemblage identified on site which consists of cores, tested cobbles, a flaked cobble tool, a hammerstone, and a large percentage of cortical debitage (70 of 97 debitage items, or 72.2%), all of which are indicative of initial lithic reduction activities, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified.

Based upon the cultural constituents and the physical context, archaeologists for the Applicant interpret this site as a sparse density lithic procurement and initial lithic reduction locality. The lithic materials appear to be derived from cobbles of toolstone quality found on site within the desert pavement surfaces, and the artifact types identified (unidirectional and bifacial cores, a hammerstone, tested cobbles, a flaked cobble tool, and a preponderance of cortical debitage) reflect early stage biface reduction. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Additionally, all six loci identified are comprised of only one type of lithic material (jasper), which is interpreted as single reduction loci. Thus, the site appears to represent a minimum of six episodes or localities of early stage biface reduction.

This site lacks artifacts with unique or temporally diagnostic characteristics, and the material remains cannot be associated with a specific period of prehistory or ethnohistory. Analysis of the artifact distribution has been accounted for during the recordation process. Combined site CA-SBR-13442 is situated on the toe slope of a nearly level erosional fan remnant composed of moderately developed desert pavement consisting of poorly sorted sub-angular to sub-rounded pebbles and cobbles. This geomorphic landform indicates a Early-to Middle-Pleistocene (Rogers 1967) period of formation and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits; therefore, data potential is considered exhausted through recordation of combined site CA-SBR-13442.

CA-SBR-13443-H

In October 2009 archaeological site CA-SBR-13023/H was resurveyed as part of the Calico Solar Project. As a result of the survey, additional artifacts were discovered between this site boundary and the site boundaries of CA-SBR-13077 and P-36-014795 (isolated artifact); therefore, these sites and the isolated artifact were combined to form combined site CA-SBR-13443/H. CA-SBR-13023/H was originally described as a multi-component site, measuring 43 meters northwest to southeast by 48 meters northeast to southwest, containing a total of 23 historical artifacts (bottle/jar glass fragments, cans, iron fasteners, and two sheets of metal), four prehistoric artifacts (one mano, one metate, and two flakes), and two loci with higher concentrations of artifacts. CA-SBR-13077 was originally described as a discrete prehistoric lithic scatter, measuring 8 meters north to south by 10 meters east to west, containing 11 cryptocrystalline silicate flakes. P-36-014795 was originally described as an isolated find consisting of three red cryptocrystalline silicate jasper tertiary flakes.

Combined Site CA-SBR-13443/H is an amorphous-shaped very sparse density multi-component site that covers a total surface area of 14,213.6 square meters; the site is characterized by a scatter of historical refuse and prehistoric lithic materials. The site is located within the central portion of the Phase 2 area of the Calico Solar Project site. The site is situated at the intersection of multiple alluvial landforms, including the toe of the younger alluvial fan piedmont issuing from the Cady Mountains to the north, the toe slope of an older erosional fan remnant to the south, and a west trending active axial channel that transects the two landforms. An alluvial fan piedmont is the large, gently sloping depositional feature that dominates the northern portion of the Calico Solar Project area; commonly referred to as a “bajada.” As a whole, this appears to be a much younger landform than those in the southern portion of the Calico Solar Project area. The erosional fan remnant is the hills and ridges that extend above, and are surrounded by, the other landforms in the southern portion of the Calico Solar Project area. They generally are composed of a summit with moderately- to well-developed desert pavement (due to both parent material and age) and erosional side slopes that generally lack pavement. Within the southern Calico Solar Project area, these fan remnants are generally composed of a very old (Early-to-Middle Pleistocene) fanglomerate of cobbles and coarse gravels. The axial cannel is the large east-west trending drainage that separates the toe of the alluvial fan piedmont, from the relict (older) landscape that dominates the southern portion of the Calico Solar Project area.

The slope is less than one percent and faces generally to the west. On the surface, a limited portion of the site is covered with discontinuous concentrations of poorly sorted sub-angular to sub-rounded pebbles and cobbles. Medium to course sub-angular grains of sand and small pebbles moderately cover the surface between concentrations suggesting wind erosion is actively affecting the surface by removing the finer fraction of the sediment. Site sediments consist of unconsolidated fine to medium grained alluvial sand with sub-angular to sub-rounded pebbles, cobbles, and gravels, which have likely been reworked and deposited by the axial channel. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*) and desert saltbush

(*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey.

This multiple activity area measures 130 meters north to south by 305 meters east to west, and contains both a prehistoric complex lithic and ground stone scatter and a historical refuse scatter. Two loci with a higher concentration of prehistoric artifacts were identified, and artifact density is low within the site area (one artifact per 149.6 square meters). The overall condition of the site is good, with no visible alterations.

As noted above, the prehistoric component consists of a complex lithic and ground stone scatter that is composed primarily of cryptocrystalline silicate jasper artifacts and contains two loci. Artifacts within the prehistoric component include; 43 cryptocrystalline silicate jasper flakes (six primary, 15 secondary, 20 tertiary, and two shatter), four chalcedony flakes (one primary and three tertiary), one white chert tertiary flake, five chert flakes (four secondary and one tertiary), one complete granitic bifacial mano, one nearly complete metavolcanic basin metate, one jasper biface, and one chalcedony unidirectional scraper.

Of the 43 artifacts identified within the prehistoric component, 14 artifacts occur within two discrete loci (i.e., Loci 1 & 2) with higher concentrations of artifacts; the remaining cultural materials identified occur outside of these designated loci.

Locus 1 is located within the eastern portion of the site, measures 17.0 meters north to south by 21.0 meters east to west, and contains six red jasper flakes (two secondary and four tertiary), one complete granitic bifacial mano, one nearly complete metavolcanic basin metate, and one chalcedony unidirectional scraper.

Locus 2 is located within the western portion of the site, approximately 125 meters due west of Locus 1. Locus 2 measures 2.5 meters northwest to southeast by 1.6 meters northeast to southwest, and contains five chert flakes (four secondary and one tertiary).

The historical component is scattered widely throughout the site area and consists of a historical refuse scatter composed of approximately 38 items, including bottle/jar glass fragments, various cans, machine parts, and miscellaneous metal items. Artifacts within the historical component include: various sanitary cans including a juice can and a church key opened beer can (2 3/4 ”D × 4 7/8”H) (post 1935: IMACS User’s Guide 2001:471-6), Hole-and-Cap cans of various sizes (4”D × 5”H, 3 1/2”D × 4 5/8”H, 4”D × 4 3/4”H [2], 3”D × 3 5/16”H, 4 1/4”D × 6 3/8”H) both knife and cross cut opened, an ice-pick opened condensed milk can (1908-1914: IMACS User’s Guide 2001:471-9), two lard buckets (one reads “White Blossom / Extra Refined Lard / Expressly for Family Use / Kansas City” on the body and measures 6 7/8”H, the other measures 6”D × 7”H), miscellaneous can fragments, a large bucket with a wire handle (10 1/2”H), two metal machine parts (11 1/4”L × 2”W × 1/2”H each), an internal compression ring, a barrel lid fragment (3 1/4”D), a piece of 1/16” wire, a horseshoe, approximately 40 brown glass bottle fragments from five bottles; one with “K” on the base (Kinghorn Bottle Co., 1907-1920: Toulouse 1971:299) and one with “…O” on the base, and a minimum of seven aqua glass fragments from a single bottle embossed with “SCOTT / EMULS[ION] / CO[D] / LIVER” on the body (introduced 1876: Fike 1987:196).

The potential for buried artifacts at this site is high due to the location of the site at the intersection of multiple alluvial landforms; however, reworking of the local sediments by the axial channel suggests that buried artifacts are in secondary disturbed context and the likelihood of finding intact surfaces and features is low.

Based upon the cultural constituents, archaeologists for the Applicant interpret the prehistoric component of this multiple activity site as a possible temporary camp where limited resource processing activities occurred. The prehistoric cultural constituents consist of 43 flakes (seven primary, nine secondary, 25 tertiary, and two shatter), one complete granitic bifacial mano, one nearly complete metavolcanic basin metate, one jasper biface, and one chalcedony unidirectional scraper. Nearly half of this debitage assemblage consists of tertiary flakes (47.2%), suggestive of early-to-late stage bifacial reduction activities. Because the majority of lithic materials (77.2%) found within the site are of the same primary stone material (jasper) that is a constituent of the surrounding area, the bulk of the flaked stone assemblage appears to represent one single episode or locality of lithic reduction. However, it should not be discounted that formed artifacts within this locality may have been collected and/or used elsewhere. Due to the presence of ground stone artifacts (mano and metate), it appears that limited resource procurement and/or processing was also occurring within the site area.

The historical refuse scatter identified on site appears to date from the early-to-middle 1900s, and includes: a church key opened beer can, various sanitary food cans, Hole-and-Cap cans of various sizes, two lard buckets, miscellaneous can fragments, a large bucket, two metal machine parts, an internal compression ring, a barrel lid fragment, a piece of 1/16” wire, a horseshoe, approximately 40 brown glass bottle fragments from five bottles, and a minimum of seven aqua glass fragments from a single bottle. Church key opened cans date from 1935 and thereafter (IMACS User’s Guide 2001:471-6). The condensed milk can dates from 1908-1914 (IMACS User’s Guide 2001:471-9). One of the brown glass bottles date from 1907-1920 (Kinghorn Bottle Co., Toulouse 1971:299). Though manufacture dates can be determined for some of the artifacts present at combined site CA-SBR-13443/H, the time between the initial use/consumption of the artifacts and their ultimate disposal cannot be known. Therefore, the specific date of their disposal cannot be reliably determined.

Due to the close proximity of the BNSF Railroad to combined site CA-SBR-13443/H and the fact that the historical refuse scatter is widely spread throughout the site area, the archaeologists for the Applicant believe that the historical refuse is the result of numerous random episodes of refuse disposal associated with use and/or maintenance of the BNSF Railroad during the early-to-middle 1900s. Conceivably, many of these items (particularly the cans) may have been re-deposited from their primary disposal location and dispersed throughout the site area by water or high winds. Therefore, it is possible that many items may have been associated with temporary encampments and/or settlements that would have been located near or adjacent to the BNSF Railroad (formerly the Atlantic and Pacific Railroad/Atchison, Topeka, and Santa Fe Railroad).

LSA disagrees with the following statement: “The surface manifestation of combined site CA-SBR-13443/H lacks artifacts with unique or temporally diagnostic characteristics that can be associated with specific periods of prehistory or history.”

While the potential for buried artifacts at this site is high, reworking of the local sediments by the axial channel suggests that buried artifacts are in secondary disturbed context and the likelihood of finding intact surfaces and features is low. Regardless, if temporally diagnostic artifacts occur in buried context, combined site CA-SBR-13443/H does have the potential to yield important information about the past, specifically information on prehistoric settlement patterns, subsistence strategies, and trade routes.

CA-SBR-13444

In October 2009, archaeological site CA-SBR-13018 was resurveyed as part of the Calico Solar Project. Additional artifacts were discovered between this site and CA-SBR-13019; as a result of the survey, these sites were combined to form CA-SBR-13444. CA-SBR-13018 was originally described as a prehistoric site, measuring 39 meters north to south by 86 meters east to west, containing 78 cryptocrystalline silicates (jasper and chalcedony), rhyolite, and basalt lithics and two loci with a higher concentration of artifacts. CA-SBR-13019 was originally described as a prehistoric site, measuring 27 meters northwest to southeast by 16 meters northeast to southwest, containing eight flakes and one bi-directional core.

Combined site CA-SBR-13444 is an amorphous-shaped moderate density lithic reduction scatter located within the central portion of the Phase 2 area of the Calico Solar Project site and covers a total surface area of 3,330 square meters. The site is situated on the toe slope of a nearly level (1 degree slope) erosional fan remnant facing northwest. The erosional fan remnant is the hills and ridges that extend above, and are surrounded by, the other landforms in the southern portion of the Calico Solar Project site. They generally are composed of a summit with moderate- to well-developed desert pavement (due to both parent material and age) and erosional side slopes that generally lack pavement. Within the southern Calico Solar Project area, these fan remnants are generally composed of a very old (Early-to- Middle Pleistocene) fanglomerate of cobbles and coarse gravels.

Moderate- to well-developed desert pavement covers approximately 70% of the site and consists of moderately sorted sub-angular to sub-rounded coarse sand grains, and pebbles and cobbles of cryptocrystalline silicates (e.g., jasper, chert, and chalcedony), basalt, and other volcanic materials. The continuity of the desert pavement is broken by shallow northwest trending gullies dissecting the fan. Most loci and artifacts tend to be located in areas where desert pavement is present. Limited eolian deposits, consisting of small coppice dunes and minor accumulations of sand around the base of vegetation and partially in-filled gullies, cover less than five percent of the site. Along the northern site boundary, the landform discontinuously transitions into an alluvial flat. South of the site the fan remnant extends as a series of low northwest aligned ridges, covered by moderate- to well-developed desert pavement, and separated by similarly oriented washes and gullies. The axial channel for the valley, a four- to five-meter-wide west trending wash, is located 220 meters north of the site, and a prominent northwest trending wash draining the remnant fan is located 500 meters east. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*) and desert saltbush (*Artiplex polycarpa*).

This lithic reduction scatter measures 175 meters northwest to southeast by 119 meters northeast to southwest, and contains a total of 147 prehistoric artifacts. Artifact density at combined site CA-SBR- 13044 is moderate, with a calculated distribution of one artifact per 22.65 square meters. However, four discrete loci with higher concentrations of cultural materials, interpreted to be single reduction loci, do occur within the site area. The overall condition of this site is good with no visible alterations.

The major physical surface characteristic of this site is a moderate lithic reduction scatter containing approximately 147 jasper, chalcedony, rhyolite, and basalt artifacts, which include: 129 pieces of lithic debitage (23 primary, 28 secondary, 31 tertiary, two pieces of shatter, and 45 unreported type), nine jasper cores (six bifacial, two multi-directional, and one of unreported type), two basalt cores (one unidirectional and one multi-directional), one chalcedony multi-directional core, one rhyolite unidirectional core, two edge modified flakes (jasper and basalt), and three jasper tested cobbles. Of the 147 artifacts identified, 55 artifacts occur within four discrete loci (i.e., Loci 1-4) with higher concentrations of artifacts situated on moderately developed desert pavement surfaces; the remaining cultural materials identified occur outside of these designated loci.

Locus 1 is located within the western portion of the site, measures 4.0 meters north to south by 1.0 meters east to west, and includes 15 jasper flakes (three primary, five secondary, and seven tertiary), and one jasper bifacial core.

Locus 2 is located along the northwestern site boundary, approximately 12 meters northeast of Locus 1. Locus 2 measures 0.4 meters north to south by 2.3 meters east to west, and includes six jasper flakes (one primary, two secondary, and three tertiary) and one chalcedony multi-directional core.

Locus 3 is located along the central-northern site boundary, approximately 74 meters southeast of Locus 2. Locus 3 measures 2.7 meters northeast to southwest by 1.5 meters northwest to southeast, and includes 12 jasper flakes (four primary, four secondary, three tertiary, and one shatter) and one jasper tested cobble.

Locus 4 is located within the northern portion of the site, approximately 12 meters north of Locus 3. Locus 4 measures 3.1 meters north to south by 6.3 meters east to west, and includes 18 jasper flakes (seven primary, five secondary, five tertiary, and one shatter) and one jasper tested cobble.

Those artifacts observed outside of the loci total 92 and consist of 33 jasper flakes (eight primary, 12 secondary, and 13 tertiary), 27 red jasper flakes (unreported type), one light green rhyolite flake (unreported type), eight red/caramel banded jasper flakes (unreported type), six caramel jasper flakes (unreported type), three chalcedony flakes (unreported type), five jasper bifacial cores, two jasper multidirectional cores, one red basalt multi-directional core, one rhyolite unidirectional core, one jasper core, one basalt unidirectional core, one jasper edge modified flake, one basalt edge modified flake, and one jasper tested cobble.

The potential for buried artifacts is low as geologic sources indicate the erosional fan remnant dates to the Early-to-Middle Pleistocene (Rogers 1967); however, artifacts associated with portions of the fan surface and desert pavement may be covered by eolian deposits. Nonetheless, because the artifact assemblage identified on site consists of cores, tested cobbles, edge modified flakes, and debitage, all of which are indicative of lithic procurement and initial lithic reduction activities, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified.

Based upon the cultural constituents and the physical context, archaeologists for the Applicant interpret this site as a lithic procurement and initial lithic reduction locality. The lithic materials appear to be derived from cobbles of toolstone quality found on site within the desert pavement surfaces, and the artifact types identified (unidirectional, bifacial, and multi-directional cores, tested cobbles, edge modified flakes, and a preponderance of cortical debitage) reflect early stage biface reduction. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). While edge modified flakes are present within the site, they are likely the result of core platform preparation, and not tool manufacturing. Additionally, all four loci identified comprise only one type of lithic material (jasper), suggesting that they are interpreted as single reduction loci. Thus, the site appears to represent a minimum of four episodes or localities of early stage biface reduction.

This site lacks artifacts with unique or temporally diagnostic characteristics, and the material remains cannot be associated with a specific period of prehistory or ethnohistory. The artifact distribution has been documented during the recordation process. Combined site CA-SBR-13444 is situated on the toe slope of a nearly level erosional fan remnant composed of moderate- to well developed desert pavement consisting of moderately sorted sub-angular to sub-rounded coarse sand grains, pebbles, and cobbles. This geomorphic landform indicates an Early-to-Middle Pleistocene (Rogers 1967) period of formation. Because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits. Therefore, data potential is considered exhausted through recordation of combined site CA-SBR-13444.

CA-SBR-13445

Combined site CA-SBR-13445 combines previously recorded sites CA-SBR-13088 and CA-SBR-13090. CA-SBR-13088 was originally described as a discrete prehistoric lithic scatter, measuring 37 meters north to south by 72 meters east to west, containing 96 cryptocrystalline silicate (jasper and chalcedony) secondary and tertiary flakes, one biface fragment, including four loci with a higher concentration of artifacts. CA-SBR-13090 was originally described as a prehistoric site, measuring 115 meters north to south by 50 meters east to west, containing 214 jasper artifacts (debitage, cores, core tool, scraper, and expedient tool), one andesite flake, including four loci with a higher concentration of artifacts.

Combined site CA-SBR-13445 is an amorphous-shaped moderate density complex lithic scatter that is located within the eastern portion of the Phase 2 area of the Calico Solar Project site and covers a total surface area of 9,291 square meters. The site is situated on a nearly level (1 degree slope) erosional fan remnant facing east, specifically, on a low interfluvial rise separating two west trending braided washes north and south of the site. The erosional fan remnant constitutes the hills and ridges that extend above, and are surrounded by, the other landforms in the southern portion of the Calico Solar Project site. Fan remnants generally are composed of a summit with moderate- to well-developed desert pavement (due to both parent material and age) and erosional side slopes that usually lack pavement. Within the southern Calico Solar Project site, these fan remnants are generally composed of a very old (Early-to-Middle Pleistocene) fanglomerate of cobbles and coarse gravels.

The site surface is covered by a moderate- to well-developed desert pavement consisting of moderately sorted sub-angular to sub-rounded pebbles and cobbles of cryptocrystalline silicates (e.g., jasper, chert, and chalcedony), basalt, and other volcanic materials. The continuity of the pavement is broken by small west northwest trending gullies and small drainage features. Limited eolian deposits consist of small coppice dunes and in-filled gullies that cover less than five percent of the site. Site sediments generally consist of fine to medium grained sand with poorly sorted sub-rounded to sub-angular pebbles and cobbles. The adjacent washes form the upper branches of the axial channel for the valley and converge 1,200 meters northwest of the site area. The remnant fan that the site rests upon extends east and west for several hundred meters in both directions. The Pisgah lava flow is 450 meters to the south. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*) and desert saltbush (*Artiplex polycarpa*).

This complex lithic scatter measures 125 meters north to south by 167 meters east to west, and contains a total of 322 prehistoric artifacts. Artifact density at combined site CA-SBR-13445 is moderate, with a calculated distribution of one artifact per 28.58 square meters. However, 11 discrete loci with higher concentrations of cultural materials do occur within the site area. The overall condition of the site is fair, with the southern edge destroyed due to the proximity of the So Cal Gas pipeline construction corridor. The major physical surface characteristic of this site is a moderate density lithic reduction scatter containing approximately 322 jasper and cryptocrystalline silicate artifacts, which include: 311 jasper flakes (86 primary, 189 secondary, 23 tertiary, and 13 shatter), four mustard cryptocrystalline silicate secondary flakes, four jasper cores (one bifacial, two multi-directional, and one unreported core type), one multi-directional core tool, one expedient flake tool, and one unifacial scraper. Of the 322 artifacts identified, 308 artifacts occur within 11 discrete loci (i.e., Loci 1-11) with higher concentrations of artifacts situated on moderately-developed desert pavement surfaces; the remaining cultural materials identified occur outside of these designated loci.

Locus 1 is located along the southeastern site boundary, measures 4.75 meters north to south by 7.1 meters east to west, and contains 45 cryptocrystalline silicate jasper flakes (30 primary and 15 secondary).

Locus 2 is located along the central-southern site boundary, approximately 32 meters west of Locus 1. Locus 2 measures 1.0 meter north to south by 2.0 meters east to west, and contains six primary cryptocrystalline silicate jasper flakes.

Locus 3 is located along the northeastern site boundary, approximately 57 meters northeast of Locus 2. Locus 3 measures 1.0 meter north to south by 1.0 meter east to west, and contains six cryptocrystalline silicate jasper flakes (three primary and three secondary).

Locus 4 is located along the eastern site boundary, approximately 22 meters southeast of Locus 3. Locus 4 measures 4.3 meters north to south by 2.0 meters east to west, and contains 26 cryptocrystalline silicate jasper flakes (six primary, 10 secondary and 10 tertiary).

Locus 5 is located within the central portion of the site, approximately 101 meters west of Locus 4. Locus 5 measures 12.0 meters north to south by 11.0 meters east to west, and contains 86 cryptocrystalline silicate jasper flakes (nine primary and 77 secondary), one multi-directional jasper core tool, and one multi-directional jasper core.

Locus 6 is located along the southwestern site boundary, approximately 10 meters west of Locus 5. Locus 6 measures 3.5 meters north to south by 4.0 meters east to west, and contains 20 cryptocrystalline silicate jasper flakes (three primary and 17 secondary).

Locus 7 is located within the central-western portion of the site, approximately 28 meters northwest of Locus 6. Locus 7 measures 3.0 meters north to south by 7.0 meters east to west, and contains 38 cryptocrystalline silicate jasper flakes (eight primary and 30 secondary).

Locus 8 is located along the northern site boundary, approximately 63 meters northeast of Locus 7. Locus 8 measures 4.0 meters north to south by 3.5 meters east to west, and contains 22 cryptocrystalline silicate jasper flakes (seven primary and 15 secondary), one multi-directional jasper core, and one bifacial jasper core.

Locus 9 is located along the central-eastern site boundary, approximately 63 meters southeast of Locus 8. Locus 9 measures 5.5 meters northeast to southwest by 3.0 meters northwest to southeast, and contains 22 cryptocrystalline silicate jasper flakes (two primary, seven secondary, seven tertiary, and six shatter).

Locus 10 is located along the central-western site boundary, approximately 41 meters west of Locus 9. Locus 10 measures 2.5 meters north to south by 4.0 meters east to west, and contains 25 cryptocrystalline silicate jasper flakes (10 primary, 11 secondary, and four shatter).

Locus 11 is located along the northwestern site boundary, approximately 63 meters north of Locus 10. Locus 11 measures 1.0 meter northeast to southwest by 3.0 meters northwest to southeast, and contains eight cryptocrystalline silicate jasper flakes (two secondary, three tertiary, and three shatter).

Those artifacts observed outside of the loci consist of seven cryptocrystalline silicate jasper flakes (two primary, two secondary, and three tertiary), four mustard cryptocrystalline silicate secondary flakes, one jasper core, one jasper expedient flake tool, and one jasper unifacial scraper.

The potential for subsurface deposits on the fan remnant is low, as geologic sources indicate the fan remnant dates to the Early-to-Middle Pleistocene; however, some intact desert pavement may be covered by eolian deposits. Nonetheless, because the artifact assemblage identified on site consists of cores, a core tool, a flake tool, a scraper, and debitage, all of which are indicative of lithic procurement and early to-late stage lithic reduction activities, it is highly likely that any artifacts present in subsurface contexts would mirror those artifact types already identified.

Based upon the cultural constituents and the physical context, archaeologists for the Applicant interpret this site as a lithic procurement and early-to-late stage lithic reduction locality. The lithic materials appear to be derived from cobbles of toolstone quality found on site within the desert pavement surfaces, and the artifact types identified (bifacial and multi-directional cores, a multi-directional core tool, and a preponderance of cortical debitage) reflect early stage biface reduction. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). The presence of the expedient flake and unifacial scraper also suggest that later stage reduction activities were also undertaken at the site. Additionally, all 11 loci identified include only one type of lithic material (jasper), suggesting that they are single reduction loci.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a specific period of prehistory or ethnohistory. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and the artifact distribution has been documented during the recordation process. Combined site CA-SBR-13445 is situated on a nearly level erosional fan remnant with an Early-to-Middle Pleistocene period of formation. Because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits. Therefore, data potential is considered exhausted through recordation of combined site CA-SBR-13445.

P36-014519

P36-014519, a rock cairn covering a total surface area of (25 square feet) (ft^2), is situated on the fan skirt near the base of the alluvial fan piedmont. The alluvial fan piedmont is the large, gently sloping depositional feature that is commonly referred to as a "bajada." The general area is nearly flat and faces west southwest. Coarse sub-angular grains of sand and small pebbles moderately cover the surface suggesting wind erosion is actively affecting the site surface by removing the finer fraction of the surficial sediments, which implies some degree of surface stability. Larger clast are sparsely scattered throughout the general area and are likely from the Pisgah lava flow 250 meters southwest. A braided stream is located 60 to 70 meters south. Vegetation in the site area and vicinity is dominated by the Creosote Bush Community which is characteristic of the Mojave Desert where rainfall is less than 19 centimeters annually. Within the site area, observed vegetation includes creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), and desert saltbush (*Artiplex polycarpa*), as well as bunch grasses that were unidentifiable during the archaeological survey.

P36-014519 is a partially deflated rock cairn that measures 5 feet north to south by 5 feet east to west by 19 inches high and contains two layers of a total of 31 small to large sub-rounded to sub-angular metavolcanic cobbles. Due to the location of the cairn, it is not possible to determine if it is historic or prehistoric in origin. However, this site and site P36-014520, another isolated rock cairn, are located less than 1 foot from being exactly 400 feet apart; both are located approximately 25 meters northeast of the former alignment of the Old National Trails Highway/Historic Route 66 (CA-SBR-2910H). The placement of the cairns and absence of known mining deposits in the area indicates that these cairns are likely associated with the highway and may have been land surveying monuments. San Bernardino County was responsible for route planning at the time the Old National Trails Highway was designated, and the route may or may not have been professionally engineered. No historical "as built" drawings of the highway have been located; thus, the Applicant cannot make a direct association between the rock cairns and the highway. It should also be noted that no prehistoric or historical artifacts are present on the surface within the vicinity of the cairn. Although site recordation involved only an examination of the site surface, the potential for buried prehistoric or historical artifacts at this site is low due to eolian deflation of the site sediments.

The cairn feature at P36-014519 has been documented during the recordation process, and the data potential is considered exhausted through recordation of P36-014519.

C.4 – GEOLOGY AND PALEONTOLOGY

Testimony of Dal Hunter, Ph.D., C.E.G.

C.4.1 SUMMARY OF CONCLUSIONS

The proposed Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) site is located in an active geologic area of the north-central Mojave Desert Geomorphic Province in central San Bernardino County in south-central California. Because of its geologic setting, the site could be subject to intense levels of earthquake-related ground shaking. The effects of strong ground shaking would need to be mitigated, to the extent practical, through structural designs required by the California Building Code (CBC 2007) and the project geotechnical report. The CBC (2007) requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction. A geotechnical investigation has been performed and presents standard engineering design recommendations for mitigation of seismic shaking and site soil conditions.

There are no known viable geologic or mineralogical resources at the proposed Calico Solar Project site. Locally, paleontological resources have been documented within older Quaternary alluvium which underlies the younger Quaternary alluvium of the site surface. Potential impacts to paleontological resources would be mitigated through worker training and monitoring by qualified paleontologists, as required by Conditions of Certification, **PAL-1** through **PAL-7**.

Based on its independent research and review, California Energy Commission and U.S. Bureau of Land Management staff believes that the potential is low for significant adverse impacts to the proposed project from geologic hazards during its design life and to potential geologic, mineralogic, and paleontological resources from the construction, operation, and closure of the proposed project. It is staff's opinion that the Calico Solar Project could be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards and in a manner that both protects environmental quality and assures public safety, to the extent practical. Implementation and enforcement of the proposed conditions of certification should result in less than significant impacts to geology and paleontology.

C.4.2 INTRODUCTION

In this section, California Energy Commission (Energy Commission) and U.S. Bureau of Land Management (BLM) staff discusses the potential impacts of geologic hazards on the proposed Calico Solar Project as well as the project's potential impacts on geologic, mineralogic, and paleontological resources. Staff's objective is to ensure that there would be no consequential adverse impacts to significant geological and paleontological resources during project construction, operation, and closure and that operation of the plant would not expose occupants to high-probability geologic hazards. A brief geological and paleontological overview is provided. The section concludes with staff's proposed monitoring and mitigation measures for geologic hazards and geologic, mineralogic, and paleontological resources, with proposed conditions of certification.

C.4.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Federal agencies are required to review major federal actions such as the Calico Solar Project under the National Environmental Policy Act (NEPA). This document has been prepared in consultation and coordination with the BLM to also address federal environmental issues. The BLM and CEC have conducted a joint environmental review of the project in a single NEPA/California Environmental Quality Act (CEQA) process. The Federal Land Policy and Management Act of 1976 (FLPMA) establishes the agency's multiple-use mandate to serve present and future generations.

The CEQA Guidelines, Appendix G, provide a checklist of questions that lead agencies typically address.

- Section (V) (c) includes guidelines that determine if a project will either directly or indirectly destroy a unique paleontological resource or site or a unique geological feature.
- Sections (VI) (a), (b), (c), (d), and (e) focus on whether or not the project would expose persons or structures to geological hazards.
- Sections (X) (a) and (b) concern the project's effects on mineral resources.

The California Building Standards Code (CBSC) and CBC (2007) provide geotechnical and geological investigation and design guidelines, which engineers must follow when designing a facility. As a result, the criteria used to assess the significance of a geological hazard include evaluating each hazard's potential impact on the design and construction of the proposed facility. Geological hazards include faulting and seismicity, volcanic eruptions, liquefaction, dynamic compaction, hydrocompaction, subsidence, expansive soils, landslides, tsunamis, and seiches. Of these, dynamic compaction, hydrocompaction, subsidence, and expansive soils are geotechnical engineering issues but are not normally associated with concerns for public safety.

Staff has reviewed geological and mineral resource maps for the surrounding area, as well as site-specific information provided by the applicant, to determine if any geological and mineralogical resources exist in the area and to determine if operations could adversely affect such geological and mineralogical resources.

To evaluate whether the proposed project and alternatives would generate a potentially significant impact as defined by CEQA on mineral resources, the staff evaluated them against checklist questions posed in the 2006 CEQA Guidelines, Appendix G, Environmental Checklist established for Mineral Resources. These questions are:

A. Would the project result in the loss of availability of a known mineral resource that would be of value to the region and residents of the state?

B. Would the project result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

Under NEPA, the impact of the proposed project and alternatives on mineral resources would be considered significant if they would directly or indirectly interfere with active mining claims or operations, or would result in reducing or eliminating the availability of important mineral resources. The staff's evaluation of the significance of the impact of the proposed project on mineral resources includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27.

Staff reviewed existing paleontological information and requested records searches from the San Diego Natural History Museum (SDNHM) and the Natural History Museum of Los Angeles County (LACM) for the site area. Site-specific information generated by the applicant for the Calico Solar Project was also reviewed. All research was conducted in accordance with accepted assessment protocol (SVP 1995) to determine whether any known paleontological resources exist in the general area. If present or likely to be present, conditions of certification which outline required procedures to mitigate impacts to potential resources are proposed as part of the project's approval.

The Antiquities Act of 1906 (16 United States Code [USC]) requires that objects of antiquity be taken into consideration for federal projects and the CEQA, Appendix G, also requires the consideration of paleontological resources. The Paleontological Resources Preservation Act of 2009 requires the Secretaries of the United States Department of the Interior and Agriculture to manage and protect paleontological resources on Federal land using scientific principles and expertise. The potential for discovery of significant paleontological resources or the impact of surface disturbing activities to such resources is assessed using the Potential Fossil Yield Classification (PFYC) system. The PFYC class ranges from Class 5 (very high) to Class 1 (very low) (USDI 2007). The formerly used system, replaced by the PFYC system in 2009, assigned one of three conditions: Condition 1 (areas known to contain vertebrate fossils), Condition 2 (areas with exposures of geological units or settings that have high potential to contain vertebrate fossils); and Condition 3 (areas that are very unlikely to produce vertebrate fossils); due to the recency of this change, information from the previous system is included in the analysis as well.

The proposed conditions of certification allow BLM's Authorized Officer, the Energy Commission's compliance project manager (CPM) and the applicant to adopt a compliance monitoring scheme ensuring compliance with laws, ordinances, regulations, and standards (LORS) applicable to geological hazards and the protection of geologic, mineralogic, and paleontological resources.

Based on the information below, it is staff's opinion that the potential for significant adverse impacts to the project from geological hazards, and to potential geologic, mineralogic, and paleontological resources from the proposed project is low.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Applicable LORS are listed in the application for certification (AFC) (SES 2008a). The following briefly describes the current LORS for both geologic hazards and resources and mineralogical and paleontological resources.

Geology and Paleontology Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Antiquities Act of 1906 (16 United States Code [USC], 431-433	The proposed Calico Solar Project is located entirely on federal (Bureau of Land Management) land. Although there is no specific mention of natural or paleontological resources in the Act itself, or in the Act's uniform rules and regulations (Title 43 Part 3, Code of Federal Regulations [43 CFR Part 3], 'objects of antiquity' has been interpreted to include fossils by the Federal Highways Act of 1956, the National Park Service (NPS), the Bureau of Land Management (BLM), the Forest Service (USFS), and other Federal agencies. All design will also need to adhere to any applicable BLM design standards.
Antiquities Act of 1906 (16 United States Code [USC], 431-433)	The proposed Calico Solar Project facility site is located entirely on land currently administered by the Bureau of Land Management (BLM). Although there is no specific mention of natural or paleontological resources in the Act itself, or in the Act's uniform rules and regulations (Title 43 Part 3, Code of Federal Regulations [43 CFR Part 3], 'objects of antiquity' has been interpreted to include fossils by the Federal Highways Act of 1956, the National Park Service (NPS), the BLM, the Forest Service (USFS), and other Federal agencies.
National Environmental Policy Act (NEPA) of 1970 (42 USC 4321, et. seq.)	Established the Council on Environmental Quality (CEQ), which is charged with preserving 'important historic, cultural, and natural aspects of our national heritage'.
Federal Land Policy and Management Act (FLPMA) of 1976 (43 USC 1701-1784)	Authorizes the BLM to manage public lands to protect the quality scientific, scenic, historical, archeological, and other values, and to develop 'regulations and plans for the protection of public land areas of critical environmental concern', which include 'important historic, cultural or scenic values'. Also charged with the protection of 'life and safety from natural hazards'.
Paleontological Resources Preservation Act (PRPA) (Public Law [PL] 111-011)	Authorizes Departments of Interior and Agriculture Secretaries to manage the protection of paleontological resources on Federal lands.
State	
California Building Code (CBC), 2007	The CBC (2007) includes a series of standards that are used in project investigation, design, and construction (including grading and erosion control).
Alquist-Priolo Earthquake Fault Zoning Act, Public Resources Code (PRC), Section 2621–2630	Mitigates against surface fault rupture of known active faults beneath occupied structures. Requires disclosure to potential buyers of existing real estate and a 50-foot setback for new occupied buildings. Portions of the site and proposed ancillary facilities are located within designated Alquist-Priolo Fault Zones. The proposed site layout places occupied structures outside of the 50-foot setback zone.

Applicable Law	Description
The Seismic Hazards Mapping Act, PRC Section 2690–2699	Areas are identified that are subject to the effects of strong ground shaking, such as liquefaction, landslides, tsunamis, and seiches.
PRC, Chapter 1.7, Sections 5097.5 and 30244	Regulates removal of paleontological resources from state lands, defines unauthorized removal of fossil resources as a misdemeanor, and requires mitigation of disturbed sites.
Warren-Alquist Act, PRC, Sections 25527 and 25550.5(i)	The Warren-Alquist Act requires the Energy Commission to "give the greatest consideration to the need for protecting areas of critical environmental concern, including, but not limited to, unique and irreplaceable scientific, scenic, and educational wildlife habitats; unique historical, archaeological, and cultural sites…" With respect to paleontological resources, the Energy Commission relies on guidelines from the Society of Vertebrate Paleontology, indicated below.
California Environmental Quality Act (CEQA), PRC sections 15000 et seq., Appendix G	Mandates that public and private entities identify the potential impacts on the environment during proposed activities. Appendix G outlines the requirements for compliance with CEQA and provides a definition of significant impacts on a fossil site.
Society of Vertebrate Paleontology (SVP), 1995	The "Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontological Resources: Standard Procedures" is a set of procedures and standards for assessing and mitigating impacts to vertebrate paleontological resources. The measures were adopted in October 1995 by the SVP, a national organization of professional scientists.
Local	
San Bernardino County 2007 Development Code, Chapters 82.15, 82.20 and Safety Element	Chapter 82.15 requires that a geological study will be undertaken where roads and structures are to be constructed. Also requires that roads and utilities will be perpendicular to faults. Chapter 82.20 defines criteria for site evaluation for paleontological resources in the county, including preliminary field surveys, monitoring during construction, and specimen recovery; also defines qualifications for professional paleontologists. The Safety Element requires compliance with geological/geotechnical reports, the CBC, and other state agencies and regulations.

C.4.4 PROPOSED PROJECT

C.4.4.1 SETTING AND EXISTING CONDITIONS

The proposed Calico Solar Project would be constructed on 8,230 acres north of Interstate Highway 40 (I-40) in San Bernardino County, California. The property is located entirely on public land managed by the BLM. The site is approximately 115 miles east of Los Angeles, 37 miles east of Barstow, 17 miles east of Newberry Springs, and 57 miles northeast of Victorville. The historic mining town of Hector and the Hector Road interchange on I-40 are adjacent to the property (URS 2008). The Burlington

Northern Santa Fe railroad tracks parallel I-40 and cross the site, but the right-of-way (ROW) is excluded from the property. Within the overall project boundaries, 3 areas totaling approximately 2,240 acres are excluded from the project site.

The proposed Calico Solar Project would be a primary power generating facility capable of producing 850 megawatts (MW) of electricity, and would be constructed in two phases. The original Phase I identified in the AFC called for construction of a 500-MW facility on 5,838 acres with Phase II generating an additional 350 MW from the remaining 2,392 acres (URS 2008).

However, the applicant subsequently revised the project to align the output of Phase I with the capacity of the Southern California Edison (SCE) transmission system prior to the completion of a 500-kilovolt (kV) upgrade to the Lugo-Pisgah Transmission line. Although the newly defined Phase I would not require the replacement of the existing 220-kV Lugo-Pisgah transmission line with a new 500-kV line, Phase I would require upgrades to the SCE Pisgah Substation and communication systems.

The new Phase I would be limited to 275 MW, with the remaining 575 MW as part of the newly defined Phase II. Power would be generated by up to 34,000 SunCatcher solar dish collectors which would be supported on individual metal pipe or drilled pier foundations. Each SunCatcher is capable of generating 25 kilowatts (kW) of grid-quality electricity and consists of a 38-foot by 40-foot dish array of mirrors that automatically focus sunlight onto a power conversion unit (PCU). The PCU consists of a heat exchanger and closed-cycle, high-efficiency Solar Stirling Engine that utilizes heated hydrogen gas to drive a rotary generator and produce electricity.

Supporting facilities would include an operations and administration building, a maintenance building, a new 230-kW substation, a satellite services complex and main services complex. Water for the project would be provided by a new well and demineralized for washing the mirrors. Waste water from this process would be disposed of by evaporation from two concrete-lined ponds that would have a combined capacity of 2 million gallons. On-site ancillary facilities associated with the solar array would include buried water pipe lines, and a roughly 2-mile-long 220-kV electrical transmission line connecting the new substation to the existing SCE Pisgah Substation just off the southern and eastern end of the site. The Pisgah Substation would require upgrades to accept power from the Calico Solar Project, and demolition and upgrade of 65 miles of the existing Lugo-Pisgah No. 2, 220-kV transmission line. Off-site upgrades are not a part of the Calico Solar Project, but are addressed in **Section C.4.8** as reasonably foreseeable impacts.

Regional Setting

The proposed site is located in the central portion of the Mojave Desert physiographic province in Southern California. The Mojave Desert is a broad interior region of isolated mountain ranges which separate vast expanses of desert plains and interior drainage basins and occupies approximately 25,000 square miles in southeastern California and portions of Nevada, Utah, and Arizona. In California, its overall topography is dominated by southeast to northwest-trending faulting with a secondary east-to-west-trending alignment which is attributable to Transverse Range faulting.

Project Site Description

The proposed Calico Solar Project would be constructed on 8,230 acres north of Interstate Highway 40 (I-40) in San Bernardino County, California. The potential site is located within the structurally defined Eastern California Shear Zone (ECSZ). The property lies on the southwest flank of the Cady Mountains on federal land managed by the BLM. Overall the site slopes southwest toward the local topographic low at the normally dry Troy Lake.

Surface cover at the site consists of Quaternary alluvium and fanglomerate composed of sediments washed down from the Cady Mountains to the northeast. Small outcrops of Tertiary basalt, andesite, and volcanic breccia occur in the northernmost portion of the site. A small outcrop of basalt flow from the geologically recent Pisgah Crater eruption is present along the southernmost site boundary.

C.4.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section considers two types of impacts. The first is geologic hazards, which could impact the proper functioning of the proposed facility and create life/safety concerns. The second is the potential impacts the proposed facility could have on existing geologic, mineralogic, and paleontological resources in the area.

Direct/Indirect Impacts and Mitigation

Ground shaking represents the main geologic hazard at this site. The effect of this potential hazard on the project can be effectively mitigated through facility design by incorporating recommendations contained in the project geotechnical report and the CBC (2007). Proposed Conditions of Certification **GEN-1, GEN-5,** and **CIVIL-1** in the **Facility Design** section should also mitigate these potential impacts to a less than significant level.

The proposed Calico Solar Project site is not located within an established Mineral Resource Zone (MRZ) and no economically viable mineral deposits are known to be present at the site.

Near-surface geology beneath the site consists primarily of Quaternary alluvium and fanglomerate overlying Quaternary older alluvium with minor outcrops of Tertiary volcanic rocks (Dibblee 2008). Staff reviewed correspondence from the NHMLA (McLeod 2009) and the project confidential paleontological resources technical report (URS 2008) for information regarding known fossil localities and stratigraphic unit sensitivity within the project area. The LACM has recorded 2 fossil localities (camel and horse) within the Cady Mountains northeast of the project area and ancillary facilities. The project confidential paleontological resources technical report indicates the presence of 2 fossil collection sites (fossil types not stated) within the project boundaries. Also noted were the presence of silicified root masses and possible burrow structures. No major fossil finds have occurred within 2 miles of the project site.

Based on the recorded fossil finds, staff concludes the Quaternary alluvium and fanglomerate have low potential to produce fossils. Quaternary older alluvium has moderate paleontological resource sensitivity. Tertiary volcanic rocks also have a very low potential to produce fossils.

Overall, staff considers the probability for significant paleontological resources to be encountered during site construction activities to be low. However, if construction includes significant amounts of grading or deep foundation excavation and utility trenching the potential for exposure of paleontological resources will increase with depth of the excavations. This assessment is based on SVP criteria and the paleontological report appended to the AFC (SES 2008a). Low paleontological sensitivity roughly corresponds to PFYC Class 1 or 2 (Condition 3). Deeper excavations could potentially encounter a high sensitivity formation of PFYC Class 4 (Condition 2). Proposed Conditions of Certification **PAL-1** to **PAL-7** are designed to mitigate paleontological resource impacts, as discussed above, to less than significant levels. These conditions essentially require a worker education program in conjunction with the monitoring of earthwork activities by a qualified professional paleontologist (a paleontological resource specialist, or PRS).

The proposed conditions of certification allow the Energy Commission's compliance project manager (CPM) and the applicant to adopt a compliance monitoring scheme ensuring compliance with LORS applicable to geologic hazards and the protection of geologic, mineralogic, and paleontological resources.

Based on the information below, it is staff's opinion that the potential for significant adverse, direct or indirect impacts to the project, from geologic hazards, and to potential geologic, mineralogic, and paleontological resources, from the proposed project, is low.

Geological Hazards

The AFC provides documentation of potential geologic hazards at the proposed Calico Solar Project plant site, including limited site-specific subsurface information (SES 2008a). Review of the AFC, coupled with staff's independent research, indicates that the potential for geologic hazards to impact the proposed plant site during its practical design life is low if recommendations for mitigation of seismic shaking are followed. Geologic hazards related to seismic shaking are addressed in the project geotechnical report per CBC (2007) requirements (SES 2008a).

Staff's independent research included the review of available geologic maps, reports, and related data of the Calico Solar Project site. Geological information was available from the California Geological Survey (CGS), California Division of Mines and Geology (CDMG, now known as CGS), the U.S. Geological Survey (USGS), the American Geophysical Union, the Geologic Society of America, and other organizations.

Faulting and Seismicity

Energy Commission staff reviewed numerous CDMG and USGS publications as well as informational websites in order to gather data on the location, recency, and type of faulting in the project area. Type A and B faults within 80 miles of the proposed Calico Solar Project site are listed in Table 2. Type A faults have slip-rates of $\geq$5 mm per year and are capable of producing an earthquake of magnitude 7.0 or greater. Type B faults have slip-rates of 2 to 5 mm per year and are capable of producing an earthquake of magnitude 6.5 to 7.0. The fault type, potential magnitude, and distance from the site are summarized in **Geology and Paleontology Table 2**. Because of the large size of the site the distances to faults are measured from the proposed control building location within the project boundaries.

Geology and Paleontology Table 2
Active Faults Relative to the Proposed Calico Solar Project Site

Fault Name	Distance From Site (miles)	Maximum Earthquake Magnitude (Mw)	Estimated Peak Site Acceleration (g)	Movement and Strike	Slip Rate mm/yr	Fault Type
Lavic Lake	1.5	7.1		Right-Lateral Strike Slip (Northwest)	0.2 - 1	B
Pisgah-Bullion Mtn. - Mesquite Lake	4.1	7.3	0.391	Right-Lateral Strike Slip (Northwest)	0.6	B
Calico - Hidalgo	11.4	7.3	0.210	Right-Lateral Strike Slip (Northwest)	0.6	B
Landers	18.8	7.3	0.146	Right-Lateral Strike Slip (Northwest)	0.6	B
Emerson South – Copper Mtn.	20.9	7.0	0.115	Right-Lateral Strike Slip (Northwest)	0.6	B
Johnson Valley (Northern)	24.4	6.7	0.087	Left-Lateral Strike Slip (Northwest)	0.6	B
Lenwood – Lockhart – Old Woman Springs	26.7	7.5	0.124	Right-Lateral Strike Slip (Northwest)	0.6	B
Gravel Hills – Harper Lake	29.9	7.1	0.092	Right-Lateral Strike Slip (Northwest)	0.6	B
Northern Frontal Fault Zone (East)	35.2	6.7	0.080	Reverse (South)	0.5	B
Blackwater	38.2	7.1	0.076	Right-Lateral Strike Slip (Northwest)	0.6	B
Northern Frontal Fault Zone (West)	39.7	7.2	0.095	Reverse (South)	1.0	B
Helendale – South Lockhart	40.1	7.3	0.082	Right-Lateral Strike Slip (Northwest)	0.6	B
Pinto Mountain	46.3	7.2	0.069	Left-Lateral Strike Slip (Northwest)	2.5	B
Burnt Mountain	47.4	6.5	0.047	Right-Lateral Strike Slip (Northwest)	0.6	B
Eureka Peak	47.4	6.4	0.045	Right-Lateral Strike Slip (Northwest)	0.6	B
Garlock (East)	53.9	7.5	0.072	Left-Lateral Strike Slip (Northeast)	7.0	B
Death Valley (South)	54.2	7.1	0.058	Right-Lateral Strike Slip (Northwest)	4.0	B
Cleghorn	58.4	6.5	0.040	Right-Lateral Strike Slip (Northwest)	0.6	B
San Andreas – San Bernardino M-1	60.3	7.5	0.066	Right-Lateral Strike Slip (Northwest)	24.0	A
San Andreas – San Bernardino – Coachella M-1b-2	60.3	7.7	0.073	Right-Lateral Strike Slip (Northwest)	24.0	A
San Andreas – Whole M-1a	60.3	8.0	0.086	Right-Lateral Strike Slip (Northwest)	34.0	A
San Andreas – San Bernardino – Coachella M-2b	60.3	7.7	0.073	Right-Lateral Strike Slip (Northwest)	25.0	A
San Andreas – Coachella M-1c-5	61.4	7.2	0.056	Right-Lateral Strike Slip (Northwest)	25.0	A
Owl Lake	61.5	6.5	0.038	Left-Lateral Strike Slip (Northwest)	2.0	B
Panamint Valley	62.6	7.4	0.061	Right-Lateral, Normal, Oblique	2.5	B
San Andreas – Cholame – Mojave M-1b-1	72.0	7.8	0.067	Right-Lateral Strike Slip (Northwest)	34.0	A
San Andreas – Mojave	72.0	7.4	0.055	Right-Lateral Strike	30.0	A

Fault Name	Distance From Site (miles)	Maximum Earthquake Magnitude (Mw)	Estimated Peak Site Acceleration (g)	Movement and Strike	Slip Rate mm/yr	Fault Type
M-1c-3				Slip (Northwest)		
Cucamonga	72.2	6.9	0.051	Reverse (North)	5.0	B
San Jacinto – San Bernardino	72.3	6.7	0.038	Right-Lateral Strike Slip (Northwest)	12.0	A
San Jacinto – San Jacinto Valley	72.4	6.7	0.042	Right-Lateral Strike Slip (Northwest)	12.0	A
Tank Canyon	75.3	6.4	0.038	Normal (West)	1.0	B
San Jacinto - Anza	79.5	7.2	0.046	Right-Lateral Strike Slip (Northwest)	12.0	A

In addition to the Type A and B faults, two other faults systems which have potential to cause ground shaking at the proposed Calico Solar Project site are the Cady Fault and the Ludlow Fault. The Cady Fault is an east-west-trending left-lateral strike-slip fault within the Cady Mountains approximately 3 miles north of the northern site boundary. Quaternary movement has been documented on the Cady Fault where it offsets Older alluvium. Younger alluvium covers the eastern end of the Cady Fault suggesting no recent movement. The Ludlow Fault is a northwest-trending right-lateral strike-slip fault which extends to within approximately 12 miles of the eastern boundary of the proposed project site. Quaternary movement has been reported for the Ludlow Fault (SCEC 2009).

Other Type C and otherwise undifferentiated faults which are more than 20 miles from the proposed site are not discussed here because they are unlikely to undergo movement or generate seismicity which could affect the project.

The potential site is located within a structural area variously referred to in literature as the Barstow-Bristol trough (Glazner, Bartley, and Sanner 2000), the Eastern California Shear Zone (Dokka and Travis 1990), and the Mojave Extensional Belt (Ross 1995). All refer, fully or in part, to an area of the Mojave Desert geomorphic province (the Mojave Desert block) which is characterized by northwest-trending right-lateral strike-slip faulting which has accounted for approximately 40 miles of extensional faulting within the region since the middle Miocene (roughly 15 million years ago).

Thirty-two Type A and B faults and fault segments were identified within 80 miles of the potential site (**Geology and Paleontology Table 2).** Of these, two are in close enough proximity to the proposed project site to warrant detailed discussion. These are the Lavic Lake and Pisgah-Bullion fault zones, both of which are designated Alquist-Priolo Earthquake Fault Zones (CDMG 2003). These are subparallel Type B right-lateral northwest-trending strike-slip fault systems which extend beneath the southern portions of the site (USGS 2003). Lack of surface expression north of Interstate 40 precludes mapping of these faults across the proposed site. The Hector Mine M_w 7.1 earthquake of October 16, 1999 occurred along the apparent strike of both of these faults approximately 18 miles south of the proposed Calico Solar Project area. This earthquake resulted in horizontal slip over an estimated 28 miles with a maximum displacement of approximately 17 feet (Trieman et al. 2002). An unnamed M_w 5.1 earthquake occurred within the proposed project boundaries near the northern end of the Pisgah-Bullion fault zone, approximately 1 mile west of the proposed control building site, on December 16, 2008 (SCEC 2009).

No movement along the faults was recorded within the proposed project area during the Hector Mine earthquake. However, damage did occur at Interstate Highway 40, and along the Burlington Northern and Santa Fe Railway, both of which parallel the southern site boundary. Highway damage was considered to be minor and primarily resulted from pounding of bridge decks against bridge barriers, abutments, and wingwalls (Yashinsky, et al. 2002). Railroad damage included derailment of an Amtrak passenger train, displacement of ballast from cribbing, and buckling of tracks (Byers 2000).

The potential for actual fault-related ground rupture at the proposed Calico Solar Project is considered very low, but evidence of Holocene movement has been found on nearly every major fault in the ECSZ (Trieman et al. 2002). Events such as the Hector Mine earthquake and the unnamed earthquake of December 16, 2008 show the proposed site could be subject to intense levels of earthquake-related ground shaking in the future. The effects of strong ground shaking would need to be mitigated, to the extent practical, through structural designs required by the CBC (2007) and the project geotechnical report. The CBC (2007) requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction. A geotechnical investigation has been performed and presents standard engineering design recommendations for mitigation of seismic shaking and site soil conditions (URS 2008). Based on the apparent soil profile beneath the proposed Calico Solar Project site, the site soil class is assumed to be seismic Class D. The estimated peak horizontal ground acceleration for the power plant is 0.74 times the acceleration of gravity (0.74g) for bedrock acceleration based on 2% probability of exceedence in 50 years under 2007 CBC criteria. For a Class D site, the soils profile amplifies the potential acceleration of the ground surface to 1.94g (USGS 2008a)

Liquefaction

Liquefaction is a condition in which a saturated cohesionless soil may lose shear strength because of sudden increase in pore water pressure caused by an earthquake. However, the potential for liquefaction of strata deeper than approximately 40 feet below surface is considered negligible due to the increased confining pressure and because geologic strata at this depth are generally too compact to liquefy. The reported deep ground water table (greater than 300 feet) would indicate no potential for liquefaction. Soil characteristics reported in the project-specific geotechnical report (URS 2008) indicate strata beneath the site are also generally too dense to liquefy. Liquefaction potential on the Calico Solar Project site was addressed in the project geotechnical report per CBC (2007) and proposed Condition of Certification **GEN-1** requirements.

Lateral Spreading

Lateral spreading of the ground surface can occur within liquefiable beds during seismic events. Lateral spreading generally requires an abrupt change in slope—that is, a nearby steep hillside or deeply eroded stream bank, etc.—but can also occur on gentle slopes such as are present at the project site. Other factors such as distance from the epicenter, magnitude of the seismic event, and thickness and depth of liquefiable layers also affect the amount of lateral spreading. Because the proposed Calico Solar Project site is not subject to liquefaction, there is no potential for lateral spreading during seismic events.

Dynamic Compaction

Dynamic compaction of soils results when relatively unconsolidated granular materials experience vibration associated with seismic events. The vibration causes a decrease in soil volume, as the soil grains tend to rearrange into a more dense state (an increase is soil density). The decrease in volume can result in settlement of overlying structural improvements. Site specific geotechnical investigation indicates the alluvial deposits in the site subsurface are generally too dense to allow significant dynamic compaction (URS 2008).

Hydrocompaction

Hydrocompaction (also known as hydro-collapse) is generally limited to young soils that were deposited rapidly in a saturated state, most commonly by a flash flood. The soils dry quickly, leaving an unconsolidated, low density deposit with a high percentage of voids. Foundations built on these types of compressible materials can settle excessively, particularly when landscaping irrigation dissolves the weak cementation that is preventing the immediate collapse of the soil structure. Site specific geotechnical investigation indicates the subsurface alluvial deposits which underlie the site are generally too dense to experience significant hydrocompaction (URS 2008).

Subsidence

Local subsidence or settlement may occur when areas containing compressible soils are subjected to foundation or fill loads. Site-specific geotechnical investigation indicates the alluvial deposits which underlie the site are generally at a medium-dense to very dense consistency and therefore are considered unlikely to cause excessive settlement (subsidence) due to foundation loading.

Regional ground subsidence is typically caused by petroleum or ground water withdrawal that increases the effective unit weight of the soil profile, which in turn increases the effective stress on the deeper soils. This results in consolidation or settlement of the underlying soils. No petroleum or natural gas withdrawals are taking place in the site vicinity and ground water pumping for day-to-day site operations would be low and unlikely to cause localized subsidence. Minor regional subsidence, likely due to ground water withdrawal in the Mojave River area, has been documented as far east as Troy Lake, immediately west of the proposed site. However, negative impacts to the project due to subsidence from tectonism or from petroleum, natural gas, or future ground water production are considered very unlikely.

Expansive Soils

Soil expansion occurs when clay-rich soils with an affinity for water exist in place at a moisture content below their plastic limit. The addition of moisture from irrigation, precipitation, capillary tension, water line breaks, etc. causes the clay soils to absorb water molecules into their structure, which in turn causes an increase in the overall volume of the soil. This increase in volume can correspond to excessive movement (heave) of overlying structural improvements. The alluvium and volcanic rocks which form most of the site subsurface are not considered to be expansive.

Landslides

The proposed site slopes gently to the southwest at a gradient of approximately 2.5%. Due to the low site gradient and the absence of topographically high ground in the vicinity the potential for landslide impacts to the site is considered to be negligible.

Flooding

The proposed Calico Solar Project area has not been mapped by the Federal Emergency Management Agency (FEMA) for flood potential (FEMA 2009). Because the proposed site is topographically elevated above terrain to the south and west, it is staff's opinion that the potential for flooding at the site is limited to infrequent high volume (flash flood) events that may occur due to heavy rainfall in the adjacent Cady Mountains. Flash flooding, if it occurs, will primarily affect the established, entrenched drainages that cross the site from approximately northeast to southwest, and it is considered unlikely that significant overbank flow would occur. Therefore the potential for catastrophic flooding at the proposed Calico Solar Project site is considered to be low. Civil engineering design can minimize the potential for flash floods damage to this project to a (CEQA) less than significant level. Additional discussion of flash flooding is presented under the **Soil and Water** section of this document.

Tsunamis and Seiches

The proposed Calico Solar Project and associated linear facilities are not located near any significant surface water bodies and therefore there is no potential for impacts due to tsunamis and seiches.

Volcanic Hazards

The proposed Calico Solar Project site is located immediately northwest of the Sleeping Beauty volcanic area, an approximately 36 square mile area of Miocene age dacitic to basaltic flows, pyroclastic rocks, and volcaniclastic sediments (Glazner 1980). The Sleeping Beauty area is considered to be part of the regional Amboy Crater – Lavic Lake volcanic hazard area, an approximately 6,000 square mile area within the Mojave Desert designated by the USGS because of the presence of Holocene lava flows, cinder cone formation, and tephra eruptions (Miller 1989). The Amboy Crater – Lavic Lake volcanic hazard area is considered to be subject to future formation of cinder cones, volcanic ash falls, lava flows, and phreatic explosions. The USGS indicates the proposed Calico Solar Project lies in an area which has been and will again be subjected to ash and cinder falls associated with nearby dormant basaltic or basaltic – andesitic vents. The recurrence interval for eruptions from vents in the Amboy Crater – Lavic Lake hazard area has not been predicted but is likely to be in the range of 1,000's of years or more. Therefore staff considers the likelihood of volcanic activity to significantly affect operation of the proposed Calico Solar Project to be low. Eruptive activity would likely be limited to ashfall which would have a minor, short-lived affect on the project. This would involve having to shut down and probably cover the generators to prevent damage from the abrasive ash and having to clean the mirrors once the eruption was over. Mirrors will need to be cleaned periodically as part of normal plant operation and maintenance.

Geological, Mineralogical, and Paleontological Resources

Energy Commission staff has reviewed applicable geologic maps, reports, and on-line resources for this area (Blake 2000; CDMG 1977; CDMG 1981; CDMG 1984; CDMG 1988; CDMG 1990; CDMG 1994; CDMG 1998; CDMG 1999; CDMG 2003; CGS 2002a and b; CGS 2007; Jennings and Saucedo 2002; SCEC 2009; USGS 2003; USGS 2008 and b). Staff did not identify any geological or mineralogical resources at the proposed energy facility location.

The proposed Calico Solar Project is not located within an established Mineral Resource Zone (MRZ) and no economically viable mineral deposits are known to be present (Kohler 2006). Several operating and closed mines and mineral prospects are present within 5 miles of the proposed project boundaries. These have produced a number of industrial minerals, primarily manganese, borates, clay, and talc. No active mines are known to have existed within the proposed project boundaries (USGS 2008b).

Energy Commission staff reviewed the paleontological resources assessment in Section 5.8 and Appendix H of the AFC (SES 2008a) and the confidential paleontological resources report (URS 2008). Staff has also reviewed paleontological literature and records searches conducted by the Natural History Museum of Los Angeles County (McLeod 2009). These studies indicate the Quaternary alluvium, fanglomerate, and volcanic rocks within and near the proposed project site contain few fossils. Older Quaternary alluvium, which underlies the site at uncertain depth, may contain significant fossil vertebrates. Low paleontological sensitivity roughly corresponds to PFYC Class 1 or 2 (Condition 3). Deeper excavations could potentially encounter a high sensitivity formation of PFYC Class 4 (Condition 2).

This assessment is based on SVP criteria, the paleontological report appended to the AFC (PRC 2008), and the independent paleontological assessment of McLeod (2009). Proposed Conditions of Certification **PAL-1** to **PAL-7** are designed to mitigate paleontological resource impacts, as discussed above, to less than significant levels under both NEPA and CEQA. These conditions essentially require a worker education program in conjunction with the monitoring of earthwork activities by a qualified professional paleontologist (a paleontological resource specialist, or PRS).

The proposed conditions of certification allow the BLM Authorized Office, the Energy Commission’s compliance project manager (CPM), and the applicant to adopt a compliance monitoring scheme ensuring compliance with LORS applicable to geologic hazards and the protection of geologic, mineralogic, and paleontological resources.

Construction Impacts and Mitigation

The design-level geotechnical investigation, required for the project by the CBC (2007) and proposed Condition of Certification **GEN-1** should provide standard engineering design recommendations for mitigation of earthquake ground shaking and excessive settlement (see **PROPOSED CONDITIONS OF CERTIFICATION, FACILITY DESIGN**).

As noted above, no viable geological or mineralogical resources are known to exist in the vicinity of the Calico Solar Project construction site. Construction of the proposed project will include grading, foundation excavation, and utility trenching. Based on the soils profile, SVP assessment criteria, and the depth of the potentially fossiliferous older alluvium beneath the site, staff considers the probability of encountering paleontological resources to be low.

Proposed Conditions of Certification **PAL-1** to **PAL-7** are designed to mitigate any paleontological resource impacts, as discussed above, to a less than significant level under NEPA and CEQA. Essentially, Conditions of Certification **PAL-1** to **PAL-7** require a worker education program in conjunction with monitoring of earthwork activities by qualified professional paleontologists (paleontological resource specialist, or PRS). Earthwork is halted any time potential fossils are recognized by either the paleontologist or the worker. For finds deemed significant by the PRS, earthwork cannot restart until all fossils in that strata, including those below the design depth of the excavation, are collected. When properly implemented, the conditions of certification yield a net gain to the science of paleontology since fossils that would not otherwise have been discovered can be collected, identified, studied, and properly curated. A paleontological resource specialist is retained, for the project by the applicant, to produce a monitoring and mitigation plan, conduct the worker training, and provide the monitoring. During the monitoring, the PRS can and often does petition the Energy Commission for a change in the monitoring protocol. Most commonly, this is a request for lesser monitoring after sufficient monitoring has been performed to ascertain that there is little chance of finding significant fossils. In other cases, the PRS can propose increased monitoring due to unexpected fossil discoveries or in response to repeated out-of-compliance incidents by the earthwork contractor.

Based upon the literature and archives search, field surveys, and compliance documentation for the Calico Solar Project, the applicant has proposed monitoring and mitigation measures to be followed during the construction of the project. Energy Commission staff believes that the facility can be designed and constructed to minimize the effect of geologic hazards and impacts to potential paleontological resources at the site during project design life.

Operation Impacts and Mitigation

Operation of the proposed new solar energy generating facility should not have any adverse impact on geologic, mineralogic, or paleontological resources.

Facility Closure

The future decommissioning and closure of the proposed project should not negatively affect geologic, mineralogic, or paleontological resources since the ground disturbed during plant decommissioning and closure would have been already disturbed, and mitigated as required, during construction and operation of the project.

C.4.4.3 CEQA LEVEL OF SIGNIFICANCE

CEQA guidelines state that the environmental analysis "…shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy" (Title 14 CCR §15126.4[a][1]). Appendix F of the guidelines further suggests consideration of such factors as the project's energy requirements and energy use efficiency; its effects on local and regional energy supplies and energy resources; its requirements for additional energy supply capacity; its compliance with existing energy standards; and any alternatives that could reduce the wasteful, inefficient, and unnecessary consumption of energy (Title 14, CCR §15000 et seq., Appendix F).

Energy use, production, and efficiency are addressed in other sections of this document. Energy/efficiency factors affect geological hazards and geologic, mineralogic, and/or paleontological resources only when energy/efficiency concerns require changes to the size or location of the construction zone, as addressed below. Potential impacts to paleontological resources within the proposed project can be mitigated to a (CEQA) less than significant level by adopting and enforcing the proposed Conditions of Certification **PAL-1** through **PAL-7**.

C.4.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275-MW solar facility located within the boundaries of the proposed 850-MW project. This alternative and alternative locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

C.4.5.1 SETTING AND EXISTING CONDITIONS

The Reduced Acreage alternative would be a 275-MW solar facility within the Phase 2 boundaries of the proposed project (originally designed by Calico Solar to produce 350 MW). The environmental setting described in **Sections C.4.4.1** and **C.15.4.1** applies to this alternative.

The discussion of impacts to the proposed project, discussed in **Section C.4.4.2**, applies also to the Reduced Acreage alternative. As for the proposed project, two types of impacts are considered. The first is geological hazards, which could impact the proper functioning of the proposed facility and create life/safety concerns. The second is the potential impacts the proposed facility could have on existing geologic, mineralogic, and paleontological resources in the area.

Because the geological setting is the same as that of the proposed project, and the same types of facilities would be constructed in this alternative, the impacts would be the same as for the proposed project. The active geological setting means that the site could be subject to intense levels of earthquake-related ground shaking. The effects of strong ground shaking would need to be mitigated through structural designs required by the California Building Code (CBC 2007) and the project geotechnical report. The CBC (2007) requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction potential. A geotechnical investigation has been performed and presents standard engineering design recommendations for mitigation of seismic shaking and site soil conditions.

There are no known viable geological or mineralogical resources at the proposed Calico Solar Project site, so none exist on the Reduced Acreage alternative. Because the Reduced Acreage alternative is also located in geological formations with low to possibly high paleontological sensitivity (PFYC Class 1 or 2 [Condition 3]; PFYC Class 4

[Condition 2]), there is the potential for impacts to paleontological resources to occur; these would be mitigated through worker training and monitoring by qualified paleontologists, as required by Conditions of Certification, **PAL-1** through **PAL-7**. Since the Reduced Acreage plant would occupy only 2,300 acres (28% of the proposed project's 8,230 acres), its potential to encounter and positively or negatively impact significant fossils would be reduced to about 28% of that of the proposed project.

C.4.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Since the Reduced Acreage plant would produce only 275 MW (32% of the proposed project's 850 MW), its impacts on the Southern California Edison grid would be proportionately less.

C.4.5.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, the potential is low for significant adverse impacts to the Reduced Acreage alternative from geological hazards during its design life and moderate to high paleontological resources from the construction, operation, and closure of the proposed project. It is staff's conclusion that the alternative will be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards and in a manner that both protects environmental quality and assures public safety. The CEQA level of significance would remain unchanged from the proposed project.

C.4.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720-MW solar facility located within the boundaries of the proposed 850-MW project. This alternative, the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 2**.

C.4.6.1 SETTING AND EXISTING CONDITIONS

The general setting and existing conditions would remain as described in **Sections C.4.4.1** and **C.15.4.1** although the land requirements would be proportionately reduced to reflect the smaller project size. Locations of laydown areas may also vary.

C.4.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The discussion of impacts to the proposed project, discussed in **Sections C.4.4.2**, applies also to the Avoidance alternative. As for the proposed project, two types of impacts are considered. The first is geological hazards, which could impact the proper functioning of the proposed facility and create life/safety concerns. The second is the potential impacts the proposed facility could have on existing geologic, mineralogic, and paleontological resources in the area.

Because the geological setting is the same as that of the proposed project, and the same types of facilities would be constructed in this alternative, the impacts would be the same as for the proposed project. The active geological setting means that the site could be subject to intense levels of earthquake-related ground shaking. The effects of strong ground shaking would need to be mitigated through structural designs required by the California Building Code (CBC 2007) and the project geotechnical report. The CBC (2007) requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction potential. A geotechnical investigation has been performed and presents standard engineering design recommendations for mitigation of seismic shaking and site soil conditions.

There are no known viable geological or mineralogical resources at the proposed Calico Solar Project site, so none exist on the Avoidance alternative. Because the Avoidance alternative is also located in geological formations with moderate to possibly high paleontological sensitivity (PFYC Class 1 [Condition 3] or; Class 4 [Condition 2]), there is the potential for impacts to paleontological resources to occur; these would be mitigated through worker training and monitoring by qualified paleontologists, as required by Conditions of Certification, **PAL-1** through **PAL-7**. Since the Avoidance alternate plant would occupy only about 7,000 acres (28% of the proposed project's 8,230 acres), its potential to encounter and positively or negatively impact significant fossils would be reduced to about 28% of that of the proposed project. Since the Reduced Acreage plant would occupy only 2,300 acres (85% of the proposed project's 8,230 acres), its potential to encounter and positively or negatively impact significant fossils would be reduced to about 85% of that of the proposed project.

C.4.6.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, the potential is low for significant adverse impacts to the Avoidance alternative from geological hazards during its design life and moderate to high for paleontological resources from the construction, operation, and closure of the proposed project. It is staff's conclusion that the alternative will be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards and in a manner that both protects environmental quality and assures public safety. The CEQA level of significance would remain unchanged from the proposed project.

C.4.7 NO PROJECT / NO ACTION ALTERNATIVE

There are three No Project / No Action Alternatives evaluated as follows:

NO PROJECT / NO ACTION ALTERNATIVE #1

No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

The results of the No Project / No Action Alternative would be the following:

- Any potential impacts of the proposed project to geologic, mineralogic, or paleontological resources would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another renewable energy project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If the proposed project is not approved, renewable projects would likely be developed on other sites in San Bernardino County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District.

NO PROJECT / NO ACTION ALTERNATIVE #2

No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. Different solar technologies require different amounts of construction and operations maintenance; however, it is expected that all the technologies would require the same geological hazard mitigation and would require the same safeguards to protect potential paleontological resources as the proposed project. The CEQA level of significance would remain unchanged from the proposed project.

NO PROJECT / NO ACTION ALTERNATIVE #3

No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, there would be no potential impacts on geologic, mineralogic, or paleontological resources. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar paleontological impacts in other locations.

C.4.8 PROJECT-RELATED FUTURE ACTIONS - GEOLOGY, PALEONTOLOGY AND MINERALS

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future Environmental Impact Report (EIR)/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios

- The 275-MW Early Interconnection Option would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275-MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220-kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The 850-MW Full Build-Out Option would include replacement of a 67-mile-long 220-kV SCE transmission line with a new 500-kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.4.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275-MW Early Interconnection and the 850-MW Full Build-Out options. The setting for the 275-MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850-MW Full Build-Out option.

The SCE upgrades would be within the southern portion of the Mojave Desert Geomorphic Province of California. The Mojave Desert is bounded on the north and northwest by the Tehachapi Mountains, on the west by the Garlock fault, on the east by the Colorado River, and on the south and southwest by the San Andreas Fault. The Mojave Desert Province is characterized by broad alluvial basins of Cenozoic sedimentary and volcanic materials overlying older plutonic and metamorphic rocks (SES 2008a). The plutonic and metamorphic rocks are exposed as eroded hills throughout the region. The alluvial basins are up to several thousand feet thick.

Structurally the transmission corridor traverses a series of large alluvial fans adjacent to metamorphosed sediments that have been intruded by masses of quartz monzonite. The surficial alluvial deposits are classified as Younger Alluvium and consist of interbedded sand and gravel with lesser amounts of silt and clay. The sand and gravel deposits are generally unconsolidated to weakly consolidated sediments. The alluvium was derived from erosion of the San Gabriel and San Bernardino Mountains to the south. The Mojave River channel and associated tributaries have dissected the alluvium and continue to deposit younger alluvium in active channels. The Younger Alluvium could be underlain at the subsurface by Older Alluvium.

Geology

The project area can be subdivided into three generalized geologic areas; the western, central, and northern areas. The western portion of the Lugo-Pisgah transmission line alignment in and around Hesperia can be characterized as high desert plains and foothills of the western Mojave Desert. This area is mostly alluvial plain and pediment, with relatively small areas of hills and low mountains. This subsection contains mainly Mesozoic granitic rocks and Quaternary alluvium and lacustrine deposits. Eolian sand deposits are common. There are small areas of Precambrian gneiss and schist and Miocene and Pliocene nonmarine sedimentary rocks.

This portion of the alignment is on mostly very gently to moderately sloping pediments and alluvial fans and nearly level basin floor and dry lake bed. There are a few moderately steep hills and steep slopes traversed (i.e., Fry Mountains). Pediments are quite extensive. The elevation range is mostly from about 2,000 to 3,000 feet. Fluvial erosion and deposition and eolian deflation and deposition are the main geomorphic processes.

The central portion of the Lugo-Pisgah alignment includes mountains, hills, pediments, and alluvial plain. The area of pediment and alluvial plain is greater than that of mountains and hills. The bedrock through the central portion of the alignment is mainly Mesozoic granitic rocks that are exposed at the surface in only a few areas in the vicinity of the Rodman Mountains and Lava beds Mountains. There is Precambrian metamorphic rock associated with slopes and hills crossed and some Mesozoic mafic plutonic and Paleozoic marine sedimentary rock immediately south of the corridor. Transported Quaternary deposits, mostly alluvium that include lacustrine deposits and eolian sand are the predominant geologic mapping unit in this central portion of the alignment and along the entire alignment.

There are some steep mountains and moderately steep hills in the central and in the northern portion of the corridor. The elevation range is from about 1,600 feet up to 4,000 feet in the Granite Mountains and Rodman Mountains. Mass wasting, fluvial erosion and deposition, and eolian deflation and deposition are the main geomorphic processes.

The northern portion of the transmission corridor and in the area of the Pisgah Substation is characterized by half upland terrain, including pediments, and half alluvial plain. There are many small mountain ranges and hills with many different orientation patterns. The Mesozoic plutonic rocks are mostly granitic, but include some mafic rocks. There are also areas of Quaternary volcanic, Tertiary nonmarine sedimentary, Pre-Cretaceous metamorphic, Paleozoic marine sedimentary and Precambrian metamorphic rocks.

The majority of the transmission alignment consists of generally flat terrain which is not prone to significant mass wasting or slope stability problems. Where the Lugo-Pisgah transmission ROW does traverse a hillside or slope, the parent material is predominantly granitic or volcanic thereby minimizing the risk of landslides.

Seismicity

The SCE upgrades would be located in a seismically active region that has experienced numerous earthquakes in the past. The Alquist-Priolo Special Studies Zones Act specifies that an area termed an “Earthquake Fault Zone” is to be delineated if surrounding faults that are deemed “sufficiently active” or “well defined” after a review of seismic records and geological studies. Cities and counties affected by the Earthquake Fault Zones must regulate certain existing and development projects within the zones by permitting and building code enforcement.

Fourteen (14) major faults would be crossed by the Lugo-Pisgah 500-kV transmission ROW. Most of these faults trend northwest to southeast. Movement along the faults is predominantly strike slip and/or dip slip. The major faults crossed by the 850-MW Full Build-Out transmission line and substation upgrades include the following crossings and ages (SES 2008a):

- Calico-Hidalgo fault zone, Calico section (age: <1,600,000 years)
- Helendale-South Lockhart fault zone, Helendale section (age: <15,000 years)
- Lenwood-Lockhart fault zone, Lenwood section (age: <130,000 years)
- North Frontal thrust system, Western section (age: <130,000 years)
- Johnson Valley fault zone, Northern Johnson Valley section (age: <15,000 years)
- Pisgah-Bullion fault zone, Pisgah section (age: <15,000 years)
- Lavic Lake fault (age: <15,000 years)
- Camp Rock-Emerson-Copper Mountain fault zone, Emerson section (age: <150 years)
- Lavic Lake fault (age: <150 years)
- Calico-Hidalgo fault zone, West Calico section (age: <15,000 years)
- Helendale-South Lockhart fault zone, Helendale section (age: <15,000 years)

- Camp Rock-Emerson-Copper Mountain fault zone, Camp Rock section (age: <150 years)
- Lenwood-Lockhart fault zone, Lenwood section (age: <15,000 years)
- North Frontal thrust system, Western section (age: <15,000 years)

Paleontology

The upgrades area is located in the western portion of the Mojave Desert geomorphic region. The Mojave Desert is bounded on the north and northwest by the Tehachapi Mountains, on the west by the Garlock fault, on the east by the Colorado River, and on the south and southwest by the San Andreas Fault. The Mojave Desert Province is characterized by broad alluvial basins of Cenozoic sedimentary and volcanic materials overlying older plutonic and metamorphic rocks (SES 2008a).

The project area traverses the Mojave Desert region, beginning at the Pisgah Volcano area and terminating on the outskirts of Hesperia, California. A variety of paleontological resources have the potential to be present within the project area. Known areas of paleontology resources present within the general vicinity of the project area have been identified by the San Bernardino County Museum (SBCM). The Victorville and Hesperia regions have Pliocene and Pleistocene age fossils present (SES 2008a). Deposits from these epochs have been identified as Irvingtonian and Blancan mammal. In the vicinity of Barstow, California, the Barstow Formation is known to contain a diversity of fossil resources, including Barstow Fauna and Tick Canyon Fauna.

Minerals

There are 92 mines within San Bernardino County. Major minerals extracted in the Mojave River project area include gold, silver, feldspar, uranium, copper, iron, tungsten, turquoise, zeolite, barite, and clay. Limestone, sand, and gravel for cement and aggregate used for road construction are found at several locations throughout the area.

C.4.8.2 ENVIRONMENTAL IMPACTS

Geology

Soils and rock testing should be conducted and analyzed by a professional, licensed geotechnical engineer or geologist to determine existing foundation conditions. Exploration in sufficient quantity to adequately gather variations in the foundation conditions should be conducted to collect samples for testing. The type of materials, shear strength, resistivity, and shrink-swell potential are among the items that should be considered. The results of the geotechnical investigation would then be applied to the project’s engineering design and this would ensure that potential impacts associated with problematic soils and slope instability are reduced to less than significant levels. Excavation and grading for structure foundations, work areas, access roads, and spur roads could loosen soil and accelerate erosion.

Construction-related impacts to the geologic environment primarily are related to terrain modification (cuts, fills, temporary access roads, and drainage diversion measures) and dust generation. Other than the Pisgah Crater, no major unique geologic or physical features have been identified along the proposed corridor for the 850-MW Full Build-Out. Construction would not require cut and fill activities at most foundation sites and grading would not require import or export of earthen materials to/from the site. Some grading could be necessary for access roads; although, these can often be minimized by use of helicopters to deliver and set the transmission line components. Thus, significant impacts are not expected from geologic hazards or geological/mineralogical resources during construction. No evidence of ground subsidence caused by groundwater extraction has been noted at the existing substation sites or along the transmission corridor.

Regional and local geologic conditions would not be altered significantly by the long-term operation of the proposed upgrades. With the exception of the Pisgah Crater, no other major unique geologic or physical features would be directly affected by the transmission corridor. This potential impact however would be considered minor as the proposed transmission corridor would parallel other existing transmission lines across this feature. The transmission corridor and substation sites may be underlain by deposits of sand and gravel, and these resources could not be recovered and used during the active life of the project.

The project area is subject to ground shaking from nearby and distant earthquakes. Project structures would be designed to meet the seismic design standards of the CBC in effect at the time of design (currently 2007 edition). At least 14 faults have been identified along the proposed transmission corridor. More detailed investigations would identify whether ground rupture potential exists along the corridor; although, typically the lines are designed to span the fault zones. Due to the depth to groundwater, liquefaction is not expected to occur. To ensure that collapse potential is minimized all foundations, structures, or substation facilities would be designed in accordance with subsequent geotechnical investigations.

In summary, identified potential geologic hazards associated with the proposed upgrade options would be ground shaking from earthquakes, possible ground rupture at fault crossings, and the potential for localized low-strength foundation sites.

Paleontology

Construction of the 500-kV transmission line and substation expansion could destroy or disturb significant paleontological resources located within the project area with construction-related ground disturbances, such as the building or improvement of access and spur roads, staging area clearing, borehole drilling, trenching, excavating, grading, and vegetation removal. The decommissioning and removal of the existing transmission may also require ground clearing activities for access road improvements and construction of staging areas for dismantling the tower structures. There may also be an increase in public travel within the project area if new access roads open a previously inaccessible area. Increased public access may increase fossil removal activities within the project area. Indirect impacts to paleontological resources may include erosion of features due to channeling of runoff or modification of drainage channels. Construction activities in the vicinity of fossil resources may also cause erosion or damage to outcrop areas, due to earth shaking activities associated with drilling activities.

Minerals

Although no known mining operations have been identified in the project area, construction of the SCE upgrades could potentially interfere with daily ongoing or planned mining operations in the event that the project is constructed on or near a an active mine or a significant mineral resource.

C.4.8.3 MITIGATION

Site-specific geotechnical and seismic conditions would be appropriately addressed in the detailed engineering design and construction of towers and facilities. The following mitigation measures are included in Appendix EE of the Calico Solar Project AFC and recommended in this Staff Assessment/EIS to reduce impacts:

- Transmission structures and substation facilities should be designed in accordance with current CBC seismic and the design requirements and methodology of the Electrical Power Research Institute (EPRI).
- Transmission structures and substation facilities should be designed in accordance with recommendations provided in preliminary geotechnical reports and as amended by future geotechnical investigations with respect to collapsible.

In addition, implementation of mitigation measures discussed under **Soils and Water** section in this Staff Assessment/EIS would reduce the amount of erosion that would result from construction. In addition, compliance with a Storm Water Pollution Prevention Plan (SWPPP) would limit erosion from the construction site. With implementation of measures and best management practices that would ensure proper re-vegetation, erosion control, drainage, seismic design, among other requirements, SCE's project upgrades would create a less than significant impact to geology and paleontology.

Impacts to paleontological resources that may exist would be potentially significant. Recommended mitigation should provide for a paleontological resources inventory after final project design, pre-construction planning for monitoring and treatment of paleontological resources, and for monitoring during construction. The mitigation should require a qualified paleontological monitor and qualified paleontologist to monitor for significant subsurface fossils and then collect, analyze and curate any significant fossils found. In addition, the following mitigation measures are recommended for paleontological resources by SES in Appendix EE of the AFC:

- Prior to initiation of project construction activities the project area ROW and proposed and existing access roads should be surveyed by a Qualified Paleontologist.
- Based on the results of the paleontology resource survey, a paleontology resource management plan should be prepared and submitted to the Energy Commission and BLM for review and approval.
- All project construction staff should be trained in the importance of paleontological resources and the routine identification of fossil resources.

Implementation of this suggested paleontological mitigation would reduce project impacts to paleontological resources to a less than significant level.

If the project may potentially impact any planned or active mineral extraction operations, then SCE should coordinate with operations and management personnel, and with BLM, to determine status of and plans for active mining operations adjacent to or crossed by project alignments. SCE should develop a plan to avoid or minimize interference with mining operations in conjunction with mine/quarry operators prior to construction.

C.4.8.4 CONCLUSION

Southern California Edison would comply with applicable LORS as related to the identified upgrades project. No significant geological, paleontological or mineral resources have been identified in the project area; however, technical investigations/surveys have not yet been performed. The upgraded lines and substation equipment would be designed and constructed in accordance seismic requirements of SCE's Construction Standards and CPUC General Order 95 and EPRI. The project would have minimal potential to impact geological, paleontological or mineral resources if it implements the recommended mitigation and complies with applicable LORS.

C.4.9 CUMULATIVE IMPACT ANALYSIS

Section B.3, Cumulative Scenario, provides detailed information on the potential cumulative solar and other development projects in the project area. Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis for the proposed project. In summary, these projects are:

- Renewable energy projects on BLM, State, and private lands, as shown on Cumulative Impacts Figures 1 and 2 and in Cumulative Tables 1A and 1B. Although not all of those projects are expected to complete the environmental review processes, or be funded and constructed, the list is indicative of the large number of renewable projects currently proposed in California.
- Foreseeable future projects in the immediate Newberg Springs/Ludlow area, as shown on Cumulative Impacts Figure 3, Newberg Springs/Ludlow Area Existing and Future/Foreseeable Projects, and Cumulative Tables 2 and 3. Table 2 presents existing projects in this area and Table 3 presents future foreseeable projects in the area. Both tables indicate project name and project type, its location and its status.

These projects are defined within a geographic area that has been identified by the CEC and BLM as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all resource elements or environmental parameters. Most of these projects have, are, or will be required to undergo their own independent environmental review under CEQA and/or NEPA. Even if the cumulative projects described in Section B.3 have not yet completed the required environmental processes, they were considered in the cumulative impacts analyses in this SA/Draft EIS.

C.4.9.1 GEOGRAPHIC SCOPE OF ANALYSIS

The geographic area considered for cumulative impacts on geology and paleontology is the central portion of the Mojave Desert geomorphic province of south-central California (Norris and Webb 1990). More specifically, the area includes most of San Bernardino and Riverside Counties. The potential impacts are limited to those involving paleontological resources since no geological or mineralogical resources have been identified within the boundaries of the proposed project. There are no geological hazards with potential cumulative effects, other than regional subsidence from ground water withdrawal. Significant ground water withdrawal is not part of the proposed project.

C.4.9.2 EFFECTS OF PAST AND PRESENT PROJECTS

Any previously completed project involving subsurface excavation with paleontological monitoring could already have had a detrimental effect on paleontological resources in the area defined above under **Geographic Scope of Analysis**. Given the general scarcity of fossils, even within known fossil bearing strata, the likelihood of prior damage is modest but unavoidable, after the fact.

The existing projects most likely to have damaged paleontological resources in geological formation similar to those of the proposed Calico Solar Project site include, by virtue of size and location:

- Twenty-Nine Palms Marine Corps Air-Guard Combat Center
- SEGS I and II Solar Generating Facilities

C.4.9.3 EFFECTS OF REASONABLY FORESEEABLE FUTURE PROJECTS

As shown in **Section B.3, Cumulative Scenario Table 1A**, the Barstow office of the BLM is aware of 18 solar energy and 25 wind energy potential projects totaling 304,120 acres of land under their jurisdiction. All energy projects on BLM land would be subject to paleontological monitoring and mitigation during construction. When properly implemented and enforced, these safeguards would provide adequate protection of paleontological resources, reducing potential impacts to a (CEQA) less than significant level.

In addition to potential renewable energy projects on BLM land, a large number of renewable energy, residential, and public works projects are proposed for the Mojave and Colorado Desert regions of Southern California on State and private lands. These projects are summarized in **Table 1B** of **Section B.3, Cumulative Scenario**. Of these, the following projects have the greatest potential to affect paleontological resources within the geographic scope of this analysis:

- Abengoa Mojave Solar Power Project
- Alta-Oak Creek Mojave (Wind) Project
- Rice Solar Energy Project

These projects would be subject to CEC and/or CEQA environmental review which would include requirements for construction monitoring and mitigation of potential paleontological resources. When properly implemented and enforced, these safeguards should provide adequate protection of paleontological resources, reducing potential impacts to a (CEQA) less than significant level.

Contribution of the Calico Solar Project to Cumulative Impacts

Construction of the proposed Calico Solar Project would require localized excavation or ground disturbance over a very large area. Because the project area lies within geologic units with moderate to high paleontological sensitivity, the required excavation could, potentially, damage paleontological resources. Any damage could be cumulative to damage from other projects within the same geological formations. Implementation and enforcement of a properly designed Paleontological Resource Monitoring and Mitigation Plan (PRMMP) at this Calico Solar Project site should result in a net gain to the science of paleontology by allowing fossils that would not otherwise have been found to be recovered, identified, studied, and preserved. Cumulative impacts from Calico Solar Project, in consideration with other nearby similar projects, should therefore be either neutral (no fossils encountered) or positive (fossils encountered, preserved, and identified).

Operation. The operation of the Calico Solar Project would not present additional risk to geological resources (none identified) or paleontological resources. Once ground disturbing activity is complete plant operation has no real potential to further affect paleontological resources. Therefore, routine plant operation would not increase potential cumulative effects on paleontological resources. The longer the plant operates, however, the more likely it is to be damaged by hazards, primarily earthquake-related ground shaking. Construction and operation of the plant does not increase the potential of geological hazards at the site, just their potential to damage civil improvements.

Decommissioning. The decommissioning of the Calico Solar Project is expected to result in no adverse impacts related to geology or paleontology. Any potential impact to geological resources (none identified) or paleontological resources would have occurred and been completed during the ground disturbing phase of project construction.

C.4.10 COMPLIANCE WITH LORS

Federal, state, or local/county laws, ordinances, regulations, and standards (LORS) applicable to this project or alternatives other than the No Project / No Action alternative, were detailed in **Geology and Paleontology Table 1**. Staff anticipates that the project will be able to comply with applicable LORS.

C.4.11 NOTEWORTHY PUBLIC BENEFITS

The science of paleontology is advanced by the discovery, study and curation of new fossils. These fossils can be significant if they represent a new species, verify a known species in a new location and/or if they include structures of similar specimens that had not previously been found preserved. In general, most fossil discoveries are the result of excavations, either purposeful in known or suspected fossil localities or as the result of excavations made during earthwork for civil improvements or mineral extraction. Proper monitoring of excavations at the proposed Calico Solar Power facility, in accordance with an approved Paleontological Resources Monitoring and Mitigation Plan, could result in a benefit to the science of paleontology and should minimize the potential to damage a significant paleontological resource.

C.4.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

General conditions of certification with respect to engineering geology are proposed under Conditions of Certification **GEN-1, GEN-5, and CIVIL-1** in the **FACILITY DESIGN** section. Proposed paleontological conditions of certification follow. It is staff's opinion that the likelihood of encountering paleontological resources is low at the plant site.

PAL-1 The project owner shall provide the compliance project manager (CPM) with the resume and qualifications of its paleontological resource specialist (PRS) for review and approval. If the approved PRS is replaced prior to completion of project mitigation and submittal of the Paleontological Resources Report, the project owner shall obtain CPM approval of the replacement PRS. The project owner shall keep resumes on file for qualified paleontological resource monitors (PRMs). If a PRM is replaced, the resume of the replacement PRM shall also be provided to the CPM.

The PRS resume shall include the names and phone numbers of references. The resume shall also demonstrate to the satisfaction of the CPM the appropriate education and experience to accomplish the required paleontological resource tasks.

As determined by the CPM, the PRS shall meet the minimum qualifications for a vertebrate paleontologist as described in the Society of Vertebrate Paleontology (SVP) guidelines of 1995. The experience of the PRS shall include the following:

1. Institutional affiliations, appropriate credentials, and college degree;
2. Ability to recognize and collect fossils in the field;
3. Local geological and biostratigraphic expertise;
4. Proficiency in identifying vertebrate and invertebrate fossils; and
5. At least 3 years of paleontological resource mitigation and field experience in California and at least one year of experience leading paleontological resource mitigation and field activities.

The project owner shall ensure that the PRS obtains qualified paleontological resource monitors to monitor as he or she deems necessary on the project. Paleontological resource monitors (PRMs) shall have the equivalent of the following qualifications:

- BS or BA degree in geology or paleontology and one year of experience monitoring in California; or
- AS or AA in geology, paleontology, or biology and 4 years' experience monitoring in California; or
- Enrollment in upper division classes pursuing a degree in the fields of geology or paleontology and 2 years of monitoring experience in California.

Verification: (1) At least 60 days prior to the start of ground disturbance, the project owner shall submit a resume and statement of availability of its designated PRS for on-site work.

(2) At least 20 days prior to ground disturbance, the PRS or project owner shall provide a letter with resumes naming anticipated monitors for the project, stating that the identified monitors meet the minimum qualifications for paleontological resource monitoring required by the condition. If additional monitors are obtained during the project, the PRS shall provide additional letters and resumes to the CPM. The letter shall be provided to the CPM no later than one week prior to the monitor's beginning on-site duties.

(3) Prior to the termination or release of a PRS, the project owner shall submit the resume of the proposed new PRS to the CPM for review and approval.

PAL-2 The project owner shall provide to the PRS and the CPM, for approval, maps and drawings showing the footprint of the power plant, construction lay-down areas, and all related facilities. Maps shall identify all areas of the project where ground disturbance is anticipated. If the PRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the PRS and CPM. The site grading plan and plan and profile drawings for the utility lines would be acceptable for this purpose. The plan drawings should show the location, depth, and extent of all ground disturbances and be at a scale between 1 inch = 40 feet and 1 inch = 100 feet. If the footprint of the project or its linear facilities changes, the project owner shall provide maps and drawings reflecting those changes to the PRS and CPM.

If construction of the project proceeds in phases, maps and drawings may be submitted prior to the start of each phase. A letter identifying the proposed schedule of each project phase shall be provided to the PRS and CPM. Before work commences on affected phases, the project owner shall notify the PRS and CPM of any construction phase scheduling changes.

At a minimum, the project owner shall ensure that the PRS or PRM consults weekly with the project superintendent or construction field manager to confirm area(s) to be worked the following week and until ground disturbance is completed.

Verification: (1) At least 30 days prior to the start of ground disturbance, the project owner shall provide the maps and drawings to the PRS and CPM.

(2) If there are changes to the footprint of the project, revised maps and drawings shall be provided to the PRS and CPM at least 15 days prior to the start of ground disturbance.

(3) If there are changes to the scheduling of the construction phases, the project owner shall submit a letter to the CPM within 5 days of identifying the changes.

PAL-3 The project owner shall ensure that the PRS prepares, and the project owner submits to the CPM for review and approval, a paleontological resources monitoring and mitigation plan (PRMMP) to identify general and specific measures to minimize potential impacts to significant paleontological resources. Approval of the PRMMP by the CPM shall occur prior to any ground disturbance. The PRMMP shall function as the formal guide for monitoring, collecting, and sampling activities and may be modified with CPM approval. This document shall be used as the basis of discussion when on-site decisions or changes are proposed. Copies of the PRMMP shall reside with the PRS, each monitor, the project owner's on-site manager, and the CPM.

The PRMMP shall be developed in accordance with the guidelines of the Society of Vertebrate Paleontology (SVP 1995) and shall include, but not be limited, to the following:

1. Assurance that the performance and sequence of project-related tasks, such as any literature searches, pre-construction surveys, worker environmental training, fieldwork, flagging or staking, construction monitoring, mapping and data recovery, fossil preparation and collection, identification and inventory, preparation of final reports, and transmittal of materials for curation will be performed according to PRMMP procedures;
2. Identification of the person(s) expected to assist with each of the tasks identified within the PRMMP and the conditions of certification;
3. A thorough discussion of the anticipated geologic units expected to be encountered, the location and depth of the units relative to the project when known, and the known sensitivity of those units based on the occurrence of fossils either in that unit or in correlative units;
4. An explanation of why, how, and how much sampling is expected to take place and in what units. Include descriptions of different sampling procedures that shall be used for fine-grained and coarse-grained units;
5. A discussion of the locations of where the monitoring of project construction activities is deemed necessary, and a proposed plan for monitoring and sampling;
6. A discussion of procedures to be followed in the event of a significant fossil discovery, halting construction, resuming construction, and how notifications will be performed;
7. A discussion of equipment and supplies necessary for collection of fossil materials and any specialized equipment needed to prepare, remove, load, transport, and analyze large-sized fossils or extensive fossil deposits;
8. Procedures for inventory, preparation, and delivery for curation into a retrievable storage collection in a public repository or museum, which meet the Society of Vertebrate Paleontology's standards and requirements for the curation of paleontological resources;
9. Identification of the institution that has agreed to receive data and fossil materials collected, requirements or specifications for materials delivered

for curation and how they will be met, and the name and phone number of the contact person at the institution; and

10. A copy of the paleontological conditions of certification.

Verification: At least 30 days prior to ground disturbance, the project owner shall provide a copy of the PRMMP to the CPM. The PRMMP shall include an affidavit of authorship by the PRS and acceptance of the PRMMP by the project owner evidenced by a signature.

PAL-4 Prior to ground disturbance and for the duration of construction activities involving ground disturbance, the project owner and the PRS shall prepare and conduct weekly CPM-approved training for the following workers: project managers, construction supervisors, foremen, and general workers involved with or who operate ground-disturbing equipment or tools. Workers shall not excavate in sensitive units prior to receiving CPM-approved worker training. Worker training shall consist of an initial in-person PRS training during the project kick off for those mentioned above. Following initial training, a CPM-approved video or in-person training may be used for new employees. The training program may be combined with other training programs prepared for cultural and biological resources, hazardous materials, or other areas of interest or concern. No ground disturbance shall occur prior to CPM approval of the Worker Environmental Awareness Program (WEAP), unless specifically approved by the CPM.

The WEAP shall address the possibility of encountering paleontological resources in the field, the sensitivity and importance of these resources, and legal obligations to preserve and protect those resources.

The training shall include:

1. A discussion of applicable laws and penalties under the law;
2. Good quality photographs or physical examples of vertebrate fossils for project sites containing units of high paleontological sensitivity;
3. Information that the PRS or PRM has the authority to halt or redirect construction in the event of a discovery or unanticipated impact to a paleontological resource;
4. Instruction that employees are to halt or redirect work in the vicinity of a find and to contact their supervisor and the PRS or PRM;
5. An informational brochure that identifies reporting procedures in the event of a discovery;
6. A WEAP certification of completion form signed by each worker indicating that he/she has received the training; and
7. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

<u>Verification:</u> (1) At least 30 days prior to ground disturbance, the project owner shall submit the proposed WEAP, including the brochure, with the set of reporting procedures for workers to follow.

(2) At least 30 days prior to ground disturbance, the project owner shall submit the script and final video to the CPM for approval if the project owner is planning to use a video for interim training.

(3) If the owner requests an alternate paleontological trainer, the resume and qualifications of the trainer shall be submitted to the CPM for review and approval prior to installation of an alternate trainer. Alternate trainers shall not conduct training prior to CPM authorization.

(4) In the monthly compliance report (MCR), the project owner shall provide copies of the WEAP certification of completion forms with the names of those trained and the trainer or type of training (in-person or video) offered that month. The MCR shall also include a running total of all persons who have completed the training to date.

PAL-5 The project owner shall ensure that the PRS and PRM(s) monitor consistent with the PRMMP all construction-related grading, excavation, trenching, and augering in areas where potential fossil-bearing materials have been identified, both at the site and along any constructed linear facilities associated with the project. In the event that the PRS determines full-time monitoring is not necessary in locations that were identified as potentially fossil bearing in the PRMMP, the project owner shall notify and seek the concurrence of the CPM.

The project owner shall ensure that the PRS and PRM(s) have the authority to halt or redirect construction if paleontological resources are encountered. The project owner shall ensure that there is no interference with monitoring activities unless directed by the PRS. Monitoring activities shall be conducted as follows:

1. Any change of monitoring from the accepted schedule in the PRMMP shall be proposed in a letter or email from the PRS and the project owner to the CPM prior to the change in monitoring and will be included in the monthly compliance report. The letter or email shall include the justification for the change in monitoring and be submitted to the CPM for review and approval.

2. The project owner shall ensure that the PRM(s) keep a daily monitoring log of paleontological resource activities. The PRS may informally discuss paleontological resource monitoring and mitigation activities with the CPM at any time.

3. The project owner shall ensure that the PRS notifies the CPM within 24 hours of the occurrence of any incidents of non-compliance with any paleontological resources conditions of certification. The PRS shall recommend corrective action to resolve the issues or achieve compliance with the conditions of certification.

4. For any significant paleontological resources encountered, either the project owner or the PRS shall notify the CPM within 24 hours, or Monday morning in the case of a weekend event, where construction has been halted because of a paleontological find.

The project owner shall ensure that the PRS prepares a summary of monitoring and other paleontological activities placed in the monthly compliance reports. The summary will include the name(s) of PRS or PRM(s) active during the month; general descriptions of training and monitored construction activities; and general locations of excavations, grading, and other activities. A section of the report shall include the geologic units or subunits encountered, descriptions of samplings within each unit, and a list of identified fossils. A final section of the report will address any issues or concerns about the project relating to paleontological monitoring, including any incidents of non-compliance or any changes to the monitoring plan that have been approved by the CPM. If no monitoring took place during the month, the report shall include an explanation in the summary as to why monitoring was not conducted.

Verification: The project owner shall ensure that the PRS submits the summary of monitoring and paleontological activities in the MCR. When feasible, the CPM shall be notified 10 days in advance of any proposed changes in monitoring different from the plan identified in the PRMMP. If there is any unforeseen change in monitoring, the notice shall be given as soon as possible prior to implementation of the change.

PAL-6 The project owner, through the designated PRS, shall ensure that all components of the PRMMP are adequately performed including collection of fossil materials, preparation of fossil materials for analysis, analysis of fossils, identification and inventory of fossils, the preparation of fossils for curation, and the delivery for curation of all significant paleontological resource materials encountered and collected during project construction.

Verification: The project owner shall maintain in his/her compliance file copies of signed contracts or agreements with the designated PRS and other qualified research specialists. The project owner shall maintain these files for a period of 3 years after project completion and approval of the CPM-approved paleontological resource report (see Condition of Certification **PAL-7**). The project owner shall be responsible for paying any curation fees charged by the museum for fossils collected and curated as a result of paleontological mitigation. A copy of the letter of transmittal submitting the fossils to the curating institution shall be provided to the CPM.

PAL-7 The project owner shall ensure preparation of a Paleontological Resources Report (PRR) by the designated PRS. The PRR shall be prepared following completion of the ground-disturbing activities. The PRR shall include an analysis of the collected fossil materials and related information and submit it to the CPM for review and approval.

The report shall include, but is not limited to, a description and inventory of recovered fossil materials; a map showing the location of paleontological resources encountered; determinations of sensitivity and significance; and a statement by the PRS that project impacts to paleontological resources have been mitigated below the level of significance.

Verification: Within 90 days after completion of ground-disturbing activities, including landscaping, the project owner shall submit the PRR under confidential cover to the CPM.

C.4.13 CONCLUSIONS

The proposed Calico Solar Project site is located in an active geologic area of the north-central Mojave Desert Geomorphic Province in central San Bernardino County in south-central California. Because of its geologic setting, the site could be subject to intense levels of earthquake-related ground shaking. The effects of strong ground shaking would need to be mitigated, to the extent practical, through structural designs required by the California Building Code (CBC 2007) and the project geotechnical report. The CBC (2007) requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction. A geotechnical investigation has been performed and presents standard engineering design recommendations for mitigation of seismic shaking and site soil conditions.

There are no known viable geologic or mineralogical resources at the proposed Calico Solar Project site. Locally, paleontological resources have been documented within older Quaternary alluvium which underlies the younger Quaternary alluvium of the site surface. Potential impacts to paleontological resources would be mitigated through worker training and monitoring by qualified paleontologists, as required by Conditions of Certification, **PAL-1** through **PAL-7**.

Based on its independent research and review, California Energy Commission and U.S. Bureau of Land Management staff believes that the potential is low for significant adverse impacts to the proposed project from geologic hazards during its design life and to potential geologic, mineralogic, and paleontological resources from the construction, operation, and closure of the proposed project. It is staff's opinion that the Calico Solar Project could be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards and in a manner that both protects environmental quality and assures public safety, to the extent practical.

Certification of Completion
Worker Environmental Awareness Program
Calico Solar Project (08-AFC-13)

This is to certify these individuals have completed a mandatory California Energy Commission-approved Worker Environmental Awareness Program (WEAP). The WEAP includes pertinent information on cultural, paleontological, and biological resources for all personnel (that is, construction supervisors, crews, and plant operators) working on site or at related facilities. By signing below, the participant indicates that he/she understands and shall abide by the guidelines set forth in the program materials. Include this completed form in the Monthly Compliance Report.

No.	Employee Name	Title/Company	Signature
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25.			

Cultural Trainer: ______________ Signature:___________________ Date: ___/___/____

PaleoTrainer: _______________ Signature:___________________ Date: ___/___/____

Biological Trainer: ______________Signature:________________ Date:___/___/__

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C.5 – HAZARDOUS MATERIALS MANAGEMENT

Testimony of Rick Tyler and Alvin Greenberg, Ph.D.

C.5.1 SUMMARY OF CONCLUSIONS

The Bureau of Land Management and California Energy Commission staff's (referred to as staff hereafter) evaluation of the proposed project, along with staff's proposed mitigation measures, indicate that hazardous materials use at the proposed Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) would not present a significant impact (pursuant to the California Environmental Quality Act) and NEPA on the public. With adoption of the proposed conditions of certification, the proposed project would comply with all applicable laws, ordinances, regulations, and standards.

C.5.2 INTRODUCTION

The purpose of this **HAZARDOUS MATERIALS MANAGEMENT** section of this Staff Assessment/Draft Environmental Impact Statement (SA/DEIS) is to determine if the proposed Calico Solar Project could potentially cause significant impacts [pursuant to the California Environmental Quality Act (CEQA) and NEPA] to the public from the use, handling, storage, or transportation of hazardous materials at the proposed project site. If significant adverse impacts to the public are identified, Energy Commission staff must evaluate facility design alternatives and additional mitigation measures to reduce those impacts to the extent feasible.

This analysis does not address the potential exposure of workers to hazardous materials used at the proposed project site. Employers must inform employees of hazards associated with their work and provide those employees with special protective equipment and training to reduce the potential for health impacts from the handling of hazardous materials. The **WORKER SAFETY AND FIRE PROTECTION** section of this document describes the protection of workers from those risks.

For this analysis, staff examines plausible potential loss of containment incidents (spills) for the hazardous materials to be used at the proposed facility. The worst case plausible event, regardless of cause, is considered, and analyzed to see whether the potential impacts and risk to local populations are significant (pursuant to CEQA). Hazardous material handling and usage procedures are designed to reduce the likelihood of a spill, to reduce its potential size, and to prevent or reduce the potential migration of a spill off site to the extent that there would not be significant off-site impacts to the public. These measures seek to minimize direct contact from runoff of spills, air-borne plume concentrations, and the potential for spills to mix with runoff water and be carried offsite. Generally, staff seeks to confirm that the applicant has proposed secondary containment basins for containing liquids, and that volatile chemicals would have a restricted release to the atmosphere after capture. Containment basins are designed to be able to hold the contents of a full tank plus the potential rainfall from a 25-year storm without any loss of containment. The spilled material, along with any mixed-in water and any contaminated soils, would then be placed into containers and processed and disposed of as required by regulations.

Hazardous materials such as mineral and lubricating oils, corrosion inhibitors, herbicides, and acids and bases to control pH would be present at the proposed project site. Hazardous materials used during the construction phase include gasoline, diesel fuel, motor oil, lubricants, and small amounts of solvents and paint. No chemicals regulated as extremely hazardous materials would be used on-site during construction. None of the materials proposed for use pose a significant potential for off-site impacts as a result of the quantities on-site, their relative toxicity, their physical states, and/or their environmental mobility.

The Calico Solar Project would also require the transportation of certain liquid and solid hazardous materials to the facility. This document addresses all potential impacts associated with the use, storage, and transport of hazardous materials.

C.5.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

LAWS, ORDINANCES, REGULATION, AND STANDARDS

The following federal, state, and local laws and policies apply to the protection of public health and hazardous materials management. Staff's analysis examines the project's compliance with these requirements.

Hazardous Materials Management Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
The Superfund Amendments and Reauthorization Act of 1986 (42 USC §9601 et seq.)	Contains the Emergency Planning and Community Right To Know Act (also known as SARA Title III).
The Clean Air Act (CAA) of 1990 (42 USC 7401 et seq. as amended)	Establishes a nationwide emergency planning and response program, and imposes reporting requirements for businesses that store, handle, or produce significant quantities of extremely hazardous materials.
The CAA Section on Risk Management Plans (42 USC §112(r)	Requires states to implement a comprehensive system to inform local agencies and the public when a significant quantity of such materials is stored or handled at a facility. The requirements of both SARA Title III and the CAA are reflected in the California Health and Safety Code, section 25531, et seq.
49 CFR 172.800	Requires that the suppliers of hazardous materials prepare and implement security plans in accordance with U.S. Department of Transportation (DOT) regulations.

Applicable Law	Description
49 CFR Part 1572, Subparts A and B	Requires that suppliers of hazardous materials ensure that their hazardous material drivers comply with personnel background security checks.
The Clean Water Act (CWA) (40 CFR 112)	Aims to prevent the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Requires a written spill prevention, control, and countermeasures (SPCC) plan to be prepared for facilities that store oil that could leak into navigable waters.
Title 49, Code of Federal Regulations, Part 190	Outlines gas pipeline safety program procedures.
Title 49, Code of Federal Regulations, Part 191	Addresses the transportation of natural and other gases by pipeline. Requires preparation of annual reports, incident reports, and safety-related condition reports. Also requires operators of pipeline systems to notify the U.S. Department of Transportation DOT) of any reportable incident by telephone and submit a follow-up written report within 30 days.
Title 49, Code of Federal Regulations, Part 192	Addresses transportation of natural and other gases by pipeline: Requires minimum federal safety standards, specifies minimum safety requirements for pipelines, and includes material selection, design requirements, and corrosion protection. The safety requirements for pipeline construction vary according to the population density and land use that characterize the surrounding land. This part also contains regulations governing pipeline construction, which must be followed for Class 2 and Class 3 pipelines, and requirements for preparing a pipeline integrity management program.
6 CFR Part 27	The CFATS (Chemical Facility Anti-Terrorism Standard) regulation of the U.S. Department of Homeland Security (DHS) that requires facilities that use or store certain hazardous materials to submit information to the DHS so that a vulnerability assessment can be conducted to determine what certain specified security measures shall be implemented.
State	
California Health and Safety Code, section 25531 to 25543.4	The California Accidental Release Program (Cal-ARP) requires the preparation of a Risk Management Plan (RMP) and Off-site Consequence Analysis (OCA) and submittal to the local Certified Unified Program Agency (CUPA) for approval.

Applicable Law	Description
Title 8, California Code of Regulations, Section 5189	Requires facility owners to develop and implement effective safety management plans to ensure that large quantities of hazardous materials are handled safely. While these requirements primarily provide for the protection of workers, they also indirectly improve public safety and are coordinated with the RMP process.
Title 8, California Code of Regulations, Section 5189	Sets forth requirements for design, construction, and operation of the vessels and equipment used to store and transfer ammonia. These sections generally codify the requirements of several industry codes including the American Society for Material Engineering (ASME) Pressure Vessel Code, the American National Standards Institute (ANSI) K61.1, and the National Boiler and Pressure Vessel Inspection Code. These codes apply to anhydrous ammonia but are also used to design storage facilities for aqueous ammonia.
California Health and Safety Code, Section 41700	Requires that "No person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property."
California HSC Sections 25270 through 25270.13	Requires the preparation of a Spill Prevention, Control, and Countermeasures (SPCC) Plan if 10,000 gallons or more of petroleum is stored on-site. The above regulations would also require the immediate reporting of a spill or release of 42 gallons or more to the California Office of Emergency Services and the Certified Unified Program Agency (CUPA).
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)	Prevents certain chemicals that cause cancer and reproductive toxicity from being discharged into sources of drinking water.
Local	
2007 California Fire Code Title 24, Part 9	Adopts the California Fire Code, 2007 Edition, into San Bernardino County regulations.

The San Bernardino County Fire Department (SBCFD) is the Certified Unified Program Agency (CUPA) in the project area, and is responsible for reviewing Hazardous Materials Business Plans and Risk Management Plans. With regard to seismic safety issues, the proposed Calico Solar Project site is located in Seismic Risk Zone 4. The construction and design of buildings and vessels storing hazardous materials would meet the seismic requirements of the Uniform Building Code (SES 2008a).

C.5.4 PROPOSED PROJECT

The proposed Calico Solar Project site is approximately 8,230 acres of Bureau of Land Management (BLM)-managed land located in San Bernardino County, California (SES 2008a page 3-3). The site is located on Hector Road north of Interstate 40, 17 miles east of Newberry Springs and 115 miles east of Los Angeles, California in the Mojave Desert (SES 2008a page 1-1). The project consists of 29 contiguous parcels (SES 2008a Appendix T). The Burlington Northern Santa Fe (BNSF) railroad bisects the site from west to east (SES 2008a 3-22).

The proposed project would utilize SunCatchers – 40-foot tall Stirling dish technology developed by the applicant – that track the sun and focus solar energy onto Power Conversion Units (PCU) (SES 2008a 3-2). The dish assembly collects and focuses solar energy onto the PCU to generate electricity. Each PCU consists of a solar receiver heat exchanger and a closed-cycle, high-efficiency Solar Stirling Engine specifically designed to convert solar power to rotary power via a thermal conversion process. The engine drives an electrical generator to produce grid-quality electricity.

C.5.4.1 SETTING

Several characteristics of an area in which a project is located affect its potential for an accidental release of a hazardous material to result in a significant public exposure. These include:

- local meteorology;
- terrain characteristics; and
- location of population centers and sensitive receptors relative to the project.

Meteorological Conditions

Meteorological conditions, including wind speed, wind direction, and air temperature, affect both the extent to which accidentally released hazardous materials would be dispersed into the air and the direction in which they would be transported. This affects the potential magnitude and extent of public exposure to such materials, as well as their health risks. When wind speeds are low and the atmosphere is stable, dispersion is severely reduced and can lead to increased localized public exposure.

Recorded wind speeds, ambient air temperatures, and terrain characteristics are described in the Air Quality section (C.5.2) and Appendix V of the Application for Certification (AFC) (SES 2008a).

Terrain Characteristics

The location of elevated terrain is often an important factor in assessing potential exposure. An emission plume from an accidental release may impact high elevations before it impacts lower elevations. The topography of the Calico Solar Project site (like it’s immediately surrounding areas) is essentially flat.

Location of Exposed Populations and Sensitive Receptors

The general population includes many sensitive subgroups that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. In addition, the location of the population in the area surrounding a project site may have a large bearing on health risk. There are no sensitive receptors within the project vicinity. The nearest residence to the Calico Solar Project is more than a mile from the hydrogen storage facility at the project (SES 2008a, Section 5.16).

C.5.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Method and Threshold for Determining CEQA Significance

Staff reviews and assesses the potential for the transportation, handling, and use of hazardous materials to impact the surrounding community. All chemicals and natural gas were evaluated. Staff's analysis examines the potential impacts on all off-site members of the population including the young, the elderly, and people with existing medical conditions that may make them more sensitive to the adverse effects of hazardous materials. In order to accomplish this goal, staff utilizes the most current acceptable public health exposure levels (both acute and chronic) to protect the public from the effects of an accidental chemical release.

In order to assess the potential of released hazardous materials migrating off-site and impacting the public, staff analyzes several aspects of the proposed use of materials at a facility. Staff recognizes that some hazardous materials must be used at solar power plants. Therefore, staff conducts its analysis by focusing on the choice and amount of chemicals to be used, the manner in which the applicant would use the chemicals, the manner by which it would be transported to the facility and transferred to facility storage tanks, and the way in which the applicant plans to store those materials on-site.

Staff reviews the applicant's proposed engineering and administrative controls for hazardous material use. Engineering controls are physical or mechanical systems such as storage tanks or automatic shut-off valves that can prevent a spill of hazardous material from occurring, or that can limit the spill to a small amount or confine it to a small area. Administrative controls are rules and procedures that workers must follow to help either prevent accidents or keep them small if they do occur. Both engineering and administrative controls can act as either methods of prevention or methods of response and minimization. In both cases, the goal is to prevent a spill from moving off-site and harming the public.

Staff reviews and evaluates the proposed use of hazardous materials, as described by the applicant. Staff's assessment follows the five steps listed below:

- Step 1: Staff reviews the chemicals and amounts proposed for on-site use, as listed in and determined the need and appropriateness of their use. Only those that are needed and appropriate are allowed to be used. If staff feels that a safer alternative chemical can be used, staff would recommend or require its use, depending upon the impacts posed.

- Step 2: Chemicals proposed for use in small amounts or whose physical state is such that there is virtually no chance that a spill would migrate off the site and impact the public are removed from further assessment.
- Step 3: Measures proposed by the applicant to prevent spills are reviewed and evaluated. These included engineering controls such as automatic shut-off valves and different size transfer-hose couplings and administrative controls such as worker training and safety management programs.
- Step 4: Measures proposed by the applicant to respond to accidents are reviewed and evaluated. These measures also included engineering controls such as catchment basins and methods to keep vapors from spreading, and administrative controls such as training emergency response crews.
- Step 5: Staff then analyzes the theoretical impacts on the public of a worst-case spill of hazardous materials even with the mitigation measures proposed by the applicant. When mitigation methods proposed by the applicant are sufficient, no further mitigation is recommended. If the proposed mitigation is not sufficient to reduce the potential for adverse impacts to an insignificant level, staff would propose additional prevention and response controls until the potential for causing harm to the public is reduced to an insignificant level. It is only at this point that staff can recommend that the project be allowed to use hazardous materials.

Direct/Indirect Impacts and Mitigation

Small Quantity Hazardous Materials

In conducting this analysis, staff reviewed Tables 5.15-1 and 2 of the AFC (SES 2008a, section 5.15) and determined in Steps 1 and 2 that most of the proposed materials, although present at the proposed facility, pose a minimal potential for off-site impacts since they would be stored in small quantities, have low mobility, low vapor pressure, and/or low levels of toxicity. These hazardous materials, which were eliminated from further consideration, are discussed briefly below.

During the construction phase of the project, the only hazardous materials proposed for use include paint, cleaners, solvents, gasoline, diesel fuel, motor oil, welding gases, and lubricants. Any impact of spills or other releases of these materials would be limited to the site because of the small quantities involved, the infrequent use and hence reduced chances of release, and/or the temporary containment berms used by contractors. Petroleum hydrocarbon-based motor fuels, mineral oil, lube oil, and diesel fuel all have very low volatility and would represent limited off-site hazards, even in larger quantities.

During operations, hazardous chemicals such as cleaning agents, lube oil, sodium hypochlorite, diesel fuel, gasoline, ethylene glycol, and other various chemicals (see **Hazardous Materials Appendix A** for a list of all chemicals proposed to be used and stored at the Calico Solar Project site) would be used and stored on-site and represent limited off-site hazard due to their small quantities, low volatility, and/or low toxicity.

After removing from consideration those chemicals that pose no potential for risk of off-site impact in Steps 1 and 2, staff continued with Steps 3, 4, and 5 to review the remaining hazardous material, hydrogen gas.

Large Quantity Hazardous Materials

Hydrogen

Hydrogen is used as the working fluid in the Stirling cycle engines utilized by the project. The proposed project involves 34,000 individual engines and solar collectors. Originally, the applicant proposed use of hydrogen storage at each collector engine assembly. The proposal was later modified to utilize onsite hydrogen generation. This eliminated the use of 34,000 individual small hydrogen storage bottles at each assembly. It also eliminated the constant transportation of hydrogen bottles to and from the site. Staff views this change in the project as risk reduction particularly to road users. The project now involves the use of a distributed hydrogen system described in Supplement to the Application for Certification and the resultant amount of hydrogen that will be used on-site will be 7,162,148 cubic feet, approximately 37,243 lbs (SES 2009d).

The applicant conducted an analysis assuming a worst case release of all the hydrogen on site. It was assumed that a hydrogen release would form a vapor cloud and detonate causing an unconfined vapor cloud explosion. The distance to an over pressure of 1.0 psi was then determined. This is an overpressure that could cause some damage to structures and injury to exposed members of the general population. The maximum distance to this level of impact was estimated to be .054 miles. There are no public receptors at this distance and in general such overpressures of 1.0 psi would be confined to the project site depending on the location of the cloud at detonation. It should be noted that it is nearly impossible to detonate hydrogen in an unconfined vapor cloud because it disperses very rapidly due to its low density relative to air. It should also be noted that the applicant's release scenarios are very conservative in assuming an instantaneous release of the entire volume of hydrogen instead of a more realistic release occurring over a period of time resulting in significant dispersion of the hydrogen while the cloud was forming. Actual experience with hydrogen releases have not resulted in unconfined cloud explosions. It is wildly believed that unconfined hydrogen will not detonate without a high explosive initiating event (Lees 1998).

Staff concurs with the analysis and a conclusion provided by SES and independently concludes that the applicant's analysis is a very conservative and overestimate of both the magnitude the potential risk of any actual explosion that could occur at the facility. It is staff's conclusion that an unconfined hydrogen vapor cloud explosion is not plausible and will not occur at the proposed facility. Thus, the use of hydrogen at the proposed facility poses a risk of an on-site fire but no plausible potential for a significant impact on surrounding populations or the environment.

Mitigation

Staff believes that this project's use of hazardous materials poses no significant risk (pursuant to CEQA) but only if mitigation measures are used. These mitigation measures are discussed in this section. The potential for accidents resulting in the release of hazardous materials is greatly reduced by the implementation of a Safety Management Program, which includes both engineering and administrative controls. Elements of facility controls and the safety management plan are summarized below.

Engineering Controls

Engineering controls help prevent accidents and releases (spills) from moving off-site and impacting the community by incorporating engineering safety design criteria into the project's design. Engineering safety features proposed by the applicant include:

- Usage of secondary containment areas surrounding each of the hazardous materials storage areas, designed to contain accidental releases during storage;
- Physical separation of stored chemicals in isolated containment areas, separated by a noncombustible partition in order to prevent the accidental mixing of incompatible materials, which may in turn cause the formation and release of toxic gases or fumes.

Administrative Controls

Administrative controls help prevent accidents and releases (spills) from moving off-site and impacting the community by establishing worker training programs and process safety management programs.

A Worker Health and Safety Program would be prepared by the applicant and include (but not be limited to) the following elements (see the **WORKER SAFETY/FIRE PROTECTION** section in this analysis for specific regulatory requirements):

- Worker training on chemical hazards, health and safety issues, and hazard communication;
- Procedures to ensure the proper use of personal protective equipment;
- Safety operating procedures for the operation and maintenance of systems that use hazardous materials;
- Fire safety and prevention; and
- Emergency response actions including facility evacuation, hazardous material spill cleanup, and fire prevention.

At the Calico Solar Project, the project owner would be required to designate an individual who would have the responsibility and authority to ensure a safe and healthful workplace. This project health and safety official would oversee the health and safety program and would have the authority to halt any action or modify any work practice in order to protect the workers, facility, and the surrounding community in the event that the health and safety program is violated.

Staff proposes Condition of Certification **HAZ-1** which requires that no hazardous material would be used at the facility except as listed in the AFC and reviewed for appropriateness, unless there is prior approval by the Energy Commission Compliance Project Manager (CPM) and the BLM Approved Safety Officer. Staff reviewed the chemicals and amounts proposed for on-site use, as listed in Table 5.15-2 of the AFC and concurred with the need and appropriateness of their use. **HAZ-1** also requires changes to the allowed list of hazardous materials and their maximum amounts to be approved by the CPM. Only those that are needed and appropriate would be allowed to be used. If staff feels that a safer alternative chemical can be used, staff would recommend or require its use, depending upon the impacts posed (see Appendix A for the list of proposed hazardous materials to be used).

A Hazardous Materials Business Plan (HMBP), a Risk Management Plan (RMP), and a Spill Prevention, Control, and Countermeasures Plan (SPCC Plan) would also be prepared by the applicant that would incorporate state requirements for the handling of hazardous materials (SES 2008a, section 5.15). Staff proposes Condition of Certification **HAZ-2** which ensures that the HMBP (which includes the Inventory and Site Map, an Emergency Response Plan, Owner/Operator Identification, and Employee Training), an RMP, and a SPCC Plan would be provided to the San Bernardino County Fire Department so that they can better prepare emergency response personnel for handling emergencies which could occur at the facility.

On-site Spill Response

In order to address spill response, the facility would prepare and implement an emergency response plan that includes information on hazardous materials contingency and emergency response procedures, spill containment and prevention systems, personnel training, spill notification, on-site spill containment, prevention equipment and capabilities, etc. Emergency procedures would be established which include evacuation, spill cleanup, hazard prevention, and emergency response. The presence of oil in a quantity greater than 1,320 gallons might invoke a requirement to prepare a Spill Prevention, Control, and Countermeasure (SPCC) Plan if other requirements are met. The quantity of oil contained in any one of the planned 230/500 kV transformers would be in excess of the minimum quantity that requires such a plan. However, there are no known Waters of the United States but they may be Waters of the State and thus staff's position is that no SPCC Plan is required by 40 CFR 112 but is required pursuant to California HSC Sections 25270 through 25270.13. Therefore, the Calico Solar Project will be required to prepare a SPCC because it will store 10,000 gallons or more of petroleum on-site. The above regulations would also require the immediate reporting of a spill or release of 42 gallons or more to the California Office of Emergency Services and the Certified Unified Program Agency (CUPA).

Personnel working with hazardous materials will be trained in proper handling and emergency response to chemical spills or accidental releases. Designated personnel will also be trained as a project hazardous materials response team which would be the first responder to hazardous materials incidents. In the event of a large incident involving hazardous materials, backup support would be provided by the San Bernardino County Fire Department (SBCFD) which has a hazmat response unit capable of handling any incident at the proposed Calico Solar Project. The SBCFD Hazmat unit is located at Station #322 in Adelanto, about a one-hour drive away (SBCFD 2010).

Staff concludes that, given the remote location, the hazardous material response time is acceptable, and that the SBCFD is adequately trained and equipped to respond to a hazardous materials spill emergency at Calico Solar in a timely manner.

Transportation of Hazardous Materials

Containerized hazardous materials would be transported to the facility via truck. During construction and operation of the Calico Solar Project, staff believes that minimal amounts and types of hazardous materials (paint, cleaners, solvents, gasoline, diesel fuel, motor oil, lubricants, sodium hypochlorite, and welding gases in standard-sized cylinders) do not pose a significant risk (pursuant to CEQA) of either spills or public impacts along any transportation route. Staff therefore does not recommend a specific route.

Liquid hazardous materials can be released during a transportation accident, and the extent of their impact in the event of a release would depend on the location of the accident and the rate of vapor dispersion from the surface of the spilled pool. The likelihood of an accidental release during transport is dependent upon the truck driver, the type of vehicle used for transport; and accident rates for the type of road.

In determining that the risk of accident and release during the transportation of hazardous materials to the site, staff determined that the transport on I-40 and then for a short distance from I-40 on a dedicated road in a remote area would present a less than significant risk of accident and release. In making this determination, staff relied upon the extensive regulatory program that applies to shipment of hazardous materials on California Highways to ensure safe handling in general transportation (see the Federal Hazardous Materials Transportation Law 49 USC §5101 et seq, the U.S. Department of Transportation Regulations 49 CFR Subpart H, §172-700, and the California DMV Regulations on Hazardous Cargo). These regulations also address driver competence. See AFC section 5.11 for additional information on regulations governing the transportation of hazardous materials.

Seismic Issues

The possibility exists that an earthquake could cause the failure of a hazardous materials storage tank. A quake could also cause the failure of the secondary containment system (berms and dikes), as well as electrically controlled valves and pumps. The failure of all these preventive control measures might then result in the release of hazardous materials. The effects of the Loma Prieta earthquake of 1989, the Northridge earthquake of 1994, and the earthquake in Kobe, Japan, in January 1995, heighten concerns about earthquake safety.

Information obtained after the January 1994 Northridge earthquake showed that some damage was caused to several large and small storage tanks at the water treatment system of a cogeneration facility. The tanks with the greatest damage, including seam leakage, were older tanks, while newer tanks sustained lesser damage with displacements and attached line failures. Therefore, staff conducted an analysis of the codes and standards, which should be followed to adequately design and build storage tanks and containment areas that could withstand a large earthquake. Staff also reviewed the impacts of the February 2001 Nisqually earthquake near Olympia, Washington, a state with similar seismic design codes as California. No hazardous materials storage tanks were impacted by this quake. Referring to the sections on **GEOLOGIC RESOURCES AND HAZARDS** and **FACILITY DESIGN** in the AFC, staff notes that the proposed facility would be designed and constructed to the applicable standards of the 2007

California Building Code for Seismic Zone 4 (SES 2008a). Therefore, on the basis of damage experienced from the Northridge quake to older tanks and the lack of failures during the Nisqually earthquake with newer tanks, staff determined that tank failures during seismic events are not likely and do not represent a significant risk (pursuant to CEQA) to the public.

Site Security

The Calico Solar Project proposes to use hazardous materials which necessitates that special site security measures should be developed and implemented to prevent unauthorized access. The North American Electric Reliability Corporation (NERC) published *Security Guidelines for the Electricity Sector* in 2002 (NERC 2002) and the U.S. Department of Energy published a draft *Vulnerability Assessment Methodology for Electric Power Infrastructure* in 2002 (DOE 2002). The energy generation sector is one of 14 areas of critical Infrastructure listed by the U.S. Department of Homeland Security. On April 9, 2007, the U.S Department of Homeland Security published, in the Federal Register (6 CFR Part 27), an Interim Final Rule requiring facilities that use or store certain hazardous materials to conduct vulnerability assessments and implement certain specified security measures. This rule was implemented with the publication of Appendix A, the list of chemicals, on November 2, 2007 and hydrogen is listed as a Chemical of Interest with a threshold level of 10,000 lbs. The Calico project will have a maximum of 37,243 lbs of hydrogen on-site and therefore the CFATS regulation will apply and the project owner will need to submit a “Top Screen” assessment to the DHS. However the DHS decides to regulate the site and even if it decides not to require security measures at the Calico Solar Project, staff believes that all power plants under the jurisdiction of the Energy Commission should implement a minimum level of security consistent with the guidelines listed here.

In order to ensure that this facility (or a shipment of hazardous material) is not the target of unauthorized access, staff’s proposed conditions of certification **HAZ-4** and **HAZ-5** address both construction security and operations security plans. These plans would require the implementation of site security measures that are consistent with both the above-referenced documents and Energy Commission guidelines.

The goal of these conditions of certification is to provide the minimum level of security for power plants needed to protect California’s electrical infrastructure from malicious mischief, vandalism, or domestic/foreign terrorist attacks. The level of security needed for this solar plant is dependent upon the threat imposed, the likelihood of an adversarial attack, the likelihood of success in causing a catastrophic event, and the severity of consequences of that event.

In order to determine the level of security, the Energy Commission staff used an internal vulnerability assessment decision matrix modeled after the U.S. Department of Justice Chemical Vulnerability Assessment Methodology (July 2002), the NERC 2002 guidelines, the U.S. Department of Energy VAM-CF model, and U.S. Department of Homeland Security regulations published in the Federal Register (Interim Final Rule 6 CFR Part 27). Staff determined that the Calico Solar Project would fall into the “low vulnerability” category, so staff proposes that certain security measures be implemented but does not propose that the project owner conduct its own vulnerability assessment.

These security measures include perimeter fencing and breach detectors, guards (if appropriate), alarms, site access procedures for employees and vendors, site personnel background checks, and law enforcement contact in the event of a security breach. Site access for vendors would be strictly controlled. Consistent with current state and federal regulations governing the transport of hazardous materials, hazardous materials vendors would have to maintain their transport vehicle fleets and employ only drivers who are properly licensed and trained. The project owner would be required, through its contractual language with vendors, to ensure that vendors supplying hazardous materials strictly adhere to the U.S. DOT requirements that hazardous materials vendors prepare and implement security plans per 49 CFR 172.802 and ensure that all hazardous materials drivers are in compliance with personnel background security checks per 49 CFR Part 1572, Subparts A and B. The CPM or the BLM Authorized Safety Officer may authorize modifications to these measures, or may require additional measures in response to additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or NERC, after consultation with appropriate law enforcement agencies and the applicant.

C.5.4.3 CEQA LEVEL OF SIGNIFICANCE

Cumulative Impacts and Mitigation

Staff considered the potential for impacts due to a simultaneous release of any of the hazardous chemicals from the proposed Calico Solar Project with any other existing or foreseeable nearby facilities. Because of the small amounts of the hazardous chemicals to be stored at the facility, staff determined that there was no possibility of producing an offsite impact. Because of this determination, and the additional fact that there are no nearby facilities using large amounts of hazardous chemicals, there is no possibility that vapor plumes would mingle (combine) to produce an airborne concentration that would present a significant risk (pursuant to CEQA). Therefore, no potential cumulative impacts are predicted for the proposed action.

Compliance With LORS

Staff concludes that construction and operation of the Calico Solar Project would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of hazardous materials management.

Noteworthy Public Benefits

Staff has not identified any noteworthy public benefits associated with the use of hazardous materials at the proposed project.

C.5.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the central portion of the proposed 850 MW project. It was developed because it can be constructed as to minimize potential impacts to environmental resources. This alternative is illustrated in Alternatives Figure 1.

C.5.5.1 SETTING AND EXISTING CONDITIONS

The Reduced Acreage alternative would not significantly change the distance from hazardous materials (i.e. hydrogen storage) to the nearest residences and thus would not change the potential for impact due to proximity as compared to the proposed project. The local meteorology, terrain characteristics, and location of population centers and sensitive receptors relative to the project would remain the same. Please see the discussion of existing conditions within affected BLM lands under Section C.5.4.1

C.5.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The types of construction and operational impacts of the Reduced Acreage Alternative would be the same as those of the proposed project, as described in Section C.5.4.2. For the analysis, staff examines plausible potential loss of containment incidents (spills) for the hazardous materials to be used at the proposed facility. The proposed project analysis considers the worst case, plausible event, and the impacts are found to be less than significant (pursuant to CEQA) with the incorporation of conditions of certification. The impacts of this alternative would be even smaller due to the reduce use, handling, storage, or transport of hazardous materials and the smaller number of SunCatchers of the alternative. Construction and operation risk to workers due to the use of hydrogen will be reduced because of the reduced number of SunCatchers.

The Reduced Acreage alternative would not result in any significant change in the potential for impact associated with hazardous materials handling and storage. The proposed project would not pose a significant risk of public impact as a result of an accidental release of hazardous materials. This alternative would not significantly change the risk profile of the facility.

C.5.5.3 CEQA LEVEL OF SIGNIFICANCE

The significance criteria for the Reduced Acreage alternative are the same as the criteria for the proposed project. Like the proposed project, the construction and operation of the Reduced Acreage alternative would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of hazardous materials management with the adoption of the proposed conditions of certification. The mitigation that would be proposed for the Reduced Acreage alternative would be the same as that proposed for the proposed project (staff recommended conditions **HAZ-1** to **HAZ-6**).

C.5.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed 850 MW project. This alternative, the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 2**.

C.5.6.1 SETTING AND EXISTING CONDITIONS

The Avoidance of Donated land alternative would not significantly change the distance form hazardous materials (i.e. hydrogen storage) to the nearest residences and thus would not change the potential for impact due to proximity as compared to the proposed project. The local meteorology, terrain characteristics, and location of population centers and sensitive receptors relative to the project would remain the same. Please see the discussion of existing conditions within affected BLM lands under Section C.5.4.1.

C.5.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The types of construction and operational impacts of the Avoidance of Donated land alternative would be the same as those of the proposed project, as described in Section C.5.4.2. For the analysis, staff examines plausible potential loss of containment incidents (spills) for the hazardous materials to be used at the proposed facility. The proposed project analysis considers the worst case, plausible event, and the impacts are found to be less than significant (pursuant to CEQA) with the incorporation of conditions of certification. The impacts of this alternative would be even smaller due to the reduce use, handling, storage, or transport of hazardous materials and the smaller number of SunCatchers of the alternative. Construction and operation risk to workers due to the use of hydrogen will be reduced because of the reduced number of SunCatchers.

The Avoidance of Donated Land alternative would not result in any significant change in the potential for impact associated with hazardous materials handling and storage. The proposed project would not pose a significant risk of public impact as a result of an accidental release of hazardous materials. This alternative would not significantly change the risk profile of the facility.

C.5.6.3 CEQA LEVEL OF SIGNIFICANCE

The significance criteria for the Avoidance of Donated land alternative is exactly the same as the significance criteria for the proposed project. Like the proposed project, the construction and operation of the Avoidance of Donated land alternative would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of hazardous materials management with the adoption of the proposed conditions of certification. The mitigation that would be proposed for the Avoidance of Donated land alternative would be the same as that proposed for the proposed project (staff recommended conditions **HAZ-1** to **HAZ-6**).

C.5.7 NO PROJECT/NO ACTION ALTERNATIVE

There are three No Project/No Action Alternatives evaluated in this section, as follows:

NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed the Calico Solar Project would not be approved by the CEC and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, no hazardous materials would be used and no impacts related to the use of hazardous material would occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations

NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed the Calico Solar Project would not be approved by the CEC and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with a different solar technology. As a result, construction and operation of the solar technology would likely result in use of hazardous materials. Different solar technologies require the use of different hazardous materials; however, it is expected that all solar technologies would require the use of hazardous materials. As such, this No Project/No Action Alternative could result in impacts to hazardous material handling similar to those under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed the Calico Solar Project would not be approved by the CEC and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no use of hazardous materials. As a result, this No Project/No Action Alternative would not result in impacts from the use of hazardous materials. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.5.8 PROJECT-RELATED FUTURE ACTIONS - HAZARDOUS MATERIALS MANAGEMENT

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios:

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.5.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

A hazardous material is generally described as any substance or mixture of substances that have properties that are capable of having an adverse effect on human health and the environment. Hazardous materials handling is regulated at the federal, state, and local level. Regulations cover the transportation, labeling, handling, storage, disposal, and accidental releases of hazardous materials. Included within these regulations are reporting requirements for hazardous materials storage and usage, worker exposure protection, and reporting and spill response requirements. Hazardous material handling also covers response to incidental discovery of buried or unknown hazardous materials present in the subsurface environment.

The general population includes many sensitive subgroups that may be at a greater health risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. In addition, the location of the population in the area surrounding a project site may have a large bearing on health risk. The Lugo-Pisgah transmission line route would traverse a combination of developed urban lands on the west end, and relatively undeveloped or limited development areas of the Mojave Desert in the central and eastern sections near Pisgah Substation. The developed areas of the project area have a higher potential to pass through areas of historic or on-going soil or groundwater contamination. The desert and rural areas of the transmission line route would generally be considered lower risk for the presence of hazardous material storage areas or subsurface uncontrolled hazardous waste disposal areas, due to the lack of commercial and industrial activities.

C.5.8.2 ENVIRONMENTAL IMPACTS

Construction activities for both upgrade options would include the handling and use of hazardous materials associated with general construction activities, such as heavy equipment operations, substation expansion, transmission tower construction, and transmission line conductoring and decommissioning. Hazardous materials, such as fuels, oils, and other vehicle and equipment maintenance fluids, would be stored at the project substation sites and construction staging areas. Improperly maintained vehicles and equipment could leak fluids during construction activities and while parked. There would be a potential for incidents involving release of gasoline, diesel fuel, oil, hydraulic fluid, solvents, paint, and/or lubricants from vehicles or other equipment at the staging areas and/or the project sites. Spills and leaks of hazardous materials during construction activities could potentially result in soil or groundwater contamination. Improper handling of hazardous materials could expose project workers or the nearby public to hazards.

Transmission line and telecomm construction activities are generally mobile, moving from one site to another for construction of towers, stringing of lines, and decommissioning equipment. As a mobile construction activity, there would not typically be any centralized fueling or equipment maintenance areas constructed to support the transmission line construction operation. Therefore most of the hazardous materials would be contained within vehicles and small volume containers. Typically vehicle fueling and maintenance activities would occur at off-site facilities.

In addition, although polychlorinated biphenyls (PCB) have been banned from use with electrical distribution and substation transformers by the U.S. EPA since 1985 (U.S. EPA 2009), some older pieces of electrical equipment within SCE's system may still contain PCBs. There is a likelihood that some PCB containing equipment would need to be removed from some of the project locations during the construction of the project and removal of the existing line. Therefore, there would be a potential for a PCB release to contaminate the environment in the event of a spill while handling and transporting PCBs.

Excavation required to construct the components of the project would primarily be limited to areas at existing and proposed structure locations, at underground fiber optic trench locations, and at the expanded Pisgah Substation locations. A contamination site record search would need to be conducted to determine existing known contaminated sites in the project vicinity. Therefore, it is possible that subsurface construction activities could accidentally disturb documented contamination sites, potentially mobilizing soil and/or groundwater contamination.

Finally, previously undocumented soil and or groundwater contamination could be encountered during tower and pole installation, trenching, grading, or other excavation related activities despite the steps taken to identify and avoid contamination.

The presence of oil in a quantity greater than 1,320 gallons invokes Spill Prevention Control and Countermeasures (SPCC) regulations. The quantity of oil contained in any one of the planned 500/220 kV transformers would be in excess of the minimum quantity that requires such regulations.

C.5.8.3 MITIGATION

To identify and avoid documented contamination sites relative to the project sites, record searches specifically for the project locations would need to be conducted. Implementation of mitigation measures should require identification and avoidance of documented contamination sites, thus ensuring that the potential impacts caused by documented contaminated sites would be reduced to less than significant levels.

Soils testing should be conducted and analyzed by a professional, licensed Geotechnical Engineer or Geologist, to determine existing soil conditions. Borings in a sufficient quantity to adequately gather variations in the site soils should be conducted to remove sample cores for testing. The type of soils, soil pressure, relative compaction, resistivity, and percolation factor are among the items that should be tested for. If contaminants are encountered, special studies and remediation measures in compliance with environmental regulations should be implemented by qualified professionals.

During trenching, grading, or excavation work, mitigation measures should be developed that would require the contractor to observe the exposed soil for visual evidence of contamination. If visual contamination indicators are observed during construction, the contractor should be required to stop work until the material is properly characterized and appropriate measures are taken to protect human health and the environment. The contractor would also have to comply with the all local, State, and federal requirements for sampling and testing, and subsequent removal, transport, and disposal of hazardous materials.

All project personnel should be trained on the handling, storage, disposal, and reporting requirements for hazardous materials. All training activities should be completed in compliance with appropriate regulatory requirements. All training activities should be documented and records of training activities maintained for the project for all employees and contractors. Training activities should include appropriate spill response and containment plans.

All hazardous material storage areas and disposal areas should be constructed and operated in compliance with appropriate federal, state, and local regulations. All permits for handling of hazardous materials should be acquired prior to initiation of project activities and should be maintained at the project site. Appropriate spill response and containment plans should be maintained at the project site.

Helicopter fueling, if necessary, should occur at staging areas or at a local airport using the helicopter contractor’s fuel truck, should be supervised by the helicopter fuel service provider, and Storm Water Pollution Prevention Plan (SWPPP) measures should be followed, as applicable. The helicopter and fuel truck would likely stay overnight at a local airport or at a staging area if adequate security is in place.

Pisgah Substation Expansion (850 MW Full Build-Out). SCE would follow SPCC regulations and the control of oils spills through secondary containment would be designed by a licensed California Registered Professional Engineer. Permanent or temporary SPCC measures should be in place prior to the delivery of transformers to the site. Improvements may consist of, but not be limited to, trenches, holding areas, retention basins and curbs. An SPCC plan would be prepared and maintained on-site. Substation operating personnel should be trained in the execution of the plan.

C.5.8.4 CONCLUSION

Implementing mitigation measures similar to the Conditions of Certification that are proposed in the Staff Assessment/EIS for construction of the Calico Solar Project, and implementation of SWPPP and a SPCC plans would avoid potential significant hazard impacts from work associated with the SCE upgrade options.

C.5.9 CUMULATIVE IMPACT ANALYSIS

A project may result in significant adverse cumulative impacts (pursuant to CEQA) when its effects are “cumulatively considerable.” Cumulatively considerable means that the incremental effects of an individual project are significant (pursuant to CEQA) when viewed in connection with the effects of past projects, the effects of other current projects, or the effects of probable future projects. (Title 14, California Code of Regulations, section 15130). NEPA states that cumulative effects can result from individually minor but significant actions taking place over a period of time (40 CFR § 1508.7).

As discussed in section C.5.4.3 above, staff considered the potential for impacts due to a simultaneous release of any of the hazardous chemicals from the proposed the Calico Solar Project with any other existing or foreseeable nearby facilities. Because of the small amounts and low hazard of the hazardous chemicals to be stored at the facility, Staff determined that there was no possibility of producing an offsite impact. Because of this determination, and the additional fact that there are no nearby facilities using large amounts of hazardous chemicals, there is no possibility that vapor plumes would mingle (combine) to produce an airborne concentration that would present a significant risk (pursuant to CEQA).

Section B.3, Cumulative Scenario, provides detailed information on the potential cumulative solar and other development projects in the project area. Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis for the proposed project. In summary, these projects are:

- Renewable energy projects on BLM, State, and private lands, as shown on **Cumulative Figures 1 and 2** and in **Cumulative Tables 1A and 1B.** Although not all of those projects are expected to complete the environmental review processes, or be funded and constructed, the list is indicative of the large number of renewable projects currently proposed in California.

These projects are defined within a geographic area that has been identified by the CEC and BLM as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all resource elements or environmental parameters. Most of these projects have, are, or will be required to undergo their own independent environmental review under CEQA and/or NEPA. Even if the cumulative projects described in Section B.3 have not yet completed the required environmental processes, they were considered in the cumulative impacts analyses in this SA/Draft EIS.

Geographic Scope of Analysis

The geographic area considered for cumulative impacts from the use of Hazardous Materials is the area within 1 mile of the project boundary. Staff concludes that there is no potential to cause impacts beyond the facility boundary.

For this analysis, no other projects are located close enough to the proposed the Calico Solar Project to cause cumulative impacts on any surrounding population.

Effects of Past and Present Projects

There are no past or currently operating projects in the geographic area that would affect the same area that would be affected by the proposed facility.

Effects of Reasonably Foreseeable Future Projects

There are no reasonably foreseeable future projects in the geographic area that would affect the same area that would be affected by accidental releases at the proposed facility.

Contribution of the Calico Solar Project to Cumulative Impacts

Construction. The Calico Solar Project would not be expected to contribute to the possible short term cumulative impacts related to Hazardous Materials because it is not in close proximity to any other facility that might impact the same surrounding population in the event of an accidental release of hazardous materials.

Operation. The Calico Solar Project would not be expected to the possible long term operational cumulative impacts related to because it is not in close proximity to any other facility that might impact the same surrounding population in the event of an accidental release of hazardous materials.

Decommissioning. The decommissioning of the Calico Solar Project would not be expected to contribute to the possible short term cumulative impacts related to Hazardous Materials, similar to during construction, because it is not in close proximity to any other facility that might impact the same surrounding population in the event of an accidental release of hazardous materials. similar to construction impacts. It is unlikely that the construction or decommissioning of any of the cumulative projects would occur concurrently with the decommissioning of this project, because the decommissioning is not expected to occur for approximately 40 years. As a result, there may not be impacts related to during decommissioning of the Calico Solar Project generated by the cumulative projects. As a result, the impacts of the decommissioning of the Calico Solar Project would not be expected to contribute to cumulative impacts related to Hazardous Materials because all hazardous materials would either continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

C.5.10 COMPLIANCE WITH LORS

A discussion of the proposed project's compliance with LORS applicable to hazardous materials is provided above in subsection C.5.4.3, and **Hazardous Materials Table 1**.

C.5.11 NOTEWORTHY PUBLIC BENEFITS

The proposed project would help in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable energy and any resultant decreases in the use of riskier hazardous materials for power production at other facilities.

C.5.12 FACILITY CLOSURE

The requirements for handling hazardous materials remain in effect until such materials are removed from the site, regardless of facility closure. Therefore, the facility owners are responsible for continuing to handle such materials in a safe manner, as required by applicable laws. In the event that the facility owner abandons the facility in a manner that poses a risk to surrounding populations, staff would coordinate with the California Office of Emergency Services, San Bernardino Fire Department, and the California Department of Toxic Substances Control (DTSC) as BLM would be the landowner of the abandoned facility. To ensure that any unacceptable risk to the public is eliminated, Funding for such emergency action as well as site removal, rehabilitation and revegetation activities would be available from a performance bond required of the applicant by BLM.

C.5.13 PROPOSED CONDITIONS OF CERTIFICATION

HAZ-1 The project owner shall not use any hazardous materials not listed in **Appendix A**, below, or in greater quantities than those identified by chemical name in **Appendix A,** unless approved in advance by the BLM's authorized officer and Compliance Project Manager (CPM).

Verification: The project owner shall provide to BLM's authorized officer and the CPM in the Annual Compliance Report, a list of hazardous materials contained at the facility.

HAZ-2 The project owner shall concurrently provide a Hazardous Materials Business Plan (HMBP), a Risk Management Plan (RMP), and a Spill Prevention, Control, and Countermeasure Plan (SPCC) to the San Bernardino County Fire Department, BLM's authorized officer and the CPM for review. After receiving comments from the San Bernardino County Fire Department, BLM's authorized officer and the CPM, the project owner shall reflect all received recommendations in the final documents. If no comments are received from the county within 30 days of submittal, the project owner may proceed with preparation of final documents upon receiving comments from BLM's authorized officer and the CPM. Copies of the final HMBP, RMP, and SPCC Plan shall then be provided to the San Bernardino County Fire Department for their records and to the BLM's authorized officer and CPM for approval.

Verification: At least 60 days prior to receiving any hazardous material on the site for commissioning or operations, the project owner shall provide a copy of a final Hazardous Materials Business Plan (HMBP), a Risk Management Plan (RMP), and a Spill Prevention, Control, and Countermeasure Plan (SPCC) to BLM's authorized officer and the CPM for approval.

HAZ-3 The project owner shall develop and implement a Safety Management Plan for delivery of liquid and gaseous hazardous materials. The plan shall include procedures, protective equipment requirements, training and a checklist. It shall also include a section describing all measures to be implemented to prevent mixing of incompatible hazardous materials. This plan shall be applicable during construction, commissioning, and operation of the power plant.

Verification: At least sixty (60) days prior to the delivery of any liquid or gaseous hazardous material to the facility, the project owner shall provide a Safety Management Plan as described above to BLM's authorized officer and the CPM for review and approval.

HAZ-4 At least thirty (30) days prior to commencing construction, a site-specific Construction Site Security Plan for the construction phase shall be prepared and made available to BLM's authorized officer and the CPM for review and approval. The Construction Security Plan shall include the following:

1. Perimeter security consisting of fencing enclosing the construction area;
2. Security guards;
3. Site access control consisting of a check-in procedure or tag system for construction personnel and visitors;
4. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;
5. Protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency; and
6. Evacuation procedures.

Verification: At least thirty (30) days prior to commencing construction, the project owner shall notify BLM's authorized officer and the CPM that a site-specific Construction Security Plan is available for review and approval.

HAZ-5 The project owner shall prepare a site-specific Security Plan for the operational phase and shall be made available to BLM's authorized officer and the CPM for review and approval. The project owner shall implement site security measures addressing physical site security and hazardous materials storage. The level of security to be implemented shall not be less than that described below (as per NERC 2002).

The Operation Security Plan shall include the following:

1. Permanent full perimeter fence, at least 8 feet high around the Solar Field;
2. Main entrance security gate, either hand operable or motorized;
3. Evacuation procedures;
4. Protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency;
5. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;
6. a. A statement (refer to sample, attachment "A") signed by the project owner certifying that background investigations have been conducted on all project personnel. Background investigations shall be restricted to ascertain the accuracy of employee identity and employment history, and shall be conducted in accordance with state and federal law regarding security and privacy;

   b. A statement(s) (refer to sample, attachment "B") signed by the contractor or authorized representative(s) for any permanent contractors or other technical contractors (as determined by the CPM after consultation with the project owner) that are present at any time on the site to repair, maintain, investigate, or conduct any other technical duties involving critical components (as determined by the

CPM after consultation with the project owner) certifying that background investigations have been conducted on contractor personnel that visit the project site.

7. Site access controls for employees, contractors, vendors, and visitors;
8. Closed circuit TV (CCTV) monitoring system, recordable, and viewable in the power plant control room and security station (if separate from the control room) with cameras able to pan, tilt, and zoom, have low-light capability, and are able to view the outside entrance to the control room and the front gate; and
9. Additional measures to ensure adequate perimeter security consisting of either:
   a. Security guard present 24 hours per day, 7 days per week, **OR**
   b. Power plant personnel on-site 24 hours per day, 7 days per week and **one** of the following:
      1) The CCTV monitoring system required in number 8 above shall include cameras that are able to view 100% of the perimeter fence, the outside entrance to the control room, and the front gate from a monitor in the power plant control room; **or**
      2) Perimeter breach detectors **or** on-site motion detectors along the entire facility fence line.

The project owner shall fully implement the security plans and obtain BLM's authorized officer and CPM approval of any substantive modifications to the security plans. BLM's authorized officer and the CPM may authorize modifications to these measures, or may require additional measures, such as protective barriers for critical power plant components (e.g., transformers, gas lines, compressors, etc.) depending on circumstances unique to the facility or in response to industry-related standards, security concerns, or additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or the North American Electrical Reliability Council, after consultation with appropriate law enforcement agencies and the applicant.

Verification: At least 30 days prior to the initial receipt of hazardous materials on-site, the project owner shall notify BLM's authorized officer and the CPM that a site-specific Operations Site Security Plan is available for review and approval. In the Annual Compliance Report, the project owner shall include a statement that all current project employee and appropriate contractor background investigations have been performed, and updated certification statements are appended to the Operations Security Plan. In the Annual Compliance Report, the project owner shall include a statement that the Operations Security Plan includes all current hazardous materials transport vendor certifications for security plans and employee background investigations.

HAZ-6 The holder (project owner) shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder(s) shall comply with the Toxic Substances Control Act of 1976, as amended (15 U.S.C. 2601, et seq.) with regard to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR, Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, Section 102b

Verification: A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to BLM's authorized officer and the CPM concurrent with the filing of the reports to the involved Federal agency or State government.

C.5.14 CONCLUSIONS

Staff's evaluation of the proposed project (with proposed mitigation measures) indicates that hazardous material use, storage, and transportation would not pose a significant (pursuant to CEQA) impact on the public. Staff's analysis also shows that there would be no significant (pursuant to CEQA) cumulative impact. With adoption of the proposed conditions of certification, the proposed project would comply with all applicable LORS. Other proposed conditions of certification address the issues of site security matters.

Staff recommends that the Energy Commission impose the proposed conditions of certification, presented below, to ensure that the project is designed, constructed, and operated in compliance with applicable LORS, and would protect the public from significant risk (pursuant to CEQA) of exposure to an accidental release of hazardous materials. If all mitigation proposed by the applicant and by staff are implemented, the use, storage, and transportation of hazardous materials would not present a significant risk (pursuant to CEQA) to the public.

Staff concludes that there is insignificant potential for hazardous materials release to have significant impact beyond the facility boundary, and therefore concludes there is also insignificant potential for significant (pursuant to CEQA) impact to the environment. For any other potential impacts upon the environment, including vegetation, wildlife, air, soils, and water resulting from hazardous materials usage and disposal at the proposed facility, the reader is referred to the **Biology**, the **Air Quality**, the **Soil and Water**, and the **Waste Management** sections of this SA/DEIS.

Staff also concludes that none of the alternatives to the proposed project would materially or significantly change the impacts associated with hazardous materials handling. None of the alternatives would be preferred to the proposed project or reduce any otherwise significant (pursuant to CEQA) impacts caused by hazardous materials handling.

Staff proposes six conditions of certification, some of which are mentioned in the text (above), and listed below. **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in the AFC, unless there is prior approval by the Energy Commission Compliance Project Manager (CPM) and the BLM Authorized Safety

Officer. **HAZ-2** ensures that local emergency response services are notified of the amounts and locations of hazardous materials at the facility, **HAZ-3** requires the development of a Safety Management Plan that addresses the delivery of all liquid or gaseous hazardous materials during the construction, commissioning, and operation of the project would further reduce the risk of any accidental release not specifically addressed by the proposed spill prevention mitigation measures, and further prevent the mixing of incompatible materials that could result in the generation of toxic vapors. Site security during both the construction and operation phases is addressed in **HAZ-4** and **HAZ-5. HAZ-6** ensures that the applicant complies with all Federal LORS regarding use, management, spills, and reporting of hazardous materials on Federal lands.

SAMPLE CERTIFICATION (Attachment "A")

Affidavit of Compliance for Project Owners

I, ____

(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

____

(Company Name)

for employment at

____

(Project name and location)

have been conducted as required by the U.S. Bureau of Land Management Right-of-Way and California Energy Commission Decision for the above- named project.

____

(Signature of Officer or Agent)

Dated this ____________________ day of ____________________, 20 _______.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY BLM's AUTHORIZED OFFICER AND THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

SAMPLE CERTIFICATION (Attachment "B")

Affidavit of Compliance for Contractors

I, ____

(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

____

(Company Name)

for contract work at

____

(Project name and location)

____

(Signature of Officer or Agent)

Dated this ____________________ day of ____________________, 20 _______.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY BLM's AUTHORIZED OFFICER AND THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

C.5.15 REFERENCES

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SES 2008d – Supplement to the Application for Certification for the SES Solar Two Project. Submitted to the California Energy Commission, September 28, 2008.

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Hazardous Materials Appendix A
Hazardous Materials Proposed for Use at Calico Solar

Hazardous Materials Usage and Storage During Operations				
Chemical	**Use**	**Storage Location/Type**	**State**	**Storage Quantity**
Insulating oil	Electrical equipment	Electrical equipment (contained in transformers and electrical switches)	Liquid	60,000 gallons initial fill
Lubricating oil	Stirling Engine/dish drives PCU	Equipment 150-gallon recycle tank located in Maintenance Building	Liquid	40,000 gallons initial fill with usage of 21 gallons per month
Hydrogen	PCU working fluid	Generated on-site and stored in pressure vessel	Gas	7,162,148 scf (~37,243 lbs)
Acetylene	Welding	Cylinders stored in maintenance buildings	Gas	1,000 cubic feet
Oxygen	Welding	Cylinders stored in maintenance buildings	Gas	1,000 cubic feet
Ethylene glycol	PCU Radiator Coolant, antifreeze	PCU radiator Maintenance Buildings	Liquid	40,000 gal initial fill with usage of 21 gallons per month
Various solvents, detergents, paints, and other cleaners	Building maintenance and equipment cleaning	Three (3) 55-gallon drums and 1-gallon containers will be stored Maintenance Buildings	Liquid	Ten (10) 55-gallon drums Commercial 1-gallon containers
Gasoline	Maintenance vehicles	5,000 gallon AST at refueling station with containment	Liquid	5,000 gallons
Diesel fuel	Firewater pump Maintenance Vehicles	Firewater skid 5,000-gallon AST refueling station with containment	Liquid	100 gallons initial fill 5,000 gallons
Sodium hypochlorite 12.5% solution (bleach)	Disinfectant for potable water	Water treatment structure	Liquid	4 gallons

Notes:
AST = aboveground storage tank
PCU = power conversion unit
Source: SES 2008a.

C.6 – PUBLIC HEALTH AND SAFETY

Testimony of Alvin J. Greenberg, Ph.D.

C.6.1 SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management and Energy Commission staff (hereafter jointly referred to as staff) have analyzed potential public health and safety risks associated with construction and operation of the Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) and does not expect any significant adverse cancer or short- or long-term noncancer health effects from project toxic emissions. Staff's analysis of potential health impacts from the proposed Calico Solar Project uses a conservative health-protective methodology that accounts for impacts to the most sensitive individuals in a given population, including newborns and infants. According to the results of staff's health risk assessment, emissions from the Calico Solar Project, which include only one stationary source (an emergency diesel generator) and a large number of mobile sources (gasoline-fueled and diesel-fueled maintenance and delivery vehicles), would not contribute significantly to morbidity or mortality in any age or ethnic group residing in the project area. Therefore, the impacts on public health from emissions of Toxic Air Contaminants (Hazardous Air Pollutants) according to CEQA and NEPA would be less than significance.

C.6.2 INTRODUCTION

The purpose of this Staff Assessment/Draft Environmental Impact Statement (SA/DEIS) is to determine if emissions of toxic air contaminants (TACs) from the proposed Calico Solar Project would have the potential to cause significant adverse public health and safety impacts or to violate standards for public health protection. If potentially significant health and safety impacts are identified, staff will evaluate mitigation measures to reduce such impacts to insignificant levels.

In addition to the analysis contained in this Public Health and Safety Section that focuses on potential effects to the public from emissions of toxic air contaminants, other related aspects to the assessment of potential public health and safety impacts from the Calico Solar Project are considered elsewhere in this document as listed and briefly described below:

- Air Quality – evaluates the expected air quality impacts from the emissions of criteria air pollutants from both the construction and operation of the Calico Solar Project; Criteria air pollutants are defined as air contaminants for which the state and/or federal governments have established an ambient air quality standard to protect public health;
- Hazardous Materials Management – evaluates the potential impacts on public and worker health from accidental releases of hazardous materials;
- Socioeconomics and Environmental Justice – evaluates project-induced changes on community services including law enforcement and hospitals;
- Soil and Water Resources – evaluates the potential for the Calico Solar Project to cause contamination of soil and water resources, to exacerbate flooding, and to

cause adverse effects to water supply in consideration of other existing users and projected needs;

- Transmission Line Safety and Nuisance – evaluates potential effects associated with proposed transmission lines accounting for both the physical presence of the lines and the physical interactions of their electric and magnetic fields; The potential effects include aviation safety, interference with radio-frequency communication, audible noise, fire hazards, hazardous shocks, nuisance shocks, and electric and magnetic field (EMF) exposure.
- Worker Safety and Fire Protection – assess the worker safety and fire protection measures proposed by the applicant including determining whether the project would have any adverse impacts on fire protection and emergency medical services that are also relied upon by the public;
- Waste Management – evaluates issues associated with wastes generated from the proposed project construction and operation including ensuring that wastes would be managed in an environmentally safe manner.

C.6.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The analysis of proposed project effects must comply with both CEQA and NEPA requirements given the respective power plant licensing and land jurisdictions of the California Energy Commission and U.S. Bureau of Land Management (BLM). CEQA requires that the significance of individual effects be determined by the Lead Agency; however, the use of specific significance criteria is not required by NEPA.

Because this document is intended to meet the requirements of both NEPA and CEQA, the methodology used for determining environmental impacts of the proposed project includes a consideration of guidance provided by both laws.

CEQA requires a list of criteria that are used to determine the significance of identified impacts. A significant impact is defined by CEQA as “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project” (State CEQA Guidelines Section 15382).

In comparison, NEPA states that “‘Significantly’ as used in NEPA requires considerations of both context and intensity…” (40 CFR 1508.27). Therefore, thresholds serve as a benchmark for determining if a project action will result in a significant adverse environmental impact when evaluated against the baseline. NEPA requires that an Environmental Impact Statement (EIS) is prepared when the proposed federal action (project) as a whole has the potential to “significantly affect the quality of the human environment.”

Thresholds for determining significance in this section are based on Appendix G of the CEQA Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission staff. In addition, staff’s evaluation of the environmental effects of the proposed project on land uses (i.e., those listed below) includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27.

Effects of the proposed project on the land use environment (and in compliance with both CEQA and NEPA) have been determined using the thresholds listed below.

The **PUBLIC HEALTH** section of this staff assessment discusses toxic emissions to which the public could be exposed during project construction and routine operation. Following the release of toxic contaminants into the air or water, people may come into contact with them through inhalation, dermal contact, or ingestion via contaminated food or water.

Air pollutants for which no ambient air quality standards have been established are called noncriteria pollutants. Unlike criteria pollutants such as ozone, carbon monoxide, sulfur dioxide, or nitrogen dioxide, noncriteria pollutants have no ambient (outdoor) air quality standards that specify levels considered safe for everyone.

Since noncriteria pollutants do not have such standards, a health risk assessment is used to determine if people might be exposed to those types of pollutants at unhealthy levels. The risk assessment consists of the following steps:

- identify the types and amounts of hazardous substances that the Calico Solar Project could emit to the environment;
- estimate worst-case concentrations of project emissions in the environment using dispersion modeling;
- estimate amounts of pollutants that people could be exposed to through inhalation, ingestion, and dermal contact; and
- characterize potential health risks by comparing worst-case exposure to safe standards based on known health effects.

Staff relies upon the expertise of the California Environmental Protection Agency (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA) to identify contaminants that are known to the state to cause cancer or other noncancer toxicological endpoints and to calculate the toxicity and cancer potency factors of these contaminants. Staff also relies upon the expertise of the California Air Resources Board and the local air districts to conduct ambient air monitoring of toxic air contaminants and the state Department of Public Health to conduct epidemiological investigations into the impacts of pollutants on communities. It is not within the purview or the expertise of the Energy Commission staff to duplicate the expertise and statutory responsibility of these agencies.

Initially, a screening level risk assessment is performed using simplified assumptions that are intentionally biased toward protection of public health. That is, an analysis is designed that overestimates public health impacts from exposure to project emissions. In reality, it is likely that the actual risks from the power plant will be much lower than the risks as estimated by the screening level assessment. The risks for screening purposes are based on examining conditions that would lead to the highest, or worst-case, risks and then using those conditions in the study. Such conditions include:

- using the highest levels of pollutants that could be emitted from the plant;

- assuming weather conditions that would lead to the maximum ambient concentration of pollutants;
- using the type of air quality computer model which predicts the greatest plausible impacts;
- calculating health risks at the location where the pollutant concentrations are estimated to be the highest;
- assuming that an individual's exposure to cancer-causing agents occurs continuously for 70 years; and
- using health-based standards designed to protect the most sensitive members of the population (i.e., the young, elderly, and those with respiratory illnesses).

A screening level risk assessment will, at a minimum, include the potential health effects from inhaling hazardous substances. Some facilities may also emit certain substances that could present a health hazard from noninhalation pathways of exposure (OEHHA 2003, Tables 5.1, 6.3, 7.1). When these substances are present in facility emissions, the screening level analysis includes the following additional exposure pathways: soil ingestion, dermal exposure, and mother's milk (OEHHA 2003, p. 5-3).

The risk assessment process addresses three categories of health impacts: acute (short-term) health effects, chronic (long-term) noncancer effects, and cancer risk (also long-term). Acute health effects result from short-term (one-hour) exposure to relatively high concentrations of pollutants. Acute effects are temporary in nature and include symptoms such as irritation of the eyes, skin, and respiratory tract.

Chronic health effects are those that arise as a result of long-term exposure to lower concentrations of pollutants. The exposure period is considered to be approximately from 12% to 100% of a lifetime, or from 8 to 70 years (OEHHA 2003, p. 6-5). Chronic health effects include diseases such as reduced lung function and heart disease.

The analysis for noncancer health effects compares the maximum project contaminant levels to safe levels called *Reference Exposure Levels*, or RELs. These are amounts of toxic substances to which even sensitive people can be exposed and suffer no adverse health effects (OEHHA 2003, p. 6-2). These exposure levels are designed to protect the most sensitive individuals in the population, such as infants, the aged, and people suffering from illness or disease which makes them more sensitive to the effects of toxic substance exposure. The Reference Exposure Levels are based on the most sensitive adverse health effect reported in the medical and toxicological literature and include margins of safety. The margin of safety addresses uncertainties associated with inconclusive scientific and technical information available at the time of standard setting and is meant to provide a reasonable degree of protection against hazards that research has not yet identified. The margin of safety is designed to prevent pollution levels that have been demonstrated to be harmful, as well as to prevent lower pollutant levels that may pose an unacceptable risk of harm, even if the risk is not precisely identified as to nature or degree. Health protection is achieved if the estimated worst-case exposure is below the relevant reference exposure level. In such a case, an adequate margin of safety exists between the predicted exposure and the estimated threshold dose for toxicity.

Exposure to multiple toxic substances may result in health effects that are equal to, less than, or greater than effects resulting from exposure to the individual chemicals. Only a small fraction of the thousands of potential combinations of chemicals have been tested for the health effects of combined exposures. In conformity with the California Air Pollution Control Officers Association (CAPCOA) guidelines, the health risk assessment assumes that the effects of each substance are additive for a given organ system (OEHHA 2003, pp. 1-5, 8-12). Other possible mechanisms due to multiple exposures include those cases where the actions may be synergistic or antagonistic (where the effects are greater or less than the sum, respectively). For these types of substances, the health risk assessment could underestimate or overestimate the risks.

For carcinogenic substances, the health assessment considers the risk of developing cancer and assumes that continuous exposure to the cancer-causing substance occurs over a 70-year lifetime. The risk that is calculated is not meant to project the actual expected incidence of cancer, but rather a theoretical upper-bound number based on worst-case assumptions.

Cancer risk is expressed in chances per million and is a function of the maximum expected pollutant concentration, the probability that a particular pollutant will cause cancer (called *potency factors* and established by OEHHA), and the length of the exposure period. Cancer risks for each carcinogen are added to yield total cancer risk. The conservative nature of the screening assumptions used means that actual cancer risks due to project emissions are likely to be considerably lower than those estimated.

The screening analysis is performed to assess worst-case risks to public health associated with the proposed project. If the screening analysis predicts no significant risks, then no further analysis is required. However, if risks are above the significance level, then further analysis, using more realistic site-specific assumptions, would be performed to obtain a more accurate assessment of potential public health risks.

Significance Criteria

Energy Commission staff determines the health effects of exposure to toxic emissions based on impacts to the maximum exposed individual. This is a person hypothetically exposed to project emissions at a location where the highest ambient impacts were calculated using worst-case assumptions, as described above.

As described earlier, noncriteria pollutants are evaluated for short-term (acute) and long-term (chronic) noncancer health effects, as well as cancer (long-term) health effects. The significance of project health impacts is determined separately for each of the three categories.

Acute and Chronic Noncancer Health Effects

Staff assesses the significance of noncancer health effects by calculating a *hazard index*. A hazard index is a ratio comparing exposure from facility emissions to the reference (safe) exposure level. A ratio of less than 1.0 signifies that the worst-case exposure is below the safe level. The hazard index for every toxic substance that has the same type of health effect is added to yield a Total Hazard Index. The Total Hazard Index is calculated separately for acute and chronic effects. A Total Hazard Index of less than 1.0 indicates that cumulative worst-case exposures are less than the reference exposure levels. Under these conditions, health protection from the project is likely to be achieved, even for sensitive members of the population. In such a case, staff presumes that there would be no significant noncancer project-related public health impacts.

Cancer Risk

Staff relied upon regulations implementing the provisions of Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986, (Health & Safety Code, §§25249.5 et seq.) for guidance to determine a cancer risk significance level. Title 22, California Code of Regulations section 12703(b) states that “the risk level which represents no significant risk shall be one which is calculated to result in one excess case of cancer in an exposed population of 100,000, assuming lifetime exposure.” This level of risk is equivalent to a cancer risk of 10 in 1 million, which is also written as 10×10^{-6}. An important distinction is that the Proposition 65 significance level applies separately to each cancer-causing substance, whereas staff determines significance based on the total risk from all cancer-causing chemicals. Thus, the manner in which the significance level is applied by staff is more conservative (health-protective) than that applied by Proposition 65. The significant risk level of 10 in 1 million is consistent with the level of significance adopted by many air districts. In general, these air districts would not approve a project with a cancer risk exceeding 10 in 1 million.

As noted earlier, the initial risk analysis for a project is typically performed at a screening level, which is designed to overstate actual risks, so that health protection can be ensured. Staff’s analysis also addresses potential impacts on all members of the population including the young, the elderly, people with existing medical conditions that may make them more sensitive to the adverse effects of toxic air contaminants, and any minority or low-income populations that are likely to be disproportionately affected by impacts. To accomplish this goal, staff uses the most current acceptable public health exposure levels set to protect the public from the effects of airborne toxics. When a screening analysis shows cancer risks to be above the significance level, refined assumptions would likely result in a lower, more realistic risk estimate. Based on refined assumptions, if risk posed by the facility exceeds the significance level of 10 in 1 million, staff would require appropriate measures to reduce the risk to less than significant. If, after all risk reduction measures had been considered, a refined analysis identifies a cancer risk greater than 10 in 1 million, staff would deem such risk to be significant and would not recommend project approval.

Laws, Ordinances, Regulations, and Standards

PUBLIC HEALTH AND SAFETY Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Clean Air Act section 112 (Title 42, U.S. Code section 7412)	This act requires new sources that emit more than 10 tons per year of any specified Hazardous Air Pollutant (HAP) or more than 25 tons per year of any combination of HAPs to apply Maximum Achievable Control Technology.
State	
California Health and Safety Code section 25249.5 et seq. (Proposition 65)	These sections establish thresholds of exposure to carcinogenic substances above which Prop 65 exposure warnings are required.
California Health and Safety Code section 41700	This section states that “no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property.”
California Public Resource Code section 25523(a); Title 20 California Code of Regulations (CCR) section 1752.5, 2300–2309 and Division 2 Chapter 5, Article 1, Appendix B, Part (1); California Clean Air Act, Health and Safety Code section 39650, et seq.	These regulations require a quantitative health risk assessment for new or modified sources, including power plants that emit one or more toxic air contaminants (TACs).
Local	
Mojave Desert Air Quality Management District (MDAQMD) Rule 1302	New Source Review for Toxic Air Contaminants.

C.6.4 PROPOSED PROJECT

C.6.4.1 SETTING AND EXISTING CONDITIONS

This section describes the environment in the vicinity of the proposed project site from the public health perspective. Characteristics of the natural environment, such as meteorology and terrain, affect the project's potential for causing impacts on public health. An emissions plume from a facility may affect elevated areas before lower terrain areas due to a reduced opportunity for atmospheric mixing. Consequently, areas of elevated terrain can often be subjected to increased pollutant impacts. Also, the types of land use near a site influence the surrounding population distribution and density, which, in turn, affect public exposure to project emissions. Additional factors affecting potential public health impacts include existing air quality, existing health concerns, and environmental site contamination.

Site and Vicinity Description

The project would be located in an undeveloped part of San Bernardino County adjacent to Interstate 40 and about 37 miles east of Barstow. Lands in this part of the Mojave Desert are managed predominantly by the Bureau of Land Management (BLM). Land uses in the vicinity of the proposed project include transportation use, open space, and resource conservation (SES 2008a, Section 5.9.1). There are a total of three residences within a 3-mile radius of the proposed site, the nearest of which is located approximately 1,300 feet south of the property boundary on the other side of I-40. There are no sensitive receptors in the vicinity of the project site (SES 2008a, Section 5.16.1 and Figure 5.16-1).

The site elevation slopes gently to the northeast and ranges from 1,925 to 3,050 feet above sea level (SES 2008a, Section 5.2). Topography in the vicinity of the project is varied in elevation, with regions of elevated terrain existing mostly to the north and east, where the sloping grade continues beyond the project boundary (SES 2008a, Section 5.2.1 and Figure 5.2-1).

Meteorology

Meteorological conditions, including wind speed, wind direction, and atmospheric stability, affect the extent to which pollutants are dispersed into ambient air as well as the direction of pollutant transport. This, in turn, affects the level of public exposure to emitted pollutants and associated health risks. When wind speeds are low and the atmosphere is stable, for example, dispersion is reduced, and localized exposure may be increased.

San Bernardino County is characterized by a high desert climate; summers are hot and dry, winters are moderate with low precipitation, and temperature inversions are strong. Winds generally flow from the west across the region (SES 2008a, Section 5.2.1.1 and Figure 5.2-3).

Atmospheric stability is a measure related to turbulence, or the ability of the atmosphere to disperse pollutants due to convective air movement. Mixing heights (the height above ground level through which the air is well mixed and in which pollutants can be dispersed) are lower during mornings due to temperature inversions and increase during the warmer afternoons. Staff's **AIR QUALITY** section presents more detailed meteorological data.

Existing Air Quality

The proposed site is within the jurisdiction of the Mojave Desert Air Quality Management District (MDAQMD). By examining average toxic air contaminants' concentration levels from representative air monitoring sites with cancer risk factors specific to each contaminant, lifetime cancer risk can be calculated to provide a background risk level for inhalation of ambient air. For comparison purposes, it should be noted that the overall lifetime cancer risk for the average individual in the United States is about 1 in 3, or 333,000 in 1 million.

There are several air quality monitoring stations in San Bernardino County operated by the MDAQMD and the California Air Resources Board (CARB), the closest of which is in Barstow, about 37 miles west of the proposed site. Data from this monitoring station shows that the annual arithmetic mean for PM10 ranged approximately between 22 and 30 $\mu g/m^3$ between the years 2005 and 2008. The annual arithmetic mean for PM2.5 measured at the Victorville monitoring station (about 57 miles southwest) ranged between 9.7 and 10.4 $\mu g/m^3$ between 2006 and 2007 (SES 2008a, Section 5.2.1.2 and Tessera Solar 2009q, General Comment Tables 5.2-3a and 5.2-4 Revised).

The nearest California Air Resources Board (CARB) air toxics monitoring station that actively reports values is located on Mission Boulevard in Riverside, approximately 80 miles southwest of the project site. Although staff does not consider this location to be representative of air quality in the area of the proposed site, it does serve to show the upper-bound levels of toxic air contaminants emitted by all stationary and mobile sources found in the region. In 2008, the background cancer risk calculated by CARB for the Riverside monitoring station was 104 in one million (CARB 2009). The pollutants 1,3-butadiene and benzene, emitted primarily from mobile sources (gasoline-fueled cars and trucks), accounted together for about half of the total risk. The risk from 1,3-butadiene was about 22 in one million at Riverside, while the risk from benzene was about 30 in one million. Formaldehyde accounts for about 20% of the 2008 average calculated cancer risk based on air toxics monitoring results, with a risk of about 21 in one million. Formaldehyde is emitted directly from vehicles and other combustion sources. The risk from hexavalent chromium was about 23 in one million, or ~22% of the total risk. Fifty-one percent of hexavalent chromium in California is emitted from stationary sources with activities such as chrome plating, welding, spray painting, and leather tanning, while mobile sources such as jet aircrafts and ships contribute about 38%.

The use of reformulated gasoline, beginning in the second quarter of 1996, as well as other toxics reduction measures, have led to a decrease of ambient levels of toxics and associated cancer risk during the past few years in all areas of the state and the nation. For example, in the San Francisco Bay Area, cancer risk was 342 in 1 million based on 1992 data, 315 in 1 million based on 1994 data, and 303 in 1 million based on 1995 data. In 2002, the most recent year for which data is available, the average inhalation cancer risk decreased to 162 in 1 million (BAAQMD 2004b, p. 12).

Existing Public Health Concerns

When evaluating a new project, staff often conducts a detailed study and analysis of existing public health issues in the project vicinity. This analysis is prepared in order to identify the current status of respiratory diseases (including asthma), cancer, and childhood mortality rates in the population located near the proposed project. Assessing existing health concerns in the project area will provide staff with a basis on which to evaluate the significance of any additional health impacts from the proposed Calico Solar Project and evaluate any proposed mitigation. Because of the very low population in the immediate vicinity of the project and because no existing health issues within a 6-mile radius of the project have been identified by the applicant (SES 2008a, Section 5.16.1), staff did not conduct an analysis of existing public health issues.

C.6.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Direct/Indirect Impacts and Mitigation

Proposed Project - Construction Impacts and Mitigation

Potential risks to public health during construction may be associated with exposure to toxic substances in contaminated soil disturbed during site preparation, as well as diesel exhaust from heavy equipment operation. Criteria pollutant impacts from the operation of heavy equipment and particulate matter from earth moving are examined in staff's **AIR QUALITY** analysis.

Site disturbances occur during facility construction from excavation, grading, and earth moving. Such activities have the potential to adversely affect public health through various mechanisms, such as the creation of airborne dust, material being carried off site through soil erosion, and uncovering buried hazardous substances. A Phase I Environmental Site Assessment conducted for this site in 2008 identified no "Recognized Environmental Conditions" per the American Society for Testing and Materials Standards (ASTM) definition. That is, there was no evidence or record of any use, spillage, or disposal of hazardous substances on the site, nor was there any other environmental concern that would require remedial action (SES 2008a, Appendix T Section 7). In the event that any unexpected contamination is encountered during construction, proposed Conditions of Certification **WASTE-1** and **WASTE-2** (which require a registered professional engineer or geologist to be available during soil excavation and grading to ensure proper handling and disposal of contaminated soil) would ensure that contaminated soil does not affect the public. See the staff assessment section on **WASTE MANAGEMENT** for a more detailed analysis of this topic.

The operation of construction equipment will result in air emissions from diesel-fueled engines. Diesel emissions are generated from sources such as trucks, graders, cranes, welding machines, electric generators, air compressors, and water pumps. Although diesel exhaust contains criteria pollutants such as nitrogen oxides, carbon monoxide, and sulfur oxides, it also includes a complex mixture of thousands of gases and fine particles. These particles are primarily composed of aggregates of spherical carbon particles coated with organic and inorganic substances. Diesel exhaust contains over 40 substances that are listed by the U.S. Environmental Protection Agency (U.S. EPA) as hazardous air pollutants and by the California Air Resources Board (ARB) as toxic air contaminants.

Exposure to diesel exhaust may cause both short- and long-term adverse health effects. Short-term effects can include increased coughing, labored breathing, chest tightness, wheezing, and eye and nasal irritation. Long-term effects can include increased coughing, chronic bronchitis, reductions in lung function, and inflammation of the lung. Epidemiological studies also strongly suggest a causal relationship between occupational diesel exhaust exposure and lung cancer.

Based on a number of health effects studies, the Scientific Review Panel on Toxic Air Contaminants recommended a chronic reference exposure level (see discussion of reference exposure levels in Method of Analysis section above) for diesel exhaust particulate matter of 5 micrograms of diesel particulate matter per cubic meter of air ($\mu g/m^3$) and a cancer unit risk factor of $3x10^{-4}$ $(\mu g/m^3)^{-1}$ (SRP 1998, p. 6).[1] The Scientific Review Panel did not recommend a value for an acute Reference Exposure Level since available data in support of a value was deemed insufficient. On August 27, 1998, ARB listed particulate emissions from diesel-fueled engines as a toxic air contaminant and approved the panel's recommendations regarding health effect levels.

Construction of the Calico Solar Project is anticipated to take place over a period of 48 months. Section 5.2.2.1 of the Response to CEC and BLM Data Requests (Tessera Solar 2009q) presents daily and annual maximum emissions of criteria pollutants including fugitive dust and diesel exhaust emissions from construction equipment and worker vehicles. The applicant estimated worst-case emissions of 719 pounds per day of PM10 and 143 pounds per day of PM2.5 during construction, which includes onsite and offsite activities (Tessera Solar 2009q, Table 5.2-9 Revised). The applicant has not estimated the health risks resulting from construction activities due to the short duration of this phase (SES 2008a, Section 5.16.2.2). Staff also did not conduct a quantitative assessment of construction impacts on public health because of the distance to the sparsely populated area surrounding the site and because staff has found numerous times using quantitative risk assessment tools that impacts due to construction vehicle diesel emissions are invariably less than significant even to close-in receptors. Also, as noted earlier, assessment of chronic (long-term) health effects assumes continuous exposure to toxic substances over a significantly longer time period, typically from 8 to 70 years.

Additionally, mitigation measures are proposed by both the applicant and Energy Commission staff to reduce the maximum calculated PM10 and PM2.5 emissions and thus reduce the potential impacts even further. These mitigation measures can be found in the **AIR QUALITY** section of this document and include the use of extensive fugitive dust and diesel exhaust control measures. The fugitive dust control measures are assumed to result in 90% reductions of emissions. In order to further mitigate potential impacts from particulate emissions during the operation of diesel-powered construction

[1] The SRP, established pursuant to California Health and Safety Code section 39670, evaluates the risk assessments of substances proposed for identification as Toxic Air Contaminants by ARB and the Department of Pesticide Regulation (DPR). The SRP reviews the exposure and health assessment reports and the underlying scientific data upon which the reports are based.

equipment, Energy Commission staff recommends the use of ultra-low sulfur diesel fuel and Tier 2 or Tier 1 California Emission Standards for Off-Road Compression-Ignition Engines or the installation of an oxidation catalyst and soot filters on diesel equipment. The catalyzed diesel particulate filters are passive, self-regenerating filters that reduce particulate matter, carbon monoxide, and hydrocarbon emissions through catalytic oxidation and filtration. The degree of particulate matter reduction is comparable for both mitigation measures in the range of approximately 85–92%. Such filters will reduce diesel emissions during construction and reduce any potential for significant health impacts.

Proposed Project - Operation Impacts and Mitigation

Emissions Sources

The only stationary emissions source at the proposed Calico Solar Project would be one emergency diesel generator which would be operated once a month for about 20 minutes (4 hours per year). Mobile sources of TAC emissions during operations would include gasoline-fueled and diesel-fueled maintenance and delivery vehicles as well as visitor and staff traffic (Tessera Solar 2009q, Data Responses #109 and #111).

Public Health Table 2 lists the toxic emissions potentially emitted by the Calico Solar Project and shows how each contributes to the health risk analysis. Each TAC has a toxicity value with a Reference Exposure Level established by OEHHA, which is used to calculate short-term and long-term noncancer health effects, and cancer unit risk as published in the OEHHA Guidelines (OEHHA 2003).

Public Health Table 2
Types of Health Impacts and Exposure Routes Attributed to Toxic Emissions

Substance*	Oral Cancer	Oral Noncancer	Inhalation Cancer	Noncancer (Chronic)	Noncancer (Acute)
Acetaldehyde			✔	✔	
Acrolein				✔	✔
Benzene			✔	✔	✔
1,3-butadiene			✔	✔	
DPM			✔	✔	
Formaldehyde			✔	✔	✔

Source: OEHHA 2003, Appendix L and Tessera Solar 2009q, Table DR-111a.
*all substances come from the emergency diesel generator or from on-site maintenance vehicles

Emissions Levels

Once potential emissions are identified, the next step is to quantify them by conducting a “worst case” analysis. Maximum annual emissions are required to calculate cancer and chronic (long-term) noncancer health effects.

Table DR-111a of the Response to CEC and BLM Data Requests (Tessera Solar 2009q) provides the maximum hourly and annual emission rates for TACs from all sources during operations. Diesel particulate matter (DPM) emissions for the diesel emergency engine were calculated based on emission factors obtained from the vendor. DPM emissions from diesel-fueled delivery trucks were estimated using ARB's EMFAC2007 model. TACs from gasoline-fueled maintenance, staff, and visitor vehicles were estimated using EPA's MOBILE6.2 software.

The next step in the health risk assessment process is to estimate the ambient concentrations of toxic substances. This is accomplished by using a screening air dispersion model and assuming conditions that result in maximum impacts. The applicant's screening analysis was performed using the AERMOD model. Ambient concentrations were used in conjunction with Reference Exposure Levels and cancer unit risk factors to estimate health effects that might occur from exposure to facility emissions. Exposure pathways, or ways in which people might come into contact with toxic substances, include inhalation, dermal (through the skin) absorption, soil ingestion, consumption of locally grown plant foods, and mother's milk.

The above method of assessing health effects is consistent with OEHHA's Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA, 2003) referred to earlier and results in the following health risk estimates.

Impacts

The applicant's screening health risk assessment for the project resulted in an acute Hazard Index (HI) of 0.062 and a chronic HI of 0.00000042 at the point of maximum impact (PMI). The worst-case individual cancer risk was calculated to be 0.000667 in 1 million at the PMI. All three PMIs were located on the boundaries of the project site or NAP areas (Tessera Solar 2009q, Table DR-111b). As **Public Health Table 3** shows, both the acute and chronic hazard indices and the maximum cancer risk are below the level of significance, indicating that no long-term or short-term cancer or non-cancer health effects are expected.

Public Health Table 3
Operation Hazard/Risk at Point of Maximum Impact: Applicant Assessment

Type of Hazard/Risk	Hazard Index/Risk	Significance Level	Significant?
Acute Noncancer	0.062	1.0	No
Chronic Noncancer	0.00000042	1.0	No
Individual Cancer	0.000667 in a million	10.0 in a million	No

Source: Tessera Solar 2009q, Table DR-111b

Staff conducted a quantitative evaluation of the risk assessment results presented in the Calico Solar Project AFC (08-AFC-13) and the document "In Response to CEC and BLM Data Requests, Set 1, Parts 1 and 2, Data Requests 1-48, 81, and 109-112," dated August 2009. Modeling files provided by the applicant were also reviewed. Staff concludes that, while standard procedures were followed in the applicant's analysis, two sources of uncertainty exist for which further clarification is necessary:

1. The difference in the number of vehicles to be used at the facility versus the number of vehicles modeled.
2. The use of average annual emission rates in the HARP modeling that are lower than the peak hourly rates.

In order to reduce public health impacts, several administrative changes were made to the original AFC. Of note is the proposal that, during construction, unpaved roads will be sealed, vehicle trip lengths will be reduced and the option of using alternatively fueled vehicles will be investigated. In order to reduce public health impacts during the operational phase of the project, the changes made include changing the diesel fire water pump to an electric unit, switching from diesel to gasoline vehicles for mirror wash and other maintenance vehicles, and switching to gasoline, electric and/or hybrid, vehicles for other vehicles used on-site. The remaining stationary emitting unit is the diesel-fueled emergency generator, for which the applicant is continuing to investigate the possibility of using gasoline or other alternative fuels. The emergency generator will be used 4 hours/year for testing purposes.

For the operations phase, atmospheric dispersion modeling of facility emissions was conducted by the applicant using AERMOD and the risk assessment was conducted using the CARB/OEHHA Hotspots Analysis and Reporting Program (HARP), Version 1.4a. The HARP On-Ramp program was used to load the AERMOD results into HARP. Local meteorological data were used and building downwash effects were included for 5 buildings. Potential risks to 5,211 grid receptors and 3 sensitive receptors were modeled. Exposure pathways assessed include inhalation, ingestion of home-grown produce, dermal absorption, soil ingestion and mother's milk. In staff's analysis of the HARP modeling files, the transaction file (.tra file) and the source receptor file (.src file) provided by the applicant were used.

Vehicle requirements for operations and maintenance are listed on page 144 of the August 2009 responses to data requests and include the following:

- 50 gasoline wash vehicles for cleaning solar reflector mirrors
- 28 gasoline LRU (line replacement unit) maintenance trucks
- 7 gasoline/hybrid staff and security trucks
- 120 staff cars, 5 vanpool vehicles, 10 visitor cars (all gasoline)
- 7 diesel delivery trucks

A total of 97 emitting units were modeled by the applicant for facility operations including:

- 1 diesel emergency generator
- 96 mobile sources involved in routine operations:
    - 39 wash and LRU vehicles
    - 7 security vehicles
    - 8 forklifts (fueled by propane)
    - 10 visitor vehicles
    - 25 staff vehicles
    - 7 diesel delivery trucks

It is not clear in the report why the number of vehicles modeled differs from the number of vehicles listed for the facility, leading to uncertainty as to whether all mobile sources were included in the modeling of emissions from facility operations.

Emission factors obtained from the August 2009 responses to data requests (Table DR-111a) are listed in **Public Health Table 4**. In staff's examination of the HARP modeling files provided by the applicant, it was noted that annual emissions values used are much lower than maximum 1-hour emissions values, as seen in **Public Health Table 5**. It is not possible, of course, for annual emissions to be lower than 1-hour emissions and this is contrary to the values reported in Table DR-111a, in which the annual emissions are much higher than the 1-hour emissions, as expected. This leads to the supposition that the average annual emission values used in the applicant's HARP modeling are mistaken.

Cancer risk and chronic hazard index values reported by the applicant in the August 2009 responses to data requests were very low, and verified through staff's model analysis conducted using the average annual emission values obtained from the HARP modeling files. For risk calculations using the HARP model, the "Derived (Adjusted) Method" was used for cancer risk and the "Derived (OEHHA) Method" was used for chronic noncancer hazard.

Staff conducted additional HARP modeling in which the 1-hour emissions reported in the HARP files for each mobile source were multiplied by a factor of 2,880 hours/year, which assumes operation of vehicles for 8 hours/day, 30 days/month for 12 months/year which is the rate at which the washing and LRU vehicles are expected to operate (source: page 144 of the August 2009 responses to data requests). For some vehicles this may be an underestimation (security vehicles are expected to run 24 hrs/day) or an overestimation (staff and vanpool vehicles are expected to run 2 hrs/day). The emission factors used in staff's HARP analysis are listed in **Public Health Table 6**. Cancer risk and chronic hazard index modeled by staff in this analysis are greater than those reported in the August 2009 responses to data requests, but still less than the significance levels of 10 in a million for cancer risk and 1.0 for hazard index. Staff cannot explain the difference other than to point out what appear to be mistakes in the applicant's analysis (above). The results of staff's operations phase risk assessment are compared to the results reported by the applicant in **Public Health Table 7**.

Staff's results for acute hazard index are lower than the results reported by the applicant due to a change in the acute REL for acrolein from the value used in the applicant's August 2009 report (0.19 ug/m^3) to the value published by OEHHA in their December 2008 guidance, 2.5 ug/m^3 (OEHHA 2008).

The point of maximum impact, PMI, was determined under the 70 year residential scenario. Three nearby residences, the only residential receptors located near the facility, were also modeled. Cumulative impacts were not evaluated as there are no existing or proposed projects within 6 miles of the facility.

Public Health Table 4
Operation Phase Emission Rates Listed in Response to Data Requests

Substance	Diesel Generator	Washing Vehicle (running & idling)	LRU Maintenance Truck (running & Idling)	Staff & visitor cars, van pool, security truck	Diesel Delivery Trucks	Total Emissions
Peak Hourly Emissions from <u>all</u> vehicles of each type (lb/hr)						
DPM	0.015				0.027	0.042
Benzene		0.024	0.014	0.036		0.074
1,3-Butadiene		0.002	0.001	0.002		0.005
Formaldehyde		0.010	0.006	0.005		0.022
Acetaldehyde		0.005	0.003	0.004		0.012
Acrolein		0.001	0.000	0.000		0.002
Annual Emissions from <u>all</u> vehicles of each type (lb/yr)						
DPM	0.18				13.40	13.58
Benzene		69.78	39.08	36.28		145.14
1,3-Butadiene		5.17	2.90	2.51		10.58
Formaldehyde		29.80	16.69	5.43		51.92
Acetaldehyde		13.45	7.53	4.27		25.25
Acrolein		2.29	1.28	0.30		3.87

Source: Response to Data Requests, August 2009, Table DR-111a
Note: Values listed are for emissions from <u>all</u> vehicles of each type
DPM = diesel particulate matter

Public Health Table 5
Operation Phase Emission Rates Used in Applicant's HARP Modeling

Substance	Diesel Generator	Washing Vehicle & LRU Maintenance Truck	Security	Visitor	Staff	Delivery Trucks
Peak Hourly Emissions <u>per</u> vehicle (lb/hr)						
DPM	0.015					3.91E-03
Benzene		9.69E-04	1.70E-04	6.52E-05	1.37E-03	
1,3-Butadiene		7.19E-05	1.21E-05	4.42E-06	9.38E-05	
Formaldehyde		4.14E-04	2.52E-05	9.80E-06	2.06E-04	
Acetaldehyde		1.87E-04	2.00E-05	7.67E-06	1.61E-04	
Acrolein		3.18E-05	1.37E-06	5.48E-07	1.15E-05	
Annual Emissions <u>per</u> vehicle (lb/yr)						
DPM	0.18					1.09E-07
Benzene		1.59E-07	8.37E-08	7.87E-09	7.87E-09	
1,3-Butadiene		1.18E-08	5.95E-09	5.33E-10	5.33E-10	
Formaldehyde		6.80E-08	1.24E-08	1.18E-09	1.18E-09	
Acetaldehyde		3.07E-08	9.84E-09	9.24E-10	9.24E-10	
Acrolein		5.23E-09	6.73E-10	6.60E-11	6.60E-11	

Source: Applicant's HARP modeling files
Note: Values listed are for emissions from ONE vehicle of each type
DPM = diesel particulate matter

Public Health Table 6
Operation Phase Emission Rates Used in Staff's HARP Modeling

Substance	Diesel Generator	Washing Vehicle & LRU Maintenance Truck	Security	Visitor	Staff	Delivery Trucks
Peak Hourly Emissions per vehicle (lb/hr)						
DPM	1.50E-02					3.91E-03
Benzene		9.69E-04	1.70E-04	6.52E-05	1.37E-03	
1,3-Butadiene		7.19E-05	1.21E-05	4.42E-06	9.38E-05	
Formaldehyde		4.14E-04	2.52E-05	9.80E-06	2.06E-04	
Acetaldehyde		1.87E-04	2.00E-05	7.67E-06	1.61E-04	
Acrolein		3.18E-05	1.37E-06	5.48E-07	1.15E-05	
Annual Emissions per vehicle (lb/yr)						
DPM	1.80E-01					1.13E+01
Benzene		2.79E+00	4.90E-01	1.88E-01	3.95E+00	
1,3-Butadiene		2.07E-01	3.48E-02	1.27E-02	2.70E-01	
Formaldehyde		1.19E+00	7.26E-02	2.82E-02	5.93E-01	
Acetaldehyde		5.39E-01	5.76E-02	2.21E-02	4.64E-01	
Acrolein		9.16E-02	3.95E-03	1.58E-03	3.31E-02	

Source: Peak hourly emissions from applicant's HARP modeling files; annual emissions are hourly emissions times 2,880 hrs/yr
Note: Values listed are for emissions from ONE vehicle of each type
DPM = diesel particulate matter

Public Health Table 7
Results of Staff's Analysis and the Applicant's Analysis for Cancer Risk and Chronic and Acute Hazard

	Staff's Analysis			Applicant's Analysis *(Source: Table DR-111b)*		
	Cancer Risk (per million)	Chronic HI	Acute HI	Cancer Risk (per million)	Chronic HI	Acute HI
PMI	2.7	0.0019	0.0083	0.000667	0.00000042	0.0616
MEIR (nearest resident receptor)	0.13	0.00011	0.0044	0.000014	0.000000009	0.0344

Notes:
PMI= point of maximum impact determined in staff's analysis; the PMI is located on the facility fenceline
MEIR = maximally exposed individual, residential is located at a residence approximately 0.3 miles south of the western area of the facility

Public Health Table 8
Results of Staff's Analysis: Contribution to Total Cancer Risk by Individual Substances from All Sources at the Point of Maximum Impact (PMI)

Substance	Diesel Emergency Generator	Mirror wash and LRU vehicles	Security Vehicles	Visitor Vehicles	Staff Vehicles	Diesel Delivery Vehicles	Total Risk
DPM	5.26E-11					2.17E-06	2.17E-06
Benzene		3.05E-09	4.47E-11	9.36E-11	3.66E-07		3.70E-07
1,3-Butadiene		1.36E-09	1.91E-11	3.79E-11	1.50E-07		1.52E-07
Formaldehyde		2.73E-10	1.39E-12	2.95E-12	1.15E-08		1.18E-08
Acetaldehyde		5.89E-11	5.26E-13	1.10E-12	4.30E-09		4.36E-09
Acrolein							
SUM	5.26E-11	4.74E-09	6.57E-11	1.36E-10	5.32E-07	2.17E-06	2.71E-06

Public Health Table 9
Results of Staff's Analysis: Contribution to Total Cancer Risk by Individual Substances from All Sources at the MEI-Resident

Substance	Diesel Emergency Generator	Mirror wash and LRU vehicles	Security Vehicles	Visitor Vehicles	Staff Vehicles	Diesel Delivery Vehicles	Total Risk
DPM	5.08E-12					8.66E-08	8.66E-08
Benzene		1.31E-09	2.82E-11	1.04E-09	2.98E-08		3.21E-08
1,3-Butadiene		5.82E-10	1.20E-11	4.21E-10	1.22E-08		1.32E-08
Formaldehyde		1.17E-10	8.77E-13	3.28E-11	9.39E-10		1.09E-09
Acetaldehyde		2.53E-11	3.31E-13	1.22E-11	3.50E-10		3.87E-10
Acrolein							
SUM	5.08E-12	2.03E-09	4.14E-11	1.51E-09	4.33E-08	8.66E-08	1.33E-07

C.6.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the central portion of the proposed 850 MW project. It was developed because it could be constructed without the necessity of a new 500 kV transmission line, and would avoid several other environmental impacts. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

C.6.5.1 SETTING AND EXISTING CONDITIONS

The general setting and existing conditions would remain as described in C.15.4.1 although the land requirements would be proportionately reduced to reflect the smaller project size. Locations of laydown areas may also vary.

C.6.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Reduced Acreage Alternative is likely to result in reduced emissions which would decrease the cancer risk and chronic and acute hazard indices predicted for the 850 MW project as proposed. However, the public health analysis has determined that the cancer risk and chronic and acute hazard indices are far below the level of significance at the point of maximum impact for the project as proposed. Therefore staff concludes that with respect to public health impacts, the Reduced Acreage Alternative is not preferable over the project as proposed.

C.6.5.3 CEQA LEVEL OF SIGNIFICANCE

Similar to the proposed project, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts to public health would occur as a result of emissions of TACs (HAPS) associated with the Reduced Acreage Alternative.

C.6.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed 850 MW project. This alternative, the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 2**.

C.6.6.1 SETTING AND EXISTING CONDITIONS

The general setting and existing conditions would remain as described in C.15.4.1 although the land requirements would be proportionately reduced to reflect the smaller project size. Locations of laydown areas may also vary.

C.6.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The 720 MW Alternative would result in similar types of public health and safety issues from construction, demolition and operation as the proposed 850 MW project. Staff has analyzed potential public health risks associated with construction and operation of the Calico Solar Project and does not expect any significant adverse cancer or long-term health effects to any members of the public, including low income and minority populations, from project toxic emissions. The Avoidance of Donated and Acquired Lands Alternative would reduce the project by approximately 15%, but otherwise represent the same impacts. Staff also concludes that its analysis of potential health impacts from the proposed Calico Solar Project uses a conservative health-protective methodology that accounts for impacts to the most sensitive individuals in a given population, including newborns and infants. According to the results of staff’s health risk assessment, emissions from Calico Solar Project would not contribute significantly or cumulatively to morbidity or mortality in any age or ethnic group residing in the project area.

C.6.6.3 CEQA LEVEL OF SIGNIFICANCE

Similar to the proposed project, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts would occur to public health and safety associated with the construction or operation of the 720 MW Alternative.

C.6.7 NO PROJECT/NO ACTION ALTERNATIVE

There are three No Project / No Action Alternatives evaluated as follows:

No Project / No Action Alternative #1: No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another renewable energy project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If the proposed project is not approved, renewable projects would likely be developed on other sites in San Bernardino County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District. Under the No Project/No Action alternative public health impacts to the proposed project site and area would be similar as those currently occurring under the existing conditions in the area. Given that there would be no significant change over the existing conditions, the public health impacts of the No Project/No Action alternative would be less-than-significant.

No Project / No Action Alternative #2: No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. As a result, GHG emissions would result from the construction and operation of the solar technology and would likely be similar to the GHG emissions from the proposed project. Different solar technologies require different amounts of construction and operations maintenance; however, it is expected that all the technologies would provide the more significant benefit, like the proposed project, of displacing fossil fuel fired generation and reducing associated GHG emissions. As such, this No Project/No Action Alternative could result in GHG benefits similar to those of the proposed project.

No Project / No Action Alternative #3: No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the greenhouse gas emissions from the site, including carbon uptake, is not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in the GHG benefits from the proposed project. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.6.8 PROJECT-RELATED FUTURE ACTIONS – PUBLIC HEALTH AND SAFETY

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.6.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option.

There are many potential public health concerns that could be associated with construction and operation of the SCE upgrades. These include health impacts due to the emissions of air pollutants; health risks from the emissions of air contaminants and airborne pathogens; exposure to hazards from the handling of wastes, chemicals and other materials; exposure to electromagnetic fields (EMF) from power transmission; and safety concerns for workers. EMF is discussed in the **TRANSMISSION LINE SAFETY AND NUISANCE** section of this Staff Assessment/EIS. Small quantities of hazardous or solid waste may be generated during the construction phase of the proposed upgrades, which is discussed under **HAZARDOUS MATERIALS MANAGEMENT** and **WASTE MANAGEMENT**. Worker safety is discussed in the **WORKER SAFETY AND FIRE PROTECTION** section of this Staff Assessment/EIS.

C.6.8.2 ENVIRONMENTAL IMPACTS

The potential for public exposure to hazardous materials is considered minimal because waste management plans would be implemented (see SA/EIS sections on **HAZARDOUS MATERIALS MANAGEMENT** and **WASTE MANAGEMENT**). Releases from the project in wastewater streams to the public sewer system are discussed in the section addressing **SOIL AND WATER RESOURCES**. Programs to create a safe workplace for project employees are described in **WORKER SAFETY**.

A public health issue that is not addressed elsewhere in this Staff Assessment/EIS would be health risks from the emissions of air contaminants during construction. The construction activities caused by the SCE upgrades would generate emissions at the locations of the work along the transmission line and telecommunication ROWs and at the Pisgah Substation site, as are discussed in the **AIR QUALITY** section of this Staff Assessment/EIS. The project would comply with federal, state, and local air quality rules and regulations. A State Implementation Plan was prepared for the Mohave Desert

Planning Area, which identifies sources of PM10 emissions and identifies control measures to reduce these emissions. Mitigation measures would be implemented to reduce the emissions generated during project construction and operation. Following implementation of mitigation discussed below, the construction of the SCE upgrades would not likely have a significant adverse impact on air quality in the area. Therefore, public exposure to air contaminants would not generate a significant public health risk.

C.6.8.3 MITIGATION

The Mojave Desert Air Quality Management District (MDAQMD) is responsible for the project area and developed the MDAQMD Ozone State Implementation Plan (SIP) (2004) for inclusion in the 2004 Southeast Desert Modified Ozone State Implementation Plan (2004 SED SIP). This plan identifies sources of PM10 emissions and mitigation measures to reduce these emissions. The upgrade projects would be required to comply with MDAQMD rules and portable equipment rules, which would dictate how the equipment could be operated. Mitigation measures would be implemented following the MDAQMD Ozone SIP to reduce the emissions generated during project construction and operation.

In addition, with effective and comprehensive control measures such as those listed in the **Air Quality** section of this Staff Assessment/EIS, as well as those recommended for the proposed Calico Solar Project, dust and equipment exhaust impacts could likely be reduced to a less than significant level and public exposure to air contaminants would not create a significant public health and safety risk.

C.6.8.4 CONCLUSION

The construction and structure removal activities associated with all of SCE's upgrades would cause emissions due to heavy-duty diesel and gasoline-powered construction equipment and fugitive particulate matter (dust) emissions from activity on unpaved surfaces. With effective and comprehensive control measures such as those recommended in the **AIR QUALITY** section of this SA/EIS for the proposed Calico Solar Project and included in Appendix EE of the AFC, dust and equipment exhaust impacts could likely be reduced to a less than significant level. As a result, public exposure to air contaminants would not be expected to generate a significant public health and safety risk.

C.6.9 CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

C.6.9.1 GEOGRAPHIC EXTENT

Cumulative impacts can occur if implementation of the Calico Solar Project could combine with those of other local or regional projects. Cumulative impacts would occur locally if Calico Solar Project impacts combined with impacts of projects located within the same air basin. Cumulative impacts could also occur as a result of development of some of the many proposed solar and wind development projects that have been or are expected to be under consideration by the BLM and the Energy Commission in the near future. Many of these projects are located within the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona.

For purposes of the cumulative analysis, the emissions from construction or operation of the Calico Solar Project could potentially combine with emissions from past, present and reasonably foreseeable projects to result in adverse health effects to the public. Cumulative impacts to public health could occur as a result of implementation of the Calico Solar Project on both a local and regional level. The geographic extent for the analysis of local cumulative impacts associated with the Calico Solar Project includes the Mojave Desert Air Basin (MDAB), which contains most of San Bernardino County and parts of Riverside County and Kern County.

C.6.9.2 CUMULATIVE IMPACT ANALYSIS

Cumulative impacts of the proposed project and other projects within a 6-mile radius were not evaluated by the applicant. The applicant has stated that there are no current or future projects within a 6-mile radius that could contribute to a public health cumulative impact, and therefore no further analysis was conducted (SES 2008a, Section 5.16.3). Nevertheless, there is a potential for substantial future development in the project area and throughout the southern California desert region, as indicated by the list of planed projects within a 10-mile radius (provided by the applicant), which includes several energy generating projects employing solar or wind technologies (SES 2008a, Table 5.18-3). Staff has analyzed the public health and safety effects of existing and foreseeable projects listed in the Cumulative Impacts section of the AFC (SES 2008a, Section 5.18) as follows.

C.6.9.3 LOCAL PROJECTS

The maximum cancer risk for emissions from the Calico Solar Project (calculated by staff) is 2.7 in one million at the point of maximum impact located at the project fenceline. The maximum impact location occurs where pollutant concentrations from the Calico Solar Project would theoretically be the highest. Even at this location, staff does not expect any significant change in lifetime risk to any person, and the increase does not represent any real contribution to the average lifetime cancer incidence rate due to all causes (environmental as well as life-style and genetic). Modeled facility-related residential risks are lower at more distant locations, and actual risks are expected to be much lower since worst-case estimates are based on conservative assumptions and thus overstate the true magnitude of the risk expected. Therefore, staff does not consider the incremental impact of the additional risk posed by the Calico Solar Project to be either individually or cumulatively significant.

C.6.9.4 REGIONAL PROJECTS

The nature of public health impacts from exposure to materials that could result in negative health effects combined with the vast area over which the future solar and wind development projects would be built in southeastern California, southern Nevada, and western Arizona, as well as the relative isolation of these projects from sensitive receptors, precludes the potential for impacts of these projects to combine with each other to result in significant impacts. Any emission from construction of these projects would be dispersed over these areas and would not be expected to result in chronic health problems to sensitive receptors. Operation of the future solar and wind energy projects would result in negligible emissions, mostly related to worker vehicles and maintenance trucks, therefore, operation of these future projects would not result in negative regional health effects.

C.6.9.5 CUMULATIVE IMPACT CONCLUSION

Public health impacts of the Calico Solar Project would not combine with impacts of any past, present, or reasonably foreseeable projects to result in cumulatively considerable local or regional impacts. Therefore, no mitigation is recommended to address potential cumulative project impacts.

C.6.10 COMPLIANCE WITH LORS

Staff has considered the minority population as identified in **Socioeconomics Figure 1** in its impact analysis and has found no potential significant adverse impacts for any receptors, including environmental justice populations. In arriving at this conclusion, staff notes that its analysis complies with all directives and guidelines from the Cal/EPA Office of Environmental Health Hazard Assessment and the California Air Resources Board. Staff's assessment is biased toward the protection of public health and takes into account the most sensitive individuals in the population. Using extremely conservative (health-protective) exposure and toxicity assumptions, staff's analysis demonstrates that members of the public potentially exposed to toxic air contaminant emissions of this project—including sensitive receptors such as the elderly, infants, and people with pre-existing medical conditions—will not experience any significant chronic or cancer health risk as a result of that exposure. Staff believes that it incorporated every conservative assumption called for by state and federal agencies responsible for establishing methods for analyzing public health impacts. The results of that analysis indicate that there would be no direct or cumulative significant public health and safety impact to any population in the area. Therefore, given the absence of any significant health impacts, there are no disparate health impacts and there are no environmental justice issues associated with **PUBLIC HEALTH AND SAFETY**.

Staff concludes that construction and operation of the Calico Solar Project will be in compliance with all applicable LORS regarding long-term and short-term project impacts in the area of **PUBLIC HEALTH AND SAFETY**.

C.6.11 NOTEWORTHY PUBLIC BENEFITS

It is noteworthy that a solar electric generating facility such as the proposed Calico Solar Project would emit significantly less TACs to the environment than other energy sources available in California such as natural gas or biomass, thereby reducing the health risks that would otherwise occur with these non-renewable energy sources. At the same time, the proposed Calico Solar Project would provide much needed electrical power to California residences and businesses, and will contribute to electric reliability. Electrical power is not only necessary to maintain a functioning society, but it also benefits many individuals who rely on powered equipment for their health (such as dialysis equipment and temperature control equipment). For example, it is documented that during heat waves in which elevated air-conditioning use causes an electrical blackout, hospitalizations and deaths due to heat stroke are increased.

C.6.12 FACILITY CLOSURE

Closure of the proposed Calico Solar Project (temporary or permanent) would follow a closure plan prepared by the applicant and designed to minimize public health and environmental impacts. Permanent closure would presumably occur 40 years after the start of operation unless the project remains economically viable. Decommissioning procedures would be consistent with all applicable LORS and would be submitted to the Energy Commission for approval before implementation (SES 2008a, Section 3.12.3). Staff expects that impacts to public health from the closure and decommissioning process would represent a fraction of the impacts associated with the construction or operation of the proposed Calico Solar Project.

Therefore based on staff's analysis for the construction and operation phases of this project, staff concludes that public health-related impacts from closure and decommissioning of the Calico Solar Project would be insignificant.

C.6.13 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

No conditions of certification or mitigation measures are proposed.

C.6.14 CONCLUSIONS

Staff has analyzed potential public health risks associated with construction and operation of the Calico Solar Project and does not expect any significant adverse cancer or long-term health effects to any members of the public, including low income and minority populations, from project toxic emissions. Staff also concludes that its analysis of potential health impacts from the proposed Calico Solar Project uses a conservative health-protective methodology that accounts for impacts to the most sensitive individuals in a given population, including newborns and infants. According to the results of staff's health risk assessment, emissions from Calico Solar Project would not contribute significantly or cumulatively to morbidity or mortality in any age or ethnic group residing in the project area.

C.6.15 REFERENCES

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C.7 – HYDROLOGY, WATER USE AND WATER QUALITY (SOIL AND WATER RESOURCES)

Testimony of Casey Weaver

C.7.1 SUMMARY OF CONCLUSIONS

With the information provided to date, the U.S. Bureau of Land Management and California Energy Commission staff (hereafter jointly referred to as staff) have determined that construction, operation, and decommissioning of the proposed Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) could potentially impact soil and water resources. Where these potential impacts have been identified, staff has proposed mitigation measures to reduce identified impacts to levels that are less than significant. The mitigation measures, as well as specifications for laws, ordinances, regulations and standards conformance, are included herein as conditions of certification. The conditions of certification referred to herein address the California Environmental Quality Act requirements for the California Energy Commission's analysis and the Bureau of Land Management's needs for a National Environmental Policy Act analysis. The Project would conform to all applicable laws, ordinances, regulations and standards (LORS). Staff's conclusions based on analysis of the information submitted to-date are as follows:

1. The proposed project would be located in the Mojave Desert of San Bernardino County in an area characterized by braided stream channels, flash flooding, alluvial fan conditions, low rainfall, sparse vegetation, and the potential for wind erosion/ deposition.
2. The project proposes to place 34,000 solar dishes, known as SunCatchers, within areas known to be subject to flash flooding and erosion. Project-related changes to the braided and alluvial fan stream hydraulic conditions could result in on-site erosion, stream bed degradation or aggradation, and erosion and sediment deposition impacts to adjacent land. SunCatchers within the stream courses could be subject to destabilization by stream scour. Impacts to soils related to wind erosion and runoff-borne erosion are potentially significant, as are impacts to surface water quality from sedimentation and the introduction of foreign materials, including potential contaminants, to the project area.
3. The applicant completed a hydrologic study and hydraulic modeling of the major stream channels on the project. Based on this work and subsequent analysis by staff, the project can be designed to withstand flash flood flows with minimal damage to SunCatchers. Condition of Certification **SOIL&WATER-3** ensures such a design.
4. A Draft Drainage, Erosion, and Sedimentation Control Plan mitigates the potential project-related storm water and sediment impacts. However, the calculations and assumptions used to evaluate potential storm water and sedimentation impacts are imprecise and have limitations and uncertainties associated with them such that the magnitude of potential impacts that could occur cannot be determined precisely. Based on these factors, the proposed project could result in impacts that would be significant with respect to California Environmental Quality Act significance criteria specified herein and National Environmental Policy Act significance criteria specified in 40 CFR 1508.27. Therefore, Conditions of Certification **SOIL&WATER-1,**

SOIL&WATER-2 and **SOIL&WATER-3** have been developed that define specific methods of design analysis, development of best management practices, and monitoring and reporting procedures to mitigate impacts related to flooding, erosion, sedimentation, and stream morphological changes. Compliance with LORS, particularly the Clean Water Act requirements, will insure no adverse impacts to waters of the U.S. With implementation of these Conditions, the potential effects of the proposed project would be less than significant. The applicant has not provided information necessary to complete development of requirements for dredge and fill in waters of the state. Once the applicant provides this information staff can complete development of requirements that will be included in Condition of Certification **SOIL&WATER-2.**

5. Surface water and groundwater quality could be affected by construction activities, ongoing activities on the project site including mirror washing, vehicle use and fueling, storage of oils and chemicals, the proposed septic and leach field system for sanitary wastes, and wastes from the water treatment system. These impacts are potentially significant. Compliance with laws, ordinances, regulations and standards and Conditions of Certification **SOIL&WATER-1, SOIL&WATER-2, SOIL&WATER-3** and **SOIL&WATER-6** will mitigate to a level less than significant. The applicant has not provided information necessary to complete development of requirements for discharges of brine waters to evaporation ponds or sanitary septic systems. Once the applicant provides this information staff can complete development of requirements that will be included in Condition of Certification **SOIL&WATER-2.**
6. Impacts to groundwater supply and groundwater quality during construction and operations would be less than significant. SunCatcher mirrors will be spray washed on a regular basis. Mirror washing and dust control watering will comprise the primary water uses for the project. Daily maximum water use is estimated to be 43.7gallons per minute (gpm) during construction, with total annual use of approximately 20 AF for operation. Conditions of Certification **SOIL&WATER-2**, **SOIL&WATER-3**, and **SOIL&WATER-4** are proposed by staff to ensure this water supply and treatment system comply with laws, ordinances, regulations and standards and not pose adverse impacts to water quality or supply. The applicant has not provided information necessary to complete development of requirements for discharges of brine waters to evaporation ponds or sanitary septic systems. Once the applicant provides this information staff can complete development of requirements that will be included in Condition of Certification **SOIL&WATER-2**.
7. The proposed project would use air-cooled radiators fitted on each individual engine for heat rejection. Use of this technology would substantially reduce potential water use and is consistent with Energy Commission water policy.

C.7.2 INTRODUCTION

This section analyzes potential impacts to soil and water resources from the construction and operation of the proposed Calico Solar Project. The analysis specifically focuses on the potential for Calico Solar to:

- cause accelerated wind or water erosion or sedimentation;
- exacerbate flood conditions in the vicinity of the project;

- adversely affect surface or groundwater supplies;
- degrade surface or groundwater quality; and,
- comply with all applicable laws, ordinances, regulations, and standards (LORS) and state policies.

Where the potential for significant adverse impacts is identified, staff has proposed mitigation measures to reduce the significance of the impacts, if possible, and has recommended conditions of certification.

C.7.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The most significant potential impacts due to project development are typically those leading to soil erosion, flooding, or depletion or degradation of water resources. Thresholds for determining significance in this document are based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission staff. In addition, staff's evaluation of the significance of the impact of the proposed project on soils, hydrology, water use and water quality (i.e., those listed below) includes an assessment of the context and intensity of the impacts, as defined in the National Environmental Policy Act (NEPA) implementing regulations 40 CFR Part 1508.27. The significance thresholds for soil and water resources are discussed in Section C.7.5.1.3.

Soils, hydrology and water resources impacts would be considered significant if the proposed project results in the effects listed below.

- violates any water quality standards or waste discharge requirements.
- substantially depletes groundwater supplies or interferes substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).
- substantially alters the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation onsite/offsite.
- substantially alters the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding onsite/offsite,
- creates or contributes runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.
- otherwise substantially degrades surface water or groundwater quality
- places structures within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map

- exposes people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.

Staff believes that soil erosion and flooding impacts, which are described below, are the most potentially significant impacts associated with the proposed project.

- The project will cause erosion of the project site and deposition of sediment into waters of the State. Portions of the site will largely be barren soil when constructed. Barren soil is subject to erosion by wind and water. Application of soil stabilizers and adherence to best management practices (BMPs) would reduce surface soil erosion and sedimentation impacts to less than significant.
- There could be flooding of the project site, as designed and constructed, and redirection of flood flows. Foundation elements (driven poles) designed to support the SunCatchers are proposed to be installed within existing drainage channels. The volume of the foundation elements will decrease the capacity of the existing channel to contain flood flows. Adherence to the Conditions of Certification regarding the construction and maintenance of the foundation elements within the active channels will reduce the potential impacts to less than significant.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local environmental LORS are applicable to the Calico Solar Project and are designed to ensure the best and appropriate use and management of both soil and water resources. Additionally, the requirements of these LORS are specifically intended to protect human health and the environment. The project's compliance with these LORS, as required by staff's recommended conditions of certification, is a major component of staff's determination regarding the significance and acceptability of the Calico Solar Project with respect to the use and management of soil and water resources.

Soil & Water Table 1
Laws, Ordinances, Regulations, and Standards

Federal LORS	
Clean Water Act (33 U.S.C. Section 1257 et seq.)	The Clean Water Act (CWA) (33 USC § 1257 et seq.) requires states to set standards to protect water quality, which includes regulation of storm water and wastewater discharges during construction and operation of a facility. California established its regulations to comply with the CWA under the Porter-Cologne Water Quality Control Act of 1967. The CWA also establishes protection of navigable waters through Section 401 and 404. Section 404 permitting and. Section 401 certification through the Army Corps of Engineers and Regional Water Quality Control Board (RWQCB) is required if there are potential impacts to surface waters of the State and/or Waters of the United States, such as perennial and ephemeral drainages, streams, washes, ponds, pools, and wetlands. The Army Corps and RWQCB can require impacts to these waters to be quantified and mitigated.

Resource Conservation and Recovery Act, 40 CFR Part 260 et seq.	The Resource Conservation Recovery Act (RCRA) is a comprehensive body of regulations that give U.S. EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also sets forth a framework for the management of non-hazardous solid wastes.
State LORS	
California Constitution, Article X, Section 2	This section requires that the water resources of the State be put to beneficial use to the fullest extent possible and states that the waste, unreasonable use or unreasonable method of use of water is prohibited.
The Porter-Cologne Water Quality Control Act of 1967, Water Code Sec 13000 et seq.	Requires the State Water Resources Control Board (SWRCB) and the nine RWQCBs to adopt water quality criteria to protect state waters. Those regulations require that the RWQCBs issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable. Section 13000 also states that the State must be prepared to exercise its full power and jurisdiction to protect the quality of the waters of the State from degradation.
California Water Code Section 13050	Defines "waters of the State."
California Water Code Section 13240, 13241, 13242, 13243, & Water Quality Control Plan for the Lahontan Region (Basin Plan)	The Basin Plan establishes water quality objectives that protect the beneficial uses of surface water and groundwater in the Region. The Basin Plan describes implementation plans and other control measures designed to ensure compliance with statewide plans and policies and provides comprehensive water quality planning. The following chapters are applicable to determining appropriate control measures and cleanup levels to protect beneficial uses and to meet the water quality objectives: Chapter 2, Present and Potential Beneficial Uses; Chapter 3, Water Quality Objectives, and the sections of Chapter 4, Implementation, entitled "Requirements for Site Investigation and Remediation," "Cleanup Levels," "Risk Assessment," "Stormwater Problems and Control Measures," Erosion and Sedimentation," "Solid and Liquid Waste Disposal to Land," and "Groundwater Protection and Management."
California Water Code Section 13260	Requires filing, with the appropriate RWQCB, a report of waste discharge that could affect the water quality of the state unless the requirement is waived pursuant to Water Code section 13269.
California Code of Regulations, Title 23, Division 3, Chapter 30	This chapter requires the submission of analytical test results and other monitoring information electronically over the internet to the SWRCB's Geotracker database.
State Water Resources Control Board General Permit CAS000002.	The SWRCB regulates storm water discharges associated with construction projects affecting areas greater than or equal to 1 acre to protect state waters. Under General Permit CAS000002, the SWRCB has issued a National Pollutant Discharge Elimination System (NPDES) General Permit for storm water discharges associated with construction activity. Projects can qualify under this permit if specific criteria are met and an acceptable Storm Water Pollution Prevention Plan (SWPPP) is prepared and implemented after notifying the SWRCB with a Notice of Intent.
State Water Resources Control Board 2003-003-DWQ	This general permit applies to the discharge of water to land that has a low threat to water quality. Categories of low threat discharges include piping hydrostatic test water.

California Code of Regulations, Title 22	Title 22, Division 4, Chapter 15 specifies Primary and Secondary Drinking Water Standards in terms of Maximum Contaminant Levels (MCLs). These MCLs include total dissolved solids (TDS) ranging from a recommended level of 500 milligrams per liter (mg/l), an upper level of 1,000 mg/l and a short term level of 1,500 mg/l. Other water quality MCLs are also specified, in addition to MCLS specified for heavy metals and chemical compounds.
California Code of Regulations, Title 23	Title 23, Division 3, Chapter 15 applies to waste discharges to land and requires the Regional Board issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable.
Local LORS	
County of San Bernardino General Plan and Development Code	Grading in San Bernardino County is subject to terms and conditions of San Bernardino County's General Plan, Development Code and California Building Code, based upon the 2006 International Building Code. Although the proposed site is located on federal land, county regulations for public health and safety are considered to be applicable to the project. If a county grading permit is required, the grading plan would need to be completed in compliance with San Bernardino County's General Plan and Development Code.
California Safe Drinking Water Act and San Bernardino County Code Title 3, Division 3, Chapter 6, Public Water Supply Systems	Requires public water systems to obtain a Domestic Water Supply Permit. The California Safe Drinking Water Act requires public water systems to obtain a Domestic Water Supply Permit. Public water systems are defined as a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out the year. California Department of Public Health (CDPH) administers the Domestic Water Supply Permit program, and has delegated issuance of Domestic Water Supply Permits for smaller public water systems in San Bernardino County to the County. Under the San Bernardino County Code Title 3, 5.15-6 Division 3, Chapter 6, Public Water Supply Systems, the County Department of Environmental Services monitors and enforces all applicable laws and orders for public water systems with less than 200 service connections. The proposed project would likely be considered a non-transient, non-community water system.
San Bernardino County Title 3, Division 3, Chapter 6,Article 5, Desert Groundwater Management	To help protect water resources in unregulated portions of the desert while not precluding its use, the County adopted this article. This article requires a permit to locate, construct, operate, or maintain a new groundwater well within the unincorporated, unadjudicated desert region of San Bernardino County. California Environmental Quality Act (CEQA) compliance must be completed prior to issuance of a permit, and groundwater management, mitigation, and monitoring may be required as a condition of the permit. The ordinance states that it does not apply to "groundwater wells located on Federal lands unless otherwise specified by inter-agency agreement." The BLM and County entered into a Memorandum of understanding (MOU) that provides that the BLM will require conformance with this code for all projects proposing to use groundwater from beneath public lands.
San Bernardino County Development Code Section 82.13.080, Soil Erosion and Sediment Control Plans/Permits	Section 82.13.080 establishes regulations and procedures to control human existing and potential induced accelerated erosion. Elements of this ordinance include project planning, preparation of Soil Erosion and Sediment Control Plans, runoff control, land clearing, and winter operations.
San Bernardino County Municipal Stormwater Permit	The current Permit, Order No. R8-2010-0036 adopted January 29, 2010,, outlines a schedule of monitoring requirements, best management practices, and conditions designed to promote the reduction of pollutants in stormwater discharges.

San Bernardino County Ordinance Code, Title 3, Division 3, Chapter 8, Waste Management, Article 5, Liquid Waste Disposal	This ordinance requires the following compliance for all liquid waste disposal systems: (1) compliance with applicable portions of the Uniform Plumbing Code and the San Bernardino County Department of Environmental Health (DEHS) standards; (2) approval by the DEHS and building authority with jurisdiction over the system; or (3) for alternative systems, approval by the DEHS, the appropriate building official of this jurisdiction, and the appropriate California RWQCB.
San Bernardino County Ordinance Code, Title 6, Division 3, Chapter 3, Uniform Plumbing Code	This ordinance describes the installation and inspection requirements for locating disposal/leach fields and seepage pits.
State Policies and Guidance	
Integrated Energy Policy Report (Public Resources Code, Div. 15, Section 25300 et seq.)	In the 2003 Integrated Energy Policy Report (IEPR), consistent with SWRCB Policy 75-58 and the Warren-Alquist Act, the Energy Commission adopted a policy stating they will approve the use of fresh water for cooling purposes by power plants only where alternative water supply sources and alternative cooling technologies are shown to be "environmentally undesirable" or "economically unsound."
State Water Resources Control Board Res. No. 68-16	The "Antidegradation Policy" mandates that: 1) existing high quality waters of the State are maintained until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonable affect present and anticipated beneficial uses, and will not result in waste quality less than adopted policies; and 2) requires that any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters, must meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that: a) a pollution or nuisance will not occur and b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.
State Water Resources Control Board Res. 75-58	The principal policy of the SWRCB that addresses the specific siting of energy facilities is the Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling (adopted by the Board on June 19, 1976, by Resolution 75-58). This policy states that use of fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound.
State Water Resources Control Board Res. No. 88-63	States that all groundwater and surface water of the State are considered to be suitable for municipal or domestic water supply with the exception of those waters that meet specified conditions.
State Water Resources Control Board Res. 2005-0006	Adopts the concept of sustainability as a core value for State Water Board programs and directs its incorporation in all future policies, guidelines, and regulatory actions.
State Water Resources Control Board Res. 2008-0030	Requires sustainable water resources management such as low impact development (LID) and climate change considerations, in all future policies, guidelines, and regulatory actions. Directs Regional Water Boards to "aggressively promote measures such as recycled water, conservation and LID Best Management Practices where appropriate and work with Dischargers to ensure proposed compliance documents include appropriate, sustainable water management strategies."
The California Safe Drinking Water and Toxic Enforcement Act	The California Health & Safety Code Section 25249.5 et seq. prohibits actions contaminating drinking water with chemicals known to cause cancer or possessing reproductive toxicity. The RWQCB administers the requirements of the Act.

C.7.4 PROPOSED PROJECT

C.7.4.1 SETTING AND EXISTING CONDITIONS

Proposed Project

The proposed Calico Solar Project site is approximately 8,230 acres of undeveloped land located within the Mojave Desert in the central portion of San Bernardino County. The site is located approximately 37 miles east of Barstow, California with its southern boundary adjacent to Interstate 40 (I-40) (**Soil and Water Figure 1**). Main access to the project is via north-bound Hector Road, which exits I-40, enters the southern project boundary near the center line of the project and travels north for approximately 1 mile, where it crosses the Burlington North Santa Fe (BNSF) railroad. Secondary access to the project is attained adjacent to the Pisgah substation. Access to the Pisgah substation begins on I-40 at the southbound Hector Road off ramp. Southbound Hector Road ends abruptly at the intersection with old Route 66. Taking east-bound Rte 66 approximately 4 3/4 miles, the road turns north, passes beneath I-40 and turns west for approximately 1 mile ending at a northeast heading dirt road that leads to the Pisgah substation, approximately ¼ mile northeast of that intersection.

Site construction will be accomplished in two phases and will include the development of four laydown areas, two for each of the two construction phases (**Soil and Water Figure 4**). For Phase I, one laydown area will be a 26-acre site to be located in the south east corner of the Phase I boundary adjacent to the eastern project entrance just north of the Pisgah Substation. The other Phase 1 laydown area will be a 14- acre site located adjacent to the Main Services Complex, provisionally identified to be constructed in the central portion of the project site. Phase 2 construction will utilize a 26- acre site located adjacent to the I-40 Hector Road off ramp. Another laydown area is an 11- acre site to be constructed south of the BNSF railroad and north of I-40. Temporary site access for Phase 1 construction needs would be constructed off I-40 beginning east of the Pisgah Substation and would traverse approximately 3.5 miles across Pisgah Area of Critical Environmental Concern (ACEC) requiring an approximately 30-foot Right of Way (ROW). Long term permanent access would be would be accomplished by building a bridge over the BNSF railroad along Hector Road north of I-40. In addition to the proposed Calico Solar site and construction areas, there are other features and facilities associated with the proposed project (the majority of which are located on the proposed project site or construction laydown area), including:

- Approximately 34,000 38-foot diameter solar dish Stirling systems and associated equipment and infrastructure within a fenced boundary;
- An onsite, 14.4-acre Main Services Complex that would be located generally in the center of the site for administration and maintenance activities. The complex would include three SunCatcher assembly buildings, administrative offices, operations control room, maintenance facilities, parking and access roads and a water treatment complex that would include a water treatment structure, raw water storage tank, demineralized water storage tank, basins and a potable water tank;
- An onsite hydrogen generation system;

- An onsite, 3-acre, 850-MW Substation that would deliver the generated electrical power to the existing Pisgah Substation, located generally in the south east corner of the site;
- Twelve to fifteen electrical transmission towers approximately 100 feet high that would be constructed to convey the electricity from the onsite substation to the Pisgah substation;
- Approximately 50 miles of underground 34.5kV cable;
- Approximately 650 miles of 600V cable;
- Approximately 500 miles of paved and unpaved roads;
- Underground water pipeline; and,
- Underground hydrogen supply pipelines.

In addition to the onsite features discussed above, an existing offsite water supply well (located in Cadiz, CA) is proposed to supply water for the project. This water would be transported to the project site by train.

<u>Project, Site, and Vicinity Setting</u>

The proposed project site is located in the central portion of San Bernardino County. The surrounding area consists of undeveloped desert land with small rural communities in the vicinity. The City of Barstow is located approximately 37 miles northwest of the project, the ghost town of Calico is located approximately 25 miles northwest of the project, the town of Bagdad is located approximately 36 miles southeast of the project and the town of Amboy is located approximately 42 miles southeast of the project.

Climate

The Calico Solar Project site is located in the Mojave Desert in southeastern California. The area is classified as a high desert climate characterized by low precipitation, hot summers, mild to cold winters, low humidity and strong temperature inversions. It is separated from the coastal regions by the San Gabriel and San Bernardino mountain ranges to the south and the Tehachapi Mountains to the west. The area’s climatic conditions are strongly influenced by the large scale sinking and warming of air in the semi-permanent subtropical high pressure center over the eastern Pacific Ocean. This sinking air coupled with the site’s distance from the ocean and its location in the rain shadow of surrounding mountains severely limits precipitation in the site vicinity.

Temperature and precipitation have been measured at Barstow Daggett Airport since 1948. These data indicate that the hottest month is July with the highest mean annual temperature of 104.2 degrees Fahrenheit (ºF) and lowest mean annual temperature of 73.2 ºF. The coldest month is January with the highest mean annual temperature of 60.6 ºF and lowest mean annual temperature of 35.9 ºF.

Most of the area’s precipitation occurs during the winter season, which is largely responsible for the average precipitation of approximately 4 inches. During summer months, rain is scarce, and relative humidity is very low.

The area is often windy, typical of a desert environment. The prevailing wind is from the west or west-southwest, and is generally stronger during summer than winter.

Groundwater

Lavic Valley

The project site lies within the Lavic Valley Groundwater Basin. The basin is approximately 159 square miles in area and is bounded by nonwater-bearing rocks of the Cady Mountains on the north and east, of the Bullion Mountains on the south and east, of the Lava Bed Mountains on the southwest, and by the Pisgah fault on the west. Parts of the eastern and northern boundaries are drainage divides. The southern part of this basin lies within the Twentynine Palms Marine Corps Base. In the northern part of the basin, surface drainage is toward Hector Siding and in the southern part of the basin, surface drainage is toward Lavic (dry) Lake (DWR 2004; Rogers 1967). Groundwater may flow eastward out of the basin beneath a surface drainage divide. Groundwater in the basin is found in Quaternary alluvial and lacustrine deposits. Holocene age alluvium consists of unconsolidated, well-sorted, fine- to coarse-grained sand, pebbles, and boulders with variable amounts of silt and clay deposited in washes and alluvial fans (DWR 1967). Pleistocene age deposits are composed of gently tilted, unconsolidated to moderately consolidated, moderately well bedded gravel, sand, silt and clay (DWR 1967). The principal basin recharge is derived from percolation of runoff from surrounding mountains through alluvial fans and washes (DWR 1967). Subsurface flow from adjoining basins may also contribute to recharge (DWR 1967).

Water from a well in the southern part of the basin near Lavic Lake sampled in 1917 was sodium sulfate in character with a TDS content of 1,680mg/L (DWR 1967; DWR 1954). Water from a well in the northeastern part of the basin sampled in the 1950s was sodium sulfate in character with a TDS content of 1,721mg/L. Water from a well in the northwestern part of the basin near Hector Siding sampled in the 1950s was calcium-sodium bicarbonate in character with a TDS content of 278mg/L.

Cadiz Valley

The applicant proposes to use groundwater for project construction and operation obtained from a well located in Cadiz, California. Cadiz is located approximately 64 miles southeast of the proposed project site within the Cadiz Valley groundwater basin of the Colorado River Hydrologic Region. Structurally, the Bristol and Cadiz groundwater basins constitute a single physiographic unit (Thompson 1929). A low alluvial divide separates the unit into two parts; the northwest division which holds Bristol Dry Lake (Bristol Valley Groundwater Basin) and a southeastern division which holds Cadiz Dry Lake (Cadiz Valley Groundwater Basin). The Bristol and Cadiz Valleys occupy a single great valley or trough that trends in a northwesterly direction. Thompson considered that the name Bristol Trough describes the large trough that contains Bristol and Cadiz Valleys and he stated that the two divisions clearly form a single major unit and therefore he considered the trough as one unit. The southwestern border of the trough is formed by the Bullion, Sheep Hole, and Coxcomb Mountains, which extend almost continuously from the northwest to the southeast ends of the basin. The northeastern border of the trough is more irregular with relatively isolated northwesterly trending ridges. These ridges are the Bristol and Old Dad Mountains.

Large drainages flow through the gaps between the ridges. The Bristol Trough is separated from Fenner Valley (located northeast) by the Marble and Ship Mountains. A wash which passes between these mountains brings the drainage from the Fenner and Lanfair Valleys into the Bristol Trough. Southeast of the Ship Mountains, the eastern portion of the Bristol Trough is formed by the Old Woman Mountains and Kilbeck Hills.

The maximum thickness of sediments in the Bristol trough is unknown, but may be greater than 6,000 feet in the vicinity of Bristol Dry Lake (Maas 1994). Based on available geologic, hydrologic, and geophysical data, the principal formations in the Cadiz Valley that can store and transmit groundwater have been divided into three general units: an upper alluvial aquifer; a lower alluvial aquifer; and a bedrock aquifer. The upper aquifer consists of Quaternary and late-Tertiary alluvial sediments, including stream deposited sand and gravel with lesser amounts of silt (Moyle 1967; Metropolitan 1999b). The thickness of the upper alluvial sediments is approximately 100 to 800 feet (Metropolitan 1999b). The lower alluvial aquifer consists of older sediments, including interbedded sand, gravel, silt, and clay of mid- to late-Tertiary age. Where these materials extend below the water table, they yield water freely to wells but are generally less permeable than the upper aquifer sediments (Moyle 1967; Metropolitan 1999b).

Prior to 1929, eight wells were drilled in the Bristol valley by the Atchison, Topeka & Santa Fe Railway. Of those 8, two produced very little water. The other six produced abundant water but it was too salty to be used. While the initial wells indicated that the majority of the basin contained mostly salty water, fresh water was found in wells drilled at Cadiz, Archer and southwest of Altura. Thompson attributed this anomalously high quality groundwater found in Cadiz as originating in Fenner Valley and flowing through the subsurface between Ship and Marble Mountains. The Fenner Valley watershed includes all of Fenner Valley and a portion of Lanfair Valley (see Figure 5). The boundaries of this watershed are defined by the Marble and Providence mountains to the west, the New York and Providence mountains to the north, the Piute Range to the northeast, and the Old Woman and Ship mountains to the east. The Clipper Mountains, which reach elevations above 4,600 feet, occur entirely within the Fenner Valley watershed. Elevations within the watershed range from a high of more than 7,500 feet in the New York Mountains to a low of approximately 900 feet in Fenner Gap. Fenner Gap, which forms the surface and groundwater drainage outlet of the Fenner Valley watershed, is located between the Marble and Ship mountains. Similarly, Thompson (1929), concluded that the high quality water found at Archer had originated in the Old Woman Mountains and flowed in the subsurface toward Cadiz Dry Lake.

A production well located in Fenner Gap draws water primarily from the upper and lower aquifers and yields 3,000 gallons per minute with less than 20 feet of drawdown (Metropolitan 1999b). The Cadiz Inc. agricultural wells draw water from the alluvial aquifers and typically yield 1,000 to more than 2,000 gallons per minute. Based on findings from recent drilling in Fenner Gap, carbonate bedrock of Paleozoic age, located beneath the alluvial aquifers, contains groundwater and is considered a third aquifer unit (Metropolitan 1999b). Groundwater movement and storage in this carbonate bedrock aquifer primarily occurs in secondary porosity features (i.e. joints, faults, and dissolution cavities that have developed over time). The full extent, potential yield, and storage capacity of this carbonate aquifer have not been quantified at this time. As noted above, granite and metamorphic basement rock form the subsurface margins of the aquifer system in the project area. This basement rock is generally impermeable and typically yields only minor quantities of water to wells (Freiwald 1984).

The primary sources of replenishment to the groundwater system in the Cadiz Valley include direct infiltration of precipitation (both rainfall and snowfall) in fractured bedrock exposed in mountainous terrain and infiltration of ephemeral stream flow in sandy-bottomed washes, particularly in the higher elevations of the watershed. The source of much of the groundwater recharge within the regional watershed occurs in the higher elevations.

A variety of methods have been used to estimate groundwater recharge to the Cadiz Valley. These methods range from simple estimates involving recharge as a percentage of average annual precipitation, to complex relationships between daily precipitation, evapotranspiration, soil moisture, and surface water runoff. After reviewing the Final EIR/Final EIS for the proposed Cadiz Water Project, Bredhoeft (2001) criticized the study stating that recharge values for the basin are undetermined. The FEIR/FEIS suggests that recharge approaches 50,000 acre-feet per year (AFY) while Bredhoeft claims recharge is closer to 5,000 AFY. Bredhoeft's comments on the FEIR/FEIS included a table summarizing other authors' findings using various methodologies to estimate recharge. A summary of Bredhoeft's compilation is provided in **Soil & Water Table 2**, below.

Soil & Water Table 2
Summary of Groundwater Recharge Estimates*

Methodology	Author	Recharge Estimate (AFY)
Watershed Runoff Method	MWD & BLM (1999)	20,000 to 70,000
	GeoScience	50,000
Maxey/Eakin Method	USGS (2000)	2,550–11,200
	Durbin (2000)	
Fenner Gap Groundwater Flow	Friewald (1984)	270
	LaMoreaux (1995)	3,700
	USGS (2000)	2,600–4,300
Chloride Method	USGS (2000)	1,700–9,000
	Durbin (2000)	2,000
Drawdown Associated with Cadiz Co. Pumping	Boyle Engineering (1996)	4,000

*Modified from Bredhoeft 2001

The primary natural outlet, or discharge, of groundwater from the Bristol, Cadiz and Fenner watersheds is evaporation from Bristol and Cadiz dry lakes. Transpiration by vegetation is not a significant source of groundwater discharge, since no native phreatophyte vegetation occurs in the vicinity of the Cadiz Valley.

The total amount of groundwater pumped in and surrounding the Cadiz Valley has been minimal until the last decade. The primary groundwater uses in the region are the Cadiz

Inc. agricultural operations, the Burlington Northern Santa Fe Railroad (BNSF), the various salt-mining companies operating on Bristol and Cadiz dry lakes, and the few residents in and around the communities of Chambless and Essex.

Between 1901 and 1947, approximately 2,365 AF of groundwater, or an average of 50 AFY, was produced from Fenner Valley (Shafer 1964). Between 1948 and 1962, Shafer (1964) estimated that approximately 4 AFY were pumped from Fenner Valley. The sharp drop in production was attributed to a switch from steam- to diesel-powered engines on the railroad. Freiwald (1984) estimates that between 1954 and 1981, groundwater pumping in Fenner Valley remained constant at approximately 7 to 8 AFY. Using Freiwald's (1984) pumping rate estimate for 1954 through 1981, and assuming that this rate continued through 1998, the total volume of groundwater estimated to have been pumped from this valley since 1901 ranges from approximately 2,700 to 2,750 AF. Shafer (1964) reports that approximately 14,300 AF of fresh water were pumped from the Bristol and Cadiz valleys from 1910 (when the first fresh water well was drilled) to 1964, or an average pumping rate of approximately 265 AFY. Assuming these historical pumping rates continued from 1964 through 1998 (not including the Cadiz Inc. agricultural operations), a total of approximately 9,000 additional AF was pumped from these valleys during this time period. In addition, from 1983 through 1998, the Cadiz Inc. agricultural operations produced approximately 61,740 AF of groundwater from its well field. Yearly groundwater production for the Cadiz Inc. agricultural operations has averaged 5,000-6,000 AFY from 1986through 1998. Accordingly, the total amount of groundwater pumped from the Bristol and Cadiz valleys from 1910 through 1998 is approximately 85,000 AF.

With the exception of the areas underlying and immediately adjacent to Bristol and Cadiz dry lakes, the quality of the groundwater in the Fenner Gap portion of the basin is relatively good, with TDS concentrations averaging approximately 300 milligrams per liter (mg/L). The TDS concentration in Fenner Valley groundwater is typically in the range of 300 to 400 mg/L. On Bristol and Cadiz dry lakes, surface water and shallow groundwater evaporation has concentrated dissolved salts, resulting in TDS concentrations as high as 298,000 mg/L (Schafer, 1964). The location of the interface between the low-TDS groundwater and high-TDS groundwater underlying the dry lakes has been mapped on the basis of data from observation wells in the area (Shafer 1964; Rosen 1989). Calcium chloride and sodium chloride are produced by mining operations on both Bristol and Cadiz dry lakes. The highly saline brine is pumped from brine wells and from trenches for concentration in evaporation ponds. These mining operations are conducted on patented lands and on unpatented claims on Federal land administered by the U.S. Bureau of Land Management (BLM). The amount of brine produced is proprietary information, and precise estimates are unavailable.

Within bedrock units exposed in the watersheds tributary to the proposed well site, groundwater may discharge locally to springs. Bedrock hosts for these springs include granitic rock in the Granite and Old Woman mountains, shallow intrusive rock in the Providence Mountains, and volcanic sediments in the Clipper Mountains. Many of these springs occur along joints, fractures, and fault zones in the host rock and at the interface of the fractured bedrock and the alluvial fill. Depth of infiltration and residence time for groundwater within fractured bedrock units may be highly variable. No springs or native phreatophyte vegetation are in the Cadiz BNSF well vicinity. The closest springs to the proposed well site are located in the Granite, Clipper and Old Woman mountains, more than 10 miles from the proposed water supply well as shown in Figure 5.

Cadiz Valley Groundwater Development and Future Uses

Staff notes that Cadiz Incorporated proposes to develop a conjunctive water use program in the Cadiz Valley known as the Cadiz Water Conservation and Storage Project. The following information is excerpted from the project website (http://www.cadizinc.com/our-business/water-resources/index.html):

- *The Project will utilize a portion of the aquifer system that underlies our 35,000-acre landholding in the Cadiz and Fenner Valleys of eastern San Bernardino County and conserve indigenous groundwater that otherwise would be lost to evaporation.*
- *This aquifer system can accommodate both withdrawal of indigenous groundwater and storage of imported water. Total storage capacity of the Project would be approximately 1 million acre-feet. This stored water and/or indigenous groundwater could be delivered to the nearby Colorado River Aqueduct in "dry" years — via a conveyance pipeline — for delivery to participating water providers throughout Southern California.*
- *The aquifer system is naturally recharged by precipitation (rainfall and snow melt) that occurs within a regional watershed of 1,300 square miles. For this reason, any water that is transferred to Southern California will be naturally replenished over time.*
- *In September 2008, we executed a 99-year lease agreement with the Arizona and California Railroad Company (ARZC) to utilize a portion of the railroad's existing right-of-way for the Project's water conveyance pipeline. The pipeline would connect the Project facilities at our Cadiz Valley property with the Colorado River Aqueduct.*
- *In June 2009, we signed Letters of Intent with five Southern California water providers to develop a cost-sharing agreement, finalize terms of pricing, design and capital allocation and work towards implementation of the Project.*
- *In February 2010, we released new details of a comprehensive year-long study measuring the vast scale and recharge rate of the Cadiz aquifer system. The study was conducted by internationally recognized environmental consulting firm CH2M Hill at the Project area utilizing new models produced by the U.S. Geological Survey in 2006 and 2008. CH2M Hill and additional hydrology experts that have peer-reviewed the work confirmed the aquifer system can sustainably support the Cadiz Project.*

BLM and The Metropolitan Water District of Southern California previously completed a joint FEIR /FEIS for a conjunctive water management program (Cadiz Groundwater Storage and Dry-year Supply Program*)* in the Cadiz Valley Groundwater Basin. It appears that project will not be implemented. Cadiz, Inc., plans to submit a new application for development of the project described above. This new project would be located within a mile of the proposed project water supply well. The potential impacts of this program on the project water supply are discussed below in the water supply and cumulative impacts sections.

Hydrology

The project site is in the southwest portion of the Mojave Desert, which is characterized by broad alluvial fans and fluvial terraces, playas, and scattered mountains. There are no perennial streams within the project site or in the area. The nearest major ephemeral stream is the Mojave River which is approximately 15 miles northwest of the site and is separated from the site by a watershed divide. The project site is situated within the Troy Valley hydrologic subarea, as defined by the Lahontan Region basin plan (California RWQCB, 2005).

The proposed site occupies a broad alluvial fan/plain with relatively little topographic variation (see **Soil & Water Figure 1**, Site Topography). An alluvial fan is a sedimentary deposit located at a topographic break, such as the base of a mountain front, escarpment, or valley side, that is composed of stream flow and/or debris flow sediments and has the shape of a fan, either fully or partially. The National Flood Insurance Program defines alluvial fan flooding as “flooding occurring on the surface of an alluvial fan or similar landform which originates at the apex and is characterized by high velocity flows; active processes of erosion, sediment transport, and deposition; and, unpredictable flowpaths.” It is the unpredictability of flowpath that is key in the development of a risk assessment for a project located on an alluvial fan.

The overall landform is relatively flat with shallow slopes trending from the north to south and in some areas to the southwest. The ground generally slopes in a northeast-to-southwest direction, ranging from 2% to 5% across the site, except for the western portion where the slope reduces to 1%. There are occasional small hills (buttes) and sand dune areas on the project site. Several drainage patterns occur on the site. These drainage patterns follow the gradient of higher elevations in the mountains north and east of the site towards lower elevations southerly and westerly across the site. The land between I-40 and the BNSF railroad slope to the west, ultimately towards Troy Dry Lake, a playa that is located west of the site. There are no well-defined channels on-site, although some discontinuous flood terraces occur in a few areas on-site. The drainage features on-site are not well-defined channels resulting from active flow but consist of discontinuous floodplains with areas that exhibit a mixed pattern of sheet flow or shallow concentrated flow across isolated, wide areas of land. Relatively undefined drainage features traverse most of the site with evenly distributed desert scrub vegetation throughout.

Surface water flow does not occur on-site in most years. According to the NOAA Atlas 14 internet-based Precipitation Frequency Data Server, the 100-year 24-hour storm event will generate approximately 3.5 inches of rain. When water does flow on-site, it is usually the result of precipitation occurring during 5- to 10-year storm events. These flows are ephemeral and occur only during periods of brief intense rainfall.

Storm water runoff and flows from flash floods on-site would represent surface water in the form of storm water runoff that could potentially be regulated pursuant to Porter Cologne and may be subject to jurisdiction by the CDFG pursuant to Section 1600 of the California Fish and Game Code. Concentrated flood flows through culverts under the railroad and highway may be potentially regulated.

In general, drainage in Phase 1 of the project area flows southwest from the Cady Mountains, however, along the south boundary of Phase 1 some flows are diverted by the railroad and flow straight west (see **Soil & Water Figure 2**, Regional Watersheds and **Figure 3**, CDFG Flow Paths). As shown, there is an offsite watershed area of nearly 20 square miles which drains either directly to the Phase 1 project site or drains to the railroad tracks and is partially diverted into the Phase 1 site. The Phase 1 site is nearly 10 square miles, so the total watershed area for Phase 1 is approximately 30 square miles. Several blue line streams pass through the Phase 1 project area. Many of these coalesce into larger washes and all drain to the railroad at the southern boundary of the Phase 1 site. The runoff from the Phase 1 site flows through the existing trestles at the railroad. Some of the trestles may have insufficient capacity to pass 100-year flows and some flow is diverted west along the railroad on the southern boundary of the project site and eventually flows through trestles along the southern boundary of the Phase 1 site. It is assumed that the 100-year flood will generally be conveyed along the railroad and through the trestles along the railroad right of way. This right of way is excavated and maintained by the BNSF Railroad Company to allow the water to pond and flow at low velocities. The right of way is delineated along the north line with a barbed wire fence.

The offsite watershed impacting the Phase 1 site emanates from the Cady Mountains which flank the northeast side of the project area. Field investigation and review of the topographic maps suggest that the watershed consists of a series of alluvial fans which coalesce to form a bajada. A bajada is a broad slope of debris, spread along the lower slopes of mountains by descending streams; a bajada is often formed by the coalescing of several alluvial fans. From review of the topographic mapping in the field, it appears that the areas with the highest current risk of active flooding are generally shown on the USGS 7.5 -minute quadrangles. These areas are indicated as blue lines and as shaded wash areas. While these areas are easily identifiable on the mapping, they may be occasionally difficult to identify in the field. Washes are often well incised near the base of the mountains. However, these same washes transition into sheet flow and shallow concentrated flow areas which do not have a well incised channel or a series of small channels which are braided, each of which may carry a fraction of the total flow. Sheet flow is defined as flow of water as broad sheets that are unconfined by channel boundaries. Sheet flow areas appear to be more prevalent at distal locations from the apex of the fan. These locations are primarily within the proposed site development area. Because the sheet flow and braided wash flow may carry a sediment load and follow unpredictable flow paths, development within these areas could be impacted by the storm water.

The watershed affecting the Phase 1 area is located in the Cady Mountains to the north of the project site. Flows that traverse the site emanate from the Cady Mountains watershed, drain through the trestles on the railroad and then continue west through the Phase 2 site. Upstream of the railroad trestles, the railroad embankment has diverted and channelized much of the flow creating numerous ponding areas. The trestles and ponding areas attenuate the peak flow and allow most of the sediment to drop out on the upstream (north or east) side of the railroad embankment. Additional drainage flows south from the Cady Mountains, west of the Phase 1 property limits, is diverted at the railroad tracks and then flows south in the Phase 2 area. In addition to the Cady Mountain watershed, a second watershed is located south of the freeway and includes the Pisgah Crater and lava flow area. Runoff from this watershed generally flows either north or west. It reaches I-40 and then continues north through numerous culverts and bridges into the Phase 2 project area. After flowing through the culverts at the highway, the runoff commingles with the flow from the Cady Mountains and then flows west to the outfall. As with the Cady Mountain watershed, the Pisgah watershed runoff is diverted by the I-40 road embankment and associated dikes and berms and is routed through culverts. Ponding occurs at these culvert locations and this reduces the peak flow and sediment loads which pass through the culverts.

Soil Erosion Potential

Current soil survey data is limited in much of the Mojave Desert due to the lower potential for agricultural use. Detailed soil mapping has not been performed by NRCS for the site. However, soil mapping in the general area is being conducted by NRCS. The results of that mapping effort will not likely be available for a few years.

Available soil data for the project area are derived from the STATSGO soil database (STATSGO 2001) which presents mapping at the association level. The mapped soil associations database contains several soil series within each map unit. Primarily two soil associations would be affected by project construction; the Carrizo-Rositas-Gunsight and the Nickel-Arizo-Bitter associations. The Carrizo-Rositas-Gunsight soil association occupies the majority of the site, while the Nickel-Arizo-Bitter association is present over much of the southern portion of the site, south of the BNSF rail lines. The Rock Outcrop-Lithic Torriorthents-Calvista association is present in the mountains along the northern site perimeter and the Rock Outcrop-Upspring-Sparkhule association is present on the southwest corner of the Project Site, as well as north and northwest of the site.

Soil and Water Table 3
Summary of Soil Characteristics

Soil	Texture	Depth of Surface Layer (Inches)	Land Capability Class[1]	Wind Erodibility Group[2]	Erosion (K) Factor[3]	Natural Drainage Class[4]	Permeability in inches per hour[5]
Carrizo-Rositas-Gunsight	Loamy Fine Sand	9	7S	2	0.15	Somewhat Excessively Drained	6–20
Nickel-Arizo-Bitter	Gravelly Sandy Loam	7	7S	5	0.10	Well Drained	2–6
Rock Outcrop-Lithic Torriorthents-Calvista	Gravelly Loam	8	7E	8	0.20	Excessively Drained	2–6

Notes:
1 - Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat. Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

2 - Wind erodibility groups range from 1 to 8, with 1 being highly erodible and 8 having low erodibility.

3 - This is an index of erodibility for standard condition and includes susceptibility of soil to erosion and rate of runoff. Low K values (below 0.15) indicate low erosion potential. High K values (above 0.4) are highly erodible. See report text for additional information.

4 - Table presents nonirrigated land capability classification. Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Capability classes range from 1 to 8, with higher numbers indicating progressively greater limitations and narrower choices for use: Class 1 - slight limitations that restrict use; Class 2 - moderate limitations restricting choice of plants, or requiring moderate conservation practices; Class 3 - severe limitations restricting plant choice or requiring conservation; Class 4 - severe limitations, requiring very careful management; Class 5 - subject to little or no erosion, but mainly restricted use to pasture, rangeland, forestland, wildlife habitat; Class 6 - severe limitations, generally unsuitable for cultivation, restrictions per Class 5; Class 7 - severe limitations, unsuitable for cultivation, restrictions per Class 5. Capability subclasses: e - erosion is main hazard unless close-growing plant cover maintained; s - soil limited because shallow, droughty or stony; c - chief limitation is very cold or dry climate. Capability units (after '-') are soil groups within a subclass with similar suitability for crops and pasture plants with similar management requirements and productivity.

5 - Permeability refers to saturated hydraulic conductivity for the surface layer. Permeability rates listed are minimum and maximum expressed in inches/hr.

Source: Except as otherwise indicated, table source is SES 2008a Section 5.4.

Carrizo soils are formed in alluvium present primarily on flood plains, alluvial fans, fan piedmonts, and bolson floors, with slopes up to 15%. These soils are typically very deep gravelly sand. The upper 2 inches is extremely gravelly sand with about 65% gravel. Below the upper 2 inches, the material contains coarse sand and averages 70% gravel and coarser materials, with a clay content less than 8%. The soils are excessively drained with negligible or very low runoff and rapid or very rapid permeability.

Rositas soils are formed in sandy aeolian material on dunes and sand sheets, with slopes up to 30%. These soils are typically fine sand with up to 5% gravel and up to 10% clay. Rositas soils are very deep and somewhat excessively drained, with negligible or low runoff and rapid permeability.

The Gunsight series is comprised of very deep calcareous alluvial soils on fan or stream terraces with slopes up to 60%. The soils are very gravelly loam, with gravel content ranging from 40% to 75% gravel and an average of less than 18% clay. The soils are somewhat excessively drained with very low to high runoff and moderate or moderately rapid permeability.

Nickel soils are derived in alluvium from mixed rock sources and are present on fan remnants with slopes up to 35%. The soils are very gravelly loam, with gravel content ranging from 25% to 75%, generally increasing with depth and typically less than 15% clay. The A horizon contains approximately 20% gravel and cobbles and is classified as gravelly very fine sandy loam. The soils are very deep, well drained with very low to medium runoff and moderate permeability. Nickel soils are commonly associated with Arizo and Bitter soils.

Arizo soils are also formed in mixed alluvium and are present on recent alluvial fans, inset fans, fan apron, fan skirts, stream terraces, and in intermittent stream and channel floodplains. The material is typically very gravelly fine sand with 35% to 80% gravel and cobbles, increasing with depth. The A horizon is very gravelly fine sand with 35% pebbles. The soils are very deep, excessively drained, with negligible to medium runoff and rapid to very rapid permeability.

Similar to Arizo and Nickel soils, Bitter soils are formed in mixed alluvium. They are present on dissected old fans between lower recent fans and the toes of steep slopes generally ranging from 2% to 15%. The material is extremely gravelly sandy loam with 45% to 75% pebbles and cobbles. The upper horizons are composed of extremely to very gravelly sandy loam with 50% pebbles and cobbles. Bitter soils are well drained with medium runoff and moderately slow permeability.

The rock outcrop classification is typically observed on mountainsides, ridges, and rugged hills. It can be composed of many rock types, typically granite, quartz monzonite, basalt, dacite, limestone, quartz, mica, schist, and fanglomerate.

Lithic torriorthents (shallow rocky soils) are present between rock outcrop areas, in small depressions and on relatively stable hillsides. Slopes typically range from 15% to 50%. The soil varies from sandy loam to very gravelly sand. They form in material weathered from granitic rock, with hard, fractured rock present at a depth of 1 to 18 inches. These soils are very shallow and shallow, well drained, with medium to rapid runoff and a high water erosion hazard.

The Calvista series consists of sandy loam formed from granitic rock with seams of calcite. It is typically present on slopes of 2% to 30% and mountain ridges, buttes and domes in Southern California deserts. Hard rock is generally present at a depth of 14 to 20 inches, although rock outcrops may be present. The gravel content is typically less than 35%. Calvista soils are shallow and well drained soils, with medium to rapid runoff and moderately rapid permeability.

Project Water Supply

Groundwater is the primary water source available in the site vicinity. The applicant proposes to use groundwater obtained from a well located approximately 64 miles away from the site in the area know as Cadiz. The well is owned by Burlington Northern Santa Fe (BNSF) and is known as the Cadiz BNSF well. The groundwater extracted from this well is proposed to be used for all power plant construction and operation.

The groundwater will be shipped to the site via BNSF rail cars.

Potable Water

The applicant proposes to use treated groundwater for potable needs. The groundwater will first be demineralized, then stored in a designated storage facility equipped with chemical dosage for disinfection. This treated potable water will be available at the Main Services Complex and may be piped to the Satellite Service Complex. If potable water is not piped to the Satellite Services Complex, bottled water will be made available.

Construction Water

Water demands during construction of the project will be relatively light for an effort as large as that proposed. Vertical foundation elements (metal poles) for the SunCatchers will be inserted into the subsurface using track driven vibratory equipment. The vibratory insertion method eliminates conventional drilling techniques that would generate cuttings that would require dust suppression for stockpiling, transferring, trucking and disposal of the cuttings. The track mounted equipment will also reduce ground disturbance (rutting) by spreading the load over a larger surface area.

Site construction will be accomplished in two phases, Phase 1 and Phase 2. Phase 1 construction will take place during the first 12-month period, consisting of construction of the primary access routes, the construction laydown areas, the rough grading for the Main Services Complex, the Satellite Services Complex and the substation sites, as well as the clearing areas disturbed by the construction of each 18MW or 24MW solar group. The total water use for the first 12 months of construction is estimated to be 79,780,000 gallons or approximately 245 AF.

Phase 2 will take place during construction months 13 through 40. Phase 2 will mostly involve construction of additional access roads and continued solar field development. Similar to Phase 1, construction during the initial Phase 2 12- month period (months 13 through 24) will use the most water. The total water use during the first 12-month period of Phase 2 construction (months 13 through 24) is estimated to be 74,880,000 gallons or approximately 230 AF. Water demands during final construction (months 24 to 40) are expected to drop off dramatically to average approximately 25,000,000 gallons or approximately 77 AF per year.

The applicant estimates that during the 40 months of project construction, the water demand for combined construction and dust suppression would be approximately 556 AF (**Soil & Water Table 4**). During this 40-month construction period, water use is expected to vary from approximately 13.5 million gallons (41.5 AF) per month (month 2), to 2 million gallons (6.1 AF) per month (after the 25th month). The expected average water consumption for the project during the first 24 months of construction is approximately 77 million gallons (238 AF) per year.

Soil & Water Table 4
Construction Water Use

Month After Start of Construction	Dust Control Volume of Water (millions of gallons)	Construction Volume of Water (millions of gallons)	Total Construction Volume (millions of gallons)
Phase 1Begins			
1	3.64	1.56	5.20
2	7.28	6.24	13.52
3	6.24	6.24	12.48
4	4.16	1.04	5.20
5	3.12	1.04	4.16
6	4.16	2.08	6.24
7	4.16	3.64	7.80
8	3.12	3.64	6.76
9	3.12	3.64	6.76
10	3.12	2.08	5.20
11	1.26	1.04	2.30
12	3.12	1.04	4.16
Phase 2 Begins			
13	6.24	2.08	8.32

Month After Start of Construction	Dust Control Volume of Water (millions of gallons)	Construction Volume of Water (millions of gallons)	Total Construction Volume (millions of gallons)
14	7.28	6.24	13.52
15	6.24	1.56	7.80
16	4.68	1.56	6.24
17	4.68	1.04	5.72
18	4.16	1.56	5.72
19	4.68	1.56	6.24
20	3.64	1.56	5.20
21	3.64	1.04	4.68
22	3.64	1.04	4.68
23	3.64	0.52	4.16
24	2.60	0	2.60
25	2.08	0	2.08
26	2.08	0	2.08
27	2.08	0	2.08
28	2.08	0	2.08
29	2.08	0	2.08
30	2.08	0	2.08
31	2.08	0	2.08
32	2.08	0	2.08
33	2.08	0	2.08
34	2.08	0	2.08
35	2.08	0	2.08
36	2.08	0	2.08
37	0.52	0	0.52
38	0.52	0	0.52
39	0.52	0	0.52
40	0	0	0
Total Construction Water Volumes	128.14 MG or **393 AF**	53.04 MG or **163 AF**	181.18 MG or **556 AF**

Source: SES 2008a Table 3-6

Water trucks will be used throughout the duration of the construction phase for the project. Truck filling stations will be located at the Main Services Complex, at the Satellite Services Complex, and at various temporary truck filling stations throughout the project site. An underground waterline connecting the Main Services Complex to the Satellite Services Complex will be installed beneath the BNSF railway to supply groundwater for dust control for the portion of the site located south of the BNSF railway.

Operations Water

Due to the technology proposed for this project (Stirling engines), water use during electric generation will be minimal. The applicant considers imported groundwater as "raw" water that will require treatment to remove dissolved solids for SunCatcher mirror wash water applications and additional treatment to meet drinking water quality standards. Water treatment processes identified by the applicant for demineralization are Reverse Osmosis (RO) and ion exchange. Potable water consumption, groundwater treatment, and SunCatcher mirror washing under regular monthly maintenance routines will require approximately 12.5 gpm of water per day. A maximum requirement of approximately 21 gpm of water per day will be needed during the months when each SunCatcher receives a scrub wash.

Water consumption during operation will be limited to mirror washing (13.98 AFY), water treatment (0.84 AFY), potable use (2.59 AFY), and dust control (2.5 AFY). Additionally, water will be used to generate hydrogen used in the SunCatcher engines. The applicant estimates that 205 gallons per day (0.23 AFY) of water will be required to produce a sufficient volume of hydrogen for power plant use. The applicant estimates that the total maximum consumptive use of groundwater for operation of the power plant will be approximately 20.14 AFY (see **Soil & Water Table 5**, below).

Soil & Water Table 5
Operations Water Usage Rates

Water Use	Daily Average (gallons per minute)	Daily Maximum (gallons per minute)	Annual Usage (acre-feet)
Equipment Water Requirements			
SunCatcher Mirror Washing	8.67	14.47	13.98
Water Treatment System Discharge			
Brine to Evaporation Ponds	0.52	0.83	0.84
Potable Water Use			
For drinking and sanitary water requirements	1.61	1.94	2.59
Dust Control			
Groundwater for dust control during operations	1.55	3.10	2.50
Hydrogen Generation			
For hydrogen gas extraction	0.14	0.28	0.23
Totals	**12.49**	**20.62**	**20.14**

Notes:
1 - Based on 34,000 SunCatchers requiring a monthly wash with an average of 14 gallons of demineralized water per spray wash and a 5-day work week (21 work days per month).

2 - During a 3-month period, all SunCatcher mirrors are given a scrub wash requiring up to 3 times the normal wash of 14 gallons per SunCatcher. Therefore, the Daily Maximum usage rate is based on two-thirds of the SunCatchers receiving a normal wash and one-third receiving a scrub wash.
3 - Based on every SunCatcher having approximately 8 normal washes per year with one additional scrub wash.
4 - Based on the maximum amount of demineralized water required for mirror washing and assumes a decrease in raw water quality requiring an additional 20% of system discharge.
5 - Assumes 30 gallons per person per day for 182 people.
6 - Maximum amount assumes a 20% contingency over the Daily Average.
7 - Assumes a 6-day work week and average daily usage.
8 - Assumes 5,000 gallons per day.
9 - Assumes up to 10,000 gallons per day.
10 - Assumes daily average dust control operations.
Source: SES 2008a Table 5.5-2 updated using TS 2010l

Wastewater

Sanitary

Initially, control of sanitary waste will be accomplished using portable chemical toilets. No public or private entities manage sanitary wastewater in the vicinity of the project site. Therefore, construction of a permanent onsite wastewater disposal system consisting of a septic tank and leach field will be completed to handle sanitary wastewater. According to the applicant, a facility of this type will be designed to meet the requirements of the Lahontan RWQCB and the San Bernardino County Public Health Department, and will meet operation and maintenance guidelines required by the California Department of Public Health.

Construction Wastewater

Improper handling or containment of construction wastewater could cause a broad dispersion of contaminants to soil or groundwater. Discharge of any non-hazardous construction-generated wastewater would require compliance with discharge regulations. Sources of wastewater would include equipment wash water and piping and vessel hydrostatic test water. Equipment wash water would be transported to an appropriate treatment facility. Hydrostatic test water would be reused to the extent possible and, pending analytical results of the water, would be discharged to land or trucked offsite to an appropriate treatment and disposal facility.

Process Wastewater

Extracted groundwater will require treatment to remove dissolved solids for SunCatcher mirror wash water applications and additional treatment will be required to meet current drinking water quality standards. The water will be demineralized to prevent mineral deposits forming on the SunCatcher mirrors. Treatment processes proposed to remove total dissolved solids (tds) include reverse osmosis (ro) and ion exchange. The wastewater generated by the ro unit will contain relatively high concentrations of tds. The applicant proposes to discharge the high tds wastewater into two double-lined evaporation ponds. Each pond will be designed to contain 1-year of discharge flow, estimated to total 3 million gallons. Discharge to the ponds will alternate on an annual basis, allowing one pond to undergo evaporation while the other receives the effluent. The applicant estimates that the tds concentration in the wastewater will be approximately 3,600 mg/l.

C.7.4.2 ASSESSMENT OF DIRECT AND INDIRECT IMPACTS AND DISCUSSION OF MITIGATION

The direct and indirect impact and mitigation discussion presented below is divided into a discussion of impacts related to construction and a discussion of impacts related to operation. For each potential impact evaluation, staff describes the potential effect and applies the threshold criteria for significance to the facts. If mitigation is warranted, staff provides a summary of the applicant's proposed mitigation and a discussion of the adequacy of the proposed mitigation. In the absence of an applicant-proposed mitigation or if mitigation proposed by the applicant is inadequate, staff recommends its own mitigation measures. Staff also recommends specific conditions of certification related to a potential impact to assure that the mitigation measures are implemented.

Construction Impacts and Mitigation

The project will be developed in two phases. Construction of Phase 1 is expected to take 12 months to complete and Phase 2 is expected to take 28 months. Construction will, therefore, occur over three or four winter seasons. Construction of the proposed project would include soil excavation, grading, installation of utility connections, installation of finned pole SunCatcher foundations, road building, paving, erection of structures and the use of groundwater. The amount of temporary construction and permanent disturbance generated by these activities is shown in **Soil & Water Table 6**. Groundwater use would primarily be for dust suppression, hydrostatic testing of the project's pressure vessels, moisture conditioning compacted soil and mixing concrete. Potential impacts to soils related to increased erosion or release of hazardous materials are possible during construction. Potential storm water impacts could result in an increase in flooding and sedimentation downstream if there is an increase in runoff flow rates and volume discharges from the site. Water quality could be impacted by discharge of hazardous materials released during construction. Project water demand could decrease the quantity of groundwater available. Potential construction-related impacts to soil, storm water, and water quality or quantity, including the applicant's proposed mitigation measures and staff's proposed mitigation measures, are discussed below.

Soil & Water Table 6
Estimated Disturbed Area Summary

Project Component Item	Area		Proposed Length	Comments
	Construction Disturbance	Operations Permanent Disturbance		
Off-Site Development				
Off-site access road	11 acres	11 acres	3 miles	30-foot width for roadway and drainage from I-40
Off-site transmission line	0.9 acres	Included below	0.14 miles	50 feet each side of center
Tower structures	Included above	0.02 to 0.05 acres		1 to 2 towers x 1,024 SF per tower
Subtotal	**12 acres**	**11 acres**		

Project Component Item	Area		Proposed Length	Comments
	Construction Disturbance	Operations Permanent Disturbance		
On-Site Balance-of-Plant Development				
Construction staging and construction administration area near BNSF/ Southern California Edison Pisgah Substation	26 acres	N/A		Located in Phase 1, approx. 0.5 mi north of SCE Pisgah Substation
Construction staging and construction administration area at Hector Road	26 acres	N/A		Located in Phase 2
On-site construction laydown	11 acres	N/A		Located adjacent to MSC
Site boundary fence line	55 acres	28 acres	38 miles	12-foot width construction access; 3 feet each side of the fence
Site paved roadways	138 acres	111 acres	38 miles	30-foot width for roadway and drainage
Unpaved perimeter roadways	15 acres	15 acres	10 miles	12 feet wide
Main Services Complex	42 acres	14.4 acres		Construction disturbance based on buildings, parking, assembly, and construction areas
Satellite Services Complex	21 acres	10 acres		Construction disturbance based on buildings, parking, assembly, and construction areas
Assembly buildings and storage	Included above	N/A		Post construction the assembly building and their associated laydown areas will be decommis-sioned and dishes installed on this acreage. The MSC assembly buildings used during construction of Phase 1 will be moved to the SSC for the construction of Phase 2
Subtotal	**334 acres**	**178 acres**		
On-Site Wet and Dry Utilities Access				
Water pipeline	3.6 acres	2.9 acres	2 miles	Disturbance based on 2-in diameter waterline from MSC to SSC; 15-ft wide construction access; 12-ft wide operations access

Project Component Item	Area		Proposed Length	Comments
	Construction Disturbance	Operations Permanent Disturbance		
On-site electrical and communica-tions overhead service	5 acres	N/A	9,068 feet	12 feet each side of center
Calico Solar Substation	4 acres	2.8 acres		530 feet by 555 feet
On-site transmission line	10.3 acres	N/A	1.7 miles	50 feet each side of center
Transmission access road	Included above	2.5 acres	1.7 miles	12 feet wide
Transmission tower structures	Included above	0.3 acre		12 to 14 towers at 1,024 SF per tower
34.5kV overhead runs to Calico Solar Substation	6.0 acres	N/A		17 miles by 12 feet wide with a significant portion overlapping other construction disturbed areas (75%)
Subtotal	**29 acres**	**9 acres**		
Solar Field Development = 567 by 1.5MW Solar Groups 2,4				
SunCatcher drainage swale	874 acres	874 acres		40 feet wide by 56 feet long per 2 SunCatchers
SunCatcher foundation	2.5 acres	2.5 acres	12 to15 ft	2-ft diameter post
SunCatcher pad clearing	110 acres	110 acres		12 feet wide by 12 feet long cleared pad area for each SunCatcher, excluding foundation area
North-south access routes	262 acres	262 acres	180 miles	12-foot-wide road servicing 2 SunCatchers
East-west access routes	31 acres	31 acres	21 miles	12-foot-wide road within area of limited disturbance constructed over 600V Collector Cable; 40 feet long by 12 feet wide per 12 SunCatchers
East-west PCU access routes	702 acres	702 acres	386 miles	15-foot-wide road servicing each SunCatcher PCU and providing east-west access to dish groups over generator group feeders
Debris basins for off-site flows	220 acres	220 acres		Located along northern project boundary
Debris basins for on-site flows	65 acres	65 acres		Located throughout the site

Project Component Item	Area		Proposed Length	Comments
	Construction Disturbance	**Operations Permanent Disturbance**		
Electrical Collection System				
North-south 600 V underground	60 acres	N/A		Cable disturbance based on north-south cables outside of roadways cable trench based on 2foot each side of center of cable, excluding previously accounted disturbance
1750 kVA transformers, junction boxes, and east-west 600 V underground	235 acres	2 acres		1 transformer with collector panel and 4 junction boxes per 1.5 MW with east-west 600 V cables disturbance based on 41 feet by 88 feet area per group of 12 SunCatchers
34.5kV underground	38 acres	N/A		Cable trench based on 6 feet each side of center, excluding previously accounted disturbance
Subtotal	**333 acres**	**2 acres**		
Total Area	**3,270 acres**	**2,712 acres**		Includes 10% contingency

Source: SES 2008a

Soil Erosion Potential by Water and Wind

Construction activities can lead to adverse impacts to soil resources including increased soil erosion, soil compaction, loss of soil productivity, and disturbance of soils crucial for supporting vegetation and ephemeral water dependant habitats. Activities that expose and disturb the soil leave soil particles vulnerable to detachment by wind and water. Soil erosion results in the loss of topsoil and increased sediment deposition downstream.

The magnitude, extent, and duration of those impacts depends on several factors, including the exposure of the soils to water and wind, the soil types affected, and the method, duration, and time of year of construction activities. Prolonged periods of precipitation or high intensity and short duration runoff events coupled with earth disturbance activities can result in accelerated onsite erosion. In addition, high winds during grading and excavation activities can result in wind borne erosion leading to increased particulate emissions that adversely impact air quality. The implementation of appropriate erosion control measures would help conserve soil resources, protect downstream properties and resources, and protect air quality.

Staff evaluated the potential impacts to soil resources, including the effects of construction activities that could result in erosion and downstream transportation of soils and the potential contamination of soils and groundwater. There are extensive regulatory programs in effect that are designed to prevent or minimize these types of impacts. These programs are effective, and absent unusual circumstances, an applicant's ability to identify and implement program-approved Best Management Practices (BMPs) to prevent erosion or contamination is sufficient to ensure that these impacts would be less than significant. In addition, soils would be protected by the development and implementation of grading plans and a Drainage, Erosion and Sedimentation Control Plan (DESCP).

Although these programs and BMPs are generally effective on most projects, staff considers that the proposed project does constitute an unusual circumstance. Compared to other projects previously constructed on active alluvial fans, the proposed project is of a very large scale.

The project site will be developed utilizing the existing land features without undergoing major grading operations. Off-site flow will be intercepted prior to entering the project site using large debris basins located at the toe of each mountainous drainage basin near the northern project boundary. These project debris basins are designed to retain storm water discharge and associated debris resulting from a 100-year storm. In addition to intercepting debris from the mountains, the proposed debris basins will also provide for peak runoff attenuation of the surface flows. The design attempts to protect the project site from flooding, sediment deposition, and scour.

Onsite runoff will be intercepted in detention basins constructed onsite as shown in **Soil & Water Figure 4**, Drainage Layout, and sized to retain the 100-year onsite runoff and debris flows. The onsite basins are designed to retain 4-years of average sediment accumulation for the area or subarea they are designated to serve. After the 4-years average sediment accumulation is captured, the sediment will be removed from the basins and distributed on site.

The SunCatchers will be constructed in parallel rows, with access roads built on alternating rows. To minimize erosion and enhance storm water infiltration, rows where roads are not constructed will retain native vegetation. To minimize shading on SunCatchers and prevent potential brush fire hazards, the vegetation will be trimmed. Brush trimming will consist of cutting the top of the existing brush while leaving the existing native plant root system in place, thereby minimizing soil erosion. After brush has been trimmed, blading for roadways and foundations will be conducted between alternating rows to provide access to individual SunCatchers. Blading will consist of limited removal of terrain undulations to maintain a 10percent maximum slope grade.

Localized rises or depressions within the individual 1.5 MW solar groups will be removed to provide for proper alignment and operation of the individual SunCatchers. Ground disturbance will be minimized wherever possible. The blading operations will generally keep native soils within 100 feet of the pre-development location, with no hauling of soils across the site. To minimize site disturbance, the construction for unpaved north-south access routes will be located along the center of a 144-foot area along every other north-south column of SunCatchers. To protect the bladed areas from surface erosion, drainage swales will be constructed to intercept and convey the surface low-flows from undisturbed natural areas to debris basins. Paved roadways will be constructed as close to the existing topography as possible, with limited cut-and-fill operations to maintain roadway design grade of less than 10%.

Grading operations will also be required for laydown areas, building foundations and pads and parking areas in the Main Services Complex, Satellite Services Complex, and substation areas. The clearing, blading, and grading operations will be undertaken using standard contractor heavy equipment. The equipment will consist of motor graders, bulldozers, elevating scrapers, hydraulic excavators, rubber tire loaders, compacting rollers, and dump trucks.

The project site layout will maintain the local pre-development drainage patterns where feasible, and water discharge from the project site will remain at the western boundary. The paved roadways will have Arizona Crossings (roadway dips) or low-flow culverts consisting of a small-diameter storm drain with a perforated stem pipe, as needed to cross the minor or major channels/swales. It is expected that storm water runoff will flow over the crown of the paved roadways, which are typically less than 6 inches from swale flow line to crown at centerline of roadway, thus maintaining existing local drainage patterns during storms. No crown is anticipated if polymeric stabilizers are used, further reducing drainage conveyance impacts. Where needed, unpaved roads will utilize low-flow culverts under solar field access routes. Debris basins will be added throughout the project site for low-flow surface runoff detention in lieu of culverts. The design of the drainage facilities will be based on BMPs for erosion and sediment control.

Localized channel grading is proposed to take place on a limited basis to improve channel hydraulics in the vicinity of BNSF railway right-of-way to control the surface runoff. In addition, the Main Services Complex will be protected from a 100-year flood by berms and/or channels that will direct the flow around the perimeter of the building site, if required.

The proposed arterial roadway section between the Main Services Complex and I-40 will be a designated evacuation route. As such, the driving surface will be constructed at an elevation above the projected profile of a 25-year storm event. In addition, overflow resulting from the 100-year storm event will be limited to a depth not to exceed 7 inches.

It is anticipated that roadway maintenance will be required after rainfall events. For minor storm events, it is anticipated that the unpaved roadway sections may need to be bladed to remove soil deposition, along with sediment removal from debris basins and stem pipe risers at the culvert locations. For major storm events, in addition to the aforementioned maintenance, roadway repairs may be required due to possible damage to pavement where the roadways cross the channels and where the flows exceed the culvert capacity. Soft bottom storm water detention basins will be constructed to mitigate the increase in runoff from the proposed building sites. Rainfall from paved areas and building roofs will be collected and directed to the storm water detention basins. The storm water detention basins will be sized to hold the entire volume from the proposed building sites resulting from a 24-hour, 100-year storm. The detention basin will be designed so that the retained flows will empty within 72 hours after the storm to provide mosquito abatement. This design can be accomplished by draining, evaporation, infiltration, or a combination thereof. The post-development flow rates released from the project site are expected to be less than the pre-development flow rates. Except for the building sites, the majority of the project site will remain pervious, as only a negligible portion of the site will be affected by pavement and SunCatchers foundations.

Site drainage during construction will follow predevelopment flow patterns, with ultimate discharge to the BNSF ROW and ultimately at the westernmost property boundary.

Debris basins and/or low-flow culverts consisting of a small-diameter storm drain with a perforated stem pipe will be installed for sediment control and to provide for storm peak attenuation. BMPs for erosion and sediment control will be used in combination with debris basins for roadway crossing of major washes. In the Main Services Complex, the storm water will be directed to a detention basin, where the site runoff will infiltrate and/or evaporate. The detention basin will be sized to meet the San Bernardino County development criteria.

The temporary erosion and sedimentation control measures to be used during construction will be designed to prevent sediment from being displaced and carried off-site by storm water runoff. Before beginning excavation activities, debris basins, silt fence, straw bales, or other BMPs will be constructed/installed along the perimeter of the Project, where minor runoff to off-site areas could occur. Debris basins will be constructed for the major site runoff discharge and will also provide for low flow detention. The silt fence will filter sediments from construction runoff. Berms with perforated risers will be used at road crossings and other locations as needed to control sediment transportation. During construction, the extent of earth disturbances will be minimized as much as is practical. A sediment trap will be constructed for the major site runoff discharge. The sediment trap will be located immediately upstream of the property boundary.

Diversion swales with berms will be constructed as necessary to divert runoff from off-site areas and on-site undisturbed areas around the construction site. Temporary BMP control measures will be maintained during the rainy season as necessary throughout the construction period.

Soil erosion and loss of soil due to project activities could be substantial and would need to be mitigated. The proposed erosion and sedimentation control measures include, but are not limited to: scheduling installation of BMPs to precede or coincide with construction activities; debris and retention basins; preserving the existing vegetation to the extent possible; wetting or using soil binders or weighting agents in active construction and laydown areas; controlling speed on unpaved surfaces; placing gravel in entrance ways; and use of straw bales, silt fences, and earthen berms to control runoff. Staff recommends the development and implementation of a DESCP in accordance with Condition of Certification **SOIL&WATER-1** to ensure adequate BMPs are in place to mitigate potential erosion and loss of soil. In addition, Condition of Certification **SOIL&WATER-2** would require the project owner to develop and implement a construction Storm Water Pollution Prevention Plan (SWPPP) and comply with the dredge and fill requirements that are currently under development with the Lahontan RWQCB. These requirements will be identified in the Supplemental Staff Assessment.

The vast majority of the Project grading and excavation will occur on the Project site. Known onsite soil types that will be affected by Project grading and excavation are listed in Section C.7.4.6. The wind erosion hazard is low to high. During construction, the area within the plant site fence line (8,200 acres) will be disturbed.

During construction, the surface of the disturbed areas will be devoid of vegetation and there will be the highest potential for erosion, as well as associated effects including soil loss and increased sediment yields downstream from disturbed areas. With the implementation of BMPs contained in the SWPPP and DESCP, such as straw bales, silt fences, and limiting exposed areas, the impacts of soil erosion during construction should be less than significant. Site grading will be balanced on site; there will be no import or export of fill material. The Project is not located on farmland or in areas where agricultural protection legislation is applicable; therefore, there will be no impacts to agricultural soils at the Project site.

Due to the project's large scale, numerous physical variables exist that could affect the soil resources within the site boundaries. These variables are associated with various site conditions (erodibility) and potential environmental considerations (precipitation). In order to address possible outcomes given the various site conditions and possible environmental factors, the applicant has carried out mathematical calculations and probabilistic modeling to estimate anticipated potential impacts. While modeling and calculations can be used in an attempt to estimate future effects from a variety of environmental considerations, and they provide a basis for structural design parameters, these methods are based on assumptions and projections that are imprecise and untested in this environment. Should these assumptions and calculations be inaccurate, the consequences of flash flood damage or modified sedimentation and erosion rates may be significant. Staff has proposed conditions of certification **SOIL& WATER-1, -2,** and **-3** that would mitigate these potential impacts.

Water Supply and Use

Staff evaluated the potential of the project's proposed water use to cause a substantial depletion or degradation of groundwater resources, including impacts on existing beneficial uses. Staff considered compliance with the LORS and policies presented in **Soil & Water Table 1** and whether there would be a significant California Environmental Quality Act (CEQA) impact.

The water required for construction will be obtained from a groundwater well located in Cadiz, CA (**Soil & Water Figure 5**). The groundwater pumped from the well will be placed into rail tankers and hauled to the project site. At the project site, the water will be conveyed to a groundwater storage tank located at the Water Treatment Facility within the Main Services Complex.

Construction water use, summarized in **Soil & Water Table 4** will average approximately 150,000 gallons per day, with a total annual use of approximately 167AFY. During the 2nd and 3rd months of construction, and again in the13th month of construction, peak water needs will be approximately 450,000 gallons per day. The total water use for complete project construction is estimated to be approximately 556 AF.

Basin Balance

Very little development has occurred in the Cadiz Valley Groundwater Basin. As such, there are limited data available for the site vicinity regarding aquifer characteristics in the groundwater basin. California Department of Water Resources (DWR) Bulletin 118 for the Cadiz Valley Groundwater Basin indicates that the total storage capacity of the basin is approximately 4.3 million AF with an estimated natural recharge of approximately 800 AFY. DWR estimates that in 1952, extractions within Cadiz Valley Groundwater

Basin were approximately 1 AFY. The applicant indicates that studies conducted within Cadiz Valley show a recharge in the area at 2,550 to 11,200 AFY. Studies by Bredhoft (2001) suggests recharge to the Cadiz and Fenner Valleys is approximately 5,000 AFY. Absent unusual circumstances, staff considers impacts to the basin balance to be significant if project pumping exceeds net average recharge to the basin. Since water use associated with project construction is less than annual average recharge, staff believes project pumping will not have significant impacts on aquifer storage volumes in the Cadiz Valley.

However, given the wide range and uncertainty in the estimates of recharge to the Cadiz Valley groundwater basin, it is possible that the current agricultural pumping of 5,000 AFY could be greater than basin recharge and other inflows and could result in long term declines in basin storage. Staff believes the applicant should be required to comply with Condition of Certification **SOIL&WATER-4** which would ensure the project supply would be limited to the maximum needed for project construction and is consistent with the amount analyzed. Staff also proposes Condition of Certification **SOIL&WATER-8** which would require the applicant to comply with the County of San Bernardino's Desert Groundwater Management Ordinance and implement a monitoring plan that would characterize baseline water levels in the project vicinity, characterize aquifer materials, integrate water level measurement with any existing monitoring network, and provide for analysis of the project effects on water levels in the area. Staff proposes to coordinate with the County of San Bernardino to evaluate changes due to project pumping and the current agricultural uses of about 5,000 AFY.

Groundwater Levels

In January 2010, the applicant conducted aquifer testing in the proposed Cadiz BNSF water supply well. The aquifer testing consisted of a short term stress test, followed by a 24-hour stepped rate pumping test and well recovery monitoring. The data collected during the tests were used to assess hydraulic properties of the well, short term specific capacity, transmissivity, long term drawdown effects and long term pumping zone-of-influence determination.

During the 24-hour stepped rate pumping test, approximately 187,000 gallons of water were pumped from the well. Near the end of the pumping period, drawdown of groundwater in the well was measured at approximately 3.2 feet. Within 2 ½ hours of cessation of the pumping test, groundwater recovered in the well to within .24 feet (2.88 inches) of the pre-pumping water level. This relatively minor drawdown provides a qualitative measure of the well's ability to provide an adequate water supply at the rates planned for project construction and operation. An average specific capacity of 51.3 gpm/ft was estimated based on the results of the pump test.

The applicant used the widely accepted AQTESOLV program and applied the Cooper and Jacob (1946) and Theis (1935) Recovery Test Methods to estimate aquifer transmissivity. Transmissivity is a measure of an aquifer's ability to transmit water, and is an important parameter used to evaluate potential drawdown from pumping a groundwater well. Using these methods a transmissivity of 170,000 gallons per day per foot (gpd/ft) was calculated. Using published relationships (USBR 1985) between specific capacity and transmissivity, Staff believes the value of transmissivity estimated using these methods is reasonable when compared to the specific capacity estimated from the short term pump test.

The applicant provided drawdown estimates of groundwater in the project well using the modified Cooper-Jacob Method and the transmissivity value estimate above. The results of this analysis show the total projected drawdown at the end of the initial 2-year construction phase would be approximately 2.5 feet when maximum pumping would occur. Drawdown would stabilize at 0.65 after 5 years of project operation pumping. Staff believes the stabilized drawdown estimate is reasonable and suggests there would be minimal affect on water levels in the basin. The applicant did provide an analysis of drawdown effects due to project pumping but they used the California Drinking Water Source Assessment and Protection Program (1999) 'Calculated Fixed Radius' methodology. This methodology is designed to calculate the zone of contribution to a pumping well under a given pumping scenario rather than estimate the drawdown at a given distance from a pumping well. This method is used to identify an area around a well that should be protected from contamination and protect public health and safety. Given the minimal drawdown at the pumping well discussed above, however, application of this simple methodology is useful in understanding the magnitude of the project pumping effects at distance. Estimates using this methodology show that the zone of contribution to the project pumping well would be within a radius of 540 feet after 20 years of pumping. The closest well to the site production well is 1 mile south. Staff believes that given the limited zone of contribution and minimal drawdown in the pumping well, there would be no significant impacts to wells in the Cadiz Valley due to project pumping during construction.

Staff believes the applicant should be required to comply with Condition of Certification **SOIL&WATER-4** which would ensure the project supply would be limited to the maximum needed for project construction and is consistent with the amount analyzed.

The well site is located in a relatively flat area, next to I-40 and the BNSF rail line approximately 2 miles away from the closest hills. Seeps and springs in the Cadiz BNSF well site vicinity are limited to granitic rock areas in the Granite and Old Woman mountains, shallow intrusive rock in the Providence Mountains, and volcanic sediments in the Clipper Mountains are located more than 10 miles from the proposed water supply well and are above the elevation of the Cadiz groundwater basin indicating they are not hydraulically connected and fed by shallow groundwater. Due to the lack of hydraulic connectivity, it does not appear that pumping from the Cadiz BNSF well during construction will have any effect on nearby springs or seeps. Therefore, no significant impacts to seeps or springs is expected. In addition, the depth to groundwater at the well is about 230 feet below ground surface which is also below the root zone depth of known sensitive plant species in the region. Given the depth to groundwater at the project supply well it is unlikely there is any plant or animal community that would be affected by the project pumping.

To ensure a reliable groundwater supply can be provided by a well, the maximum recommended well pumping rate should generally not result in long-term drawdown that exceeds 20% of the aquifer thickness. Based on the well construction details (length of perforated well screen used as aquifer thickness), effective porosity chosen as 0.2, and the data collected during the aquifer testing, the applicant determined that short term pumping operations for peak demand could be as high as 2,000 gpm without causing drawdown to exceed 20% of the aquifer thickness (in this case, 39 feet). Anticipated peak demand for site construction is estimated to be 100 gpm, well below the 2,000 gpm discussed above. Additionally, peak short term needs for facility operations are expected to approach 45 gpm, which would create groundwater drawdown significantly less than the anticipated peak construction drawdown. These results suggest the proposed well can provide a reliable long term supply of water for project construction and operation. To ensure an adequate supply can be delivered for project construction, staff recommends the applicant be required to comply with Condition of Certification **SOIL & WATER – 5**, by executing a Water Purchase Agreement with the water purveyor (BNSF) for a 30- to 35-year supply of fresh water for the Calico Solar Project**.**

Potable water during construction will be obtained off site and supplied to the site via truck and stored in above ground tanks. The applicant indicates the potable water will be replenished every two to three days (SES 2008a). No significant impacts are expected due to the use of this limited imported supply.

Wastewater

Improper handling or containment of construction wastewater could cause a broad dispersion of contaminants to soil or groundwater. Discharge of any non-hazardous construction-generated wastewater would require compliance with discharge regulations. Sources of wastewater would include equipment wash water and piping and vessel hydrostatic test water. Equipment wash water would be transported to an appropriate treatment facility. Hydrostatic test water would be reused to the extent possible and, pending analytical results of the water, would be discharged to land or trucked offsite to an appropriate treatment and disposal facility in accordance with the SWRCB Water Quality Order No. 2003-003-DWQ as a discharge to land with a low threat to groundwater and the requirements that are currently under development with the Lahontan RWQCB that will be included in Condition of Certification **SOIL&WATER-2**. Compliance with the requirements would reduce the potential impacts from release of waste water to less than significant. The applicant has not provided information necessary to complete development of requirements. Once the applicant provides this information, staff can complete development of requirements that will be included in Condition of Certification **SOIL&WATER-2**.

Operation Impacts and Mitigation

Operation of the proposed project could lead to accelerated soil erosion and increased storm water runoff. The project’s operation could also lead to potential water quality and water supply impacts. Soils may be potentially impacted through erosion or the release of hazardous materials used in the operation of the proposed project. Storm water runoff from the project could result in potential impacts if increased runoff flow rates and volumes discharged from the project increase erosion of the soil and increase down stream flooding. Water quality could be impacted by discharge of eroded sediments from the project or discharge of hazardous materials released during operation. Water supply used for dust suppression, SunCatcher mirror washing, and fire protection could lead to potential quantity or quality impacts to groundwater resources. Potential impacts to water quality and water supply and the potential acceleration of soil erosion and increased storm water runoff related to the operation of the project, including the applicant's proposed mitigation measures and staff's proposed mitigation measures, are discussed below.

Soil Erosion and Storm Water Control

Staff evaluated the potential impacts to soil resources caused by operation of the facility that could result in erosion and downstream transportation of soils and the potential contamination of soils and groundwater. There are extensive regulatory programs in effect that are designed to prevent or minimize these types of impacts. These programs are effective, and absent unusual circumstances, an applicant's ability to identify and implement program-approved BMPs to prevent erosion or contamination is sufficient to ensure that these impacts would be less than significant. In addition, soils would be protected by the development and implementation a Drainage, Erosion and Sedimentation Control Plan (DESCP).

Although these programs and BMPs are generally effective on most projects, staff considers that the proposed project does constitute an unusual circumstance. Compared to other projects previously constructed on active alluvial fans, the proposed project is of a very large scale.

The proposed project would be located on a series of undeveloped alluvial fans. Currently, the storm water runoff either percolates into the soil or is conveyed as sheet flow across the fans or through the alluvial fan wash channels. Several project features would contribute to the potential for increased water erosion, including earth displacement, construction of access roads and project infrastructure, the long duration for construction, and changes to the properties of the soil. Construction of the proposed project would change natural drainages, remove natural vegetation and soil structure, and add impervious areas to the site, all of which could cause an increase in storm water runoff.

To support the final design parameters, the applicant analyzed the hydrology of the project area and calculated anticipated storm flows. The study area's watershed is approximately 80 square miles. **Soil & Water Table 7** provides a summary of anticipated precipitation and storm flow (i.e., runoff) rates.

Soil & Water Table 7
Calico Solar Hydrology Summary

Storm Frequency	6-hour Storm Rainfall (inches)	24-hour Storm Rainfall (inches)	6-hour Storm Runoff (cubic feet per second)	24-hour Storm Runoff (cubic feet per second)
2-year	0.70	0.94	0	0
5-year	1.06	1.41	0	0
10-year	1.33	1.73	1,458	4,145
25-year	1.70	2.15	3,904	7,939
50-year	1.99	2.47	6,435	11,150
100-year	2.31	2.80	22,049	28,772

Source: SES 2009i, Applicants Responses to CEC & BLM Data Requests (Surface Water), pg. A-1.

Runoff from these sub-watersheds was modeled by the applicant using the Army Corps of Engineers (USACOE2009) HEC-1 computer hydrology model.

Storm water flow volume and velocity is affected by several parameters, such as surface infiltration rates and the roughness of the flow surface. Construction, operation, and decommissioning of the proposed project may modify the infiltration rate through several processes, including earthmoving, compaction, and use of dust suppressants.

Water quality could also be impacted if the storm water drainage pattern concentrates runoff in areas that are not properly designed or protected with BMPs or causes increased erosion and sediment discharge offsite. Project components that could alter or concentrate existing drainage patterns could include the installation of linear fences, access roads, buildings, SunCatchers, and associated infrastructure.

With concentrated flows, scour may transport sediment long distances. Scour may occur under sheetflow conditions due to water depths, velocities, and soil parameters. Scour of existing or future channelized flow paths can meander and move during large flow events, which is common on alluvial fans. The proposed project includes a total of 35,000 solar dishes (i.e., SunCatchers) supported by a single metal fin-pipe foundation hydraulically driven into the ground. Migration of channels and local scour caused by storm water flows could remove sediment supporting individual poles and cause them to fall to the ground. Once on the ground during a storm event, the broken glass associated with the mirrors could further break and be transported downstream. Also, the SunCatchers structure itself and the associated wiring, could be transported downstream. Although the security fence located on the downstream side of the proposed project area could stop larger pieces from leaving the property, it would not stop small glass fragments. Also, the fence itself could be threatened by storm water flows and could not guarantee the onsite capture of all damaged materials.

Condition of Certification **SOIL&WATER-3** requires the SunCatchers to withstand this potential scour. In addition, this condition requires the applicant to develop a Storm Water Damage Monitoring and Response Plan, which would include a plan to cleanup and mitigate damaged SunCatchers. The applicant proposes to construct large stormwater debris capture basins along the northern property boundary. These basins will be of sufficient size to completely retain flood flows resulting from a 100-year flood. Following significant storms, retained water would be released into the existing channels in a controlled and metered manner at a rate that will not cause damage to SunCatcher pole foundations located within the channels. With this controlled release of captured stormwater, staff believes the impact to erosion of the SunCatcher foundations will be less than significant.

Staff believes the effects of erosion and storm water flow onto and off the proposed project can be mitigated through implementation of Conditions of Certification **SOIL&WATER-1**, **-2**, and **-3**. **SOIL&WATER-1** would require the project applicant to develop a DESCP to ensure protection of water quality and soil resources. **SOIL&WATER-2** would require the applicant to develop an Industrial SWPPP that meets the requirements for discharges of storm water. Condition of Certification **SOIL&WATER-3** would require the applicant to develop a Storm Water Damage

Monitoring and Response Plan to monitor the SunCatchers and mitigate potential impacts from SunCatchers damaged during storm events.

In order to address possible outcomes given the various site conditions and possible environmental factors, the applicant has carried out mathematical calculations and probabilistic modeling to estimate anticipated potential impacts. While modeling and calculations can be used in an attempt to estimate future effects from a variety of environmental considerations, and they provide a basis for structural design parameters, these methods are based on assumptions and projections that are imprecise and untested in this environment. Should these assumptions and calculations be inaccurate, the consequences of flash flood damage or modified sedimentation and erosion rates may be significant. The Project is not located on farmland or in areas where agricultural protection legislation is applicable; therefore, there will be no impacts to agricultural soils at the Project site. Staff has proposed conditions of certification **SOIL & WATER-1, -2,** and **-3** that would mitigate these potential impacts.

Project Water Supply

The project's operational water demand is estimated to be approximately 20 AFY. The applicant has proposed to pump groundwater from a well owned by BNSF and located in Cadiz, California for all plant operational needs. Cadiz is approximately 64 miles southeast of the project site. The water will be loaded into railroad tank cars and transported by rail to the site.

Basin Balance

Very little development has occurred in the Cadiz Valley Groundwater Basin. As such, there are limited data available for the site vicinity regarding aquifer characteristics in the groundwater basin. California Department of Water Resources (DWR) Bulletin 118 for the Cadiz Valley Groundwater Basin indicates that the total storage capacity of the basin is approximately 4.3 million AF with an estimated natural recharge of approximately 800 AFY. DWR estimates that in 1952, extractions within Cadiz Valley Groundwater Basin were approximately 1 AFY. The applicant indicates that studies conducted within Cadiz Valley show a recharge in the area at 2,550 to 11,200 AFY. Studies by Bredhoft (2001) suggest recharge to the Cadiz and Fenner Valleys is approximately 5,000 AFY. Absent unusual circumstances, staff considers impacts to the basin balance to be significant if project pumping exceeds net average recharge to the basin. Since water use associated with project operation is less than annual average recharge, staff believes project pumping will not have significant impacts on aquifer storage volumes in the Cadiz Valley.

However, given the wide range and uncertainty in the estimates of recharge to the Cadiz Valley groundwater basin, it is possible that the current agricultural pumping of 5,000 AFY could be greater than basin recharge and other inflows and could result in long term declines in basin storage. Staff believes the applicant should be required to comply with Condition of Certification **SOIL&WATER-4** which would ensure the project supply would be limited to the maximum needed for project construction and operation. Staff also proposes Condition of Certification **SOIL&WATER-8** which would require the applicant to comply with the County of San Bernardino's Desert Groundwater Management Ordinance and implement a monitoring plan that would characterize baseline water levels in the project vicinity, characterize aquifer materials, integrate water level measurement with any existing monitoring network, and provide for analysis of the project effects on water levels in the area. Staff proposes to coordinate with the County of San Bernardino to evaluate changes due to project pumping and the current agricultural uses of about 5,000 AFY.

Groundwater Levels

In January 2010, the applicant conducted aquifer testing in the proposed Cadiz BNSF water supply well. The aquifer testing consisted of a short term stress test, followed by a 24-hour stepped rate pumping test and well recovery monitoring. The data collected during the tests were used to assess hydraulic properties of the well, short term specific capacity, transmissivity, long term drawdown effects and long term pumping zone-of-influence determination.

During the 24-hour stepped rate pumping test, approximately 187,000 gallons of water were pumped from the well. Near the end of the pumping period, drawdown of groundwater in the well was measured at approximately 3.2 feet. Within 2½ hours of cessation of the pumping test, groundwater recovered in the well to within 0.24 feet (2.88 inches) of the pre-pumping water level. This relatively minor drawdown provides a qualitative measure of the well’s ability to provide an adequate water supply at the rates planned for project construction and operation. An average specific capacity of 51.3 gpm/ft was estimated based on the results of the pump test.

The applicant used the widely accepted AQTESOLV program and applied the Cooper and Jacob (1946) and Theis (1935) Recovery Test Methods to estimate aquifer transmissivity. Transmissivity is a measure of an aquifer’s ability to transmit water, and is an important parameter used to evaluate potential drawdown from pumping a groundwater well. Using these methods a transmissivity of 170,000 gallons per day per foot (gpd/ft) was calculated. Using published relationships (USBR 1985) between specific capacity and transmissivity, Staff believes the value of transmissivity estimated using these methods is reasonable when compared to the specific capacity estimated from the short term pump test.

The applicant provided drawdown estimates of groundwater in the project well using the modified Cooper-Jacob Method and the transmissivity value estimate above. The results of this analysis show the total projected drawdown at the end of the 2-year construction phase would be approximately 2.5 feet and would stabilize at 0.65 after 5 years of project pumping. Staff believes the stabilized drawdown estimate is reasonable and suggests there would be minimal affect on water levels in the basin. The applicant did provide an analysis of drawdown effects due to project pumping but they used the California Drinking Water Source Assessment and Protection Program (1999) ‘Calculated Fixed Radius’ methodology. This methodology is designed to calculate the zone of contribution to a pumping well under a given pumping scenario rather than estimate the drawdown at a given distance from a pumping well. This method is used to identify an area around a well that should be protected from contamination and protect public health and safety. Given the minimal drawdown at the pumping well discussed above, however, application of this simple methodology is useful in understanding the magnitude of the project pumping effects at distance. Estimates using this methodology show that the zone of contribution to the project pumping well would be within a radius of 540 feet after 20 years of pumping. The closest well to the site production well is one-half mile (2,640 feet) away. Staff believes that given the limited zone of contribution and minimal drawdown in the pumping well, there would be no significant impacts to wells in the Cadiz Valley due to project pumping.

As shown in **Soil & Water Table 5**, the daily maximum water use for power plant operation is estimated to be 20.62 gallons per minute. Average annual use of water for power plant operation is estimated to be 20.14 AF. To ensure the proposed project does not consume significantly more water than the volume analyzed, yet provide a sufficient volume for unforeseen circumstances, staff proposes Condition of Certification **SOIL&WATER- 4** to limit the amount of groundwater the project could use annually during operations to 20 AF.

The well site is located in a relatively flat area, next to I-40 and the BNSF rail line approximately 2 miles away from the closest hills. Seeps and springs in the Cadiz BNSF well site vicinity are limited to granitic rock areas in the Granite and Old Woman mountains, shallow intrusive rock in the Providence Mountains, and volcanic sediments in the Clipper Mountains are located more than 10 miles from the proposed water supply well and are above the elevation of the Cadiz groundwater basin indicating they are not hydraulically connected and fed by shallow groundwater. Due to the lack of hydraulic connectivity, it does not appear that pumping from the Cadiz BNSF well will have any effect on nearby springs or seeps. Therefore, no significant impacts to seeps or springs is expected. In addition, the depth to groundwater at the well is about 230 feet below ground surface which is also below the root zone depth of known sensitive plant species in the region. Given the depth to groundwater at the project supply well it is unlikely there is any plant or animal community that would be affected by the project pumping.

To ensure a reliable groundwater supply can be provided by a well, the maximum recommended well pumping rate should generally not result in long-term drawdown that exceeds 20% of the aquifer thickness. Based on the well construction details (length of perforated well screen used as aquifer thickness), effective porosity chosen as 0.2, and the data collected during the aquifer testing, the applicant determined that short term pumping operations for peak demand could be as high as 2,000 gpm without causing drawdown to exceed 20% of the aquifer thickness (in this case, 39 feet). Anticipated peak demand for site construction is estimated to be 100 gpm, well below the 2,000 gpm discussed above. Additionally, peak short term needs for facility operations are expected to approach 45 gpm, which would create groundwater drawdown significantly less than the anticipated peak construction drawdown. These results suggest the proposed well can provide a reliable long term supply of water for project construction and operation. To ensure an adequate supply can be delivered for project operation, staff recommends the applicant be required to comply with Condition of Certification **SOIL & WATER – 5**, by executing a Water Purchase Agreement with the water purveyor (BNSF) for a 30- to 35-year supply of fresh water for the Calico Solar Project**.**

Groundwater Quality

Groundwater quality information is sparse in the project supply well vicinity. The Colorado River Regional Water Quality Control Board Basin Plan (2006) indicates that groundwater within the Cadiz Hydrologic Unit has municipal, domestic and industrial beneficial uses.

Within the Cadiz Valley Groundwater Basin, groundwater flows toward both Bristol and Cadiz dry lakes. Bristol Dry Lake is approximately 5½ miles southwest of the Cadiz BNSF well and Cadiz Dry Lake is approximately 11 miles south-southeast from the well. As with most dry lakes in the Mojave Desert, groundwater is saline in the immediate vicinity of the dry lakes. Salt is being mined on the west shore of Bristol dry lake in an area approximately 10 miles southwest of the proposed water supply well and is also mined in the area south of Cadiz Dry Lake.

By providing a measure of water salinity, TDS is a primary indicator of the natural quality of groundwater and is a measure of acceptance for the use of groundwater as a drinking water source. Water with TDS concentrations greater than 2,000 mg/l is generally considered undrinkable without significant treatment. In California, the recommended Secondary MCL or 'Consumer Acceptance Contaminant Level' for TDS is 500 mg/l, and upper and short term ranges can be 1,000 and 1,500 mg/l, respectively.

Thompson (1929) Indicated the groundwater basin largely holds brackish or saline groundwater, except in the vicinity of Cadiz and Archer and southwest of Altura. Historical information on water quality of the Cadiz BNSF well indicate that groundwater quality is good and Total Dissolved Solids (TDS) concentrations have ranged between approximately 250 mg/L to 359 mg/L (DWR, 1967).

Water quality can be impacted by migration of low quality or contaminated water towards pumping wells and by sustained pumping of the groundwater basin. The Cadiz Company has been pumping groundwater to irrigate agriculture fields on their property located approximately 1 to mile south of the project supply well. According to Bredhoeft 2001, the Cadiz Company has been pumping approximately 5,000 AFY of groundwater "…for more than a decade and appears to have little or no significant adverse impacts."

Use of the Cadiz BNSF well as the project supply well is not anticipated to affect water quality of the basin because pumping at the rates needed will result in limited drawdown and the resulting zone of influence would be relatively small. Therefore, staff believes there would be no water quality impacts to other users in the groundwater basin.

Wastewater

The Cadiz BNSF well groundwater is expected to contain TDS concentrations of approximately 350 mg/L. The applicant intends to treat the groundwater to a quality suitable for mirror washing. The applicant considers water with a TDS concentration of 20 mg/L to be suitable for mirror washing. Treating the groundwater using demineralizer equipment to attain a concentration suitable for mirror washing will create a wastewater stream that will contain four to five times as much TDS as the source water.

The applicant estimates that the treatment wastewater will contain approximately 3,600 mg/L TDS. The applicant proposes to discharge the wastewater to one of two concrete-lined evaporation ponds, or equivalent. Each pond will be sized to contain 1 year of discharge flow or approximately 3 million gallons. A minimum of 1 year is expected to be required for the wastewater to undergo the evaporation process. After the first year, the second pond will be in operation while the first is undergoing evaporation. The two ponds will alternate their functions on an annual basis. After the brine has gone through the evaporation process, the solids that settle at the bottom of the evaporation pond will be tested by the applicant and disposed of in an appropriate non-hazardous waste disposal facility. The solids will be scheduled for removal during the dry summer months.

The applicant proposes two separate wastewater collection systems for the proposed project. The first system would collect all wastewater generated from operation of the plant equipment and recycle and reuse that water to the extent practicable. A wastewater collection system would return water from all general plant drains back to the raw water storage tank. Water that may contain oil or grease would first be routed to an oil/water separator before going to the raw water storage tank. Prior to transport and disposal of any facility operation wastewaters that are not suitable for treatment and reuse onsite, the applicant would test and classify the stored wastewater to determine proper management and disposal requirements. Staff recommends that the collection and recycling of this wastewater be managed in accordance with applicable BMP's and LORS.

The second system would collect and treat all sanitary wastewater from sinks, toilets, and other sanitary facilities. Because there are no sanitary sewer connections, the sanitary wastewater would be processed through a septic system and discharged to a leach field. Solids would be periodically removed by a professional service. The maximum average daily wastewater flow to the leach field is expected to be 5,500 gallons (SES 2008a).

No significant water or soil related impacts are expected to occur due to wastewater if the project owner complies with proposed Conditions of Certification **SOIL&WATER-2** and -6. **SOIL&WATER-2** would provide requirements for discharge of wastewater and **SOIL&WATER-6** provides the requirements for the installation of the proposed septic tank and leach field. The applicant has not provided information necessary to complete development of requirements for discharges of brine waters to evaporation ponds or sanitary septic systems. Once the applicant provides this information, staff can complete development of requirements that will be included in Condition of Certification **SOIL&WATER-2**.

Decommissioning

The removal of the Project from service, or decommissioning, may range from "mothballing" to the removal of equipment and appurtenant facilities, depending on conditions at the time. The applicant proposes to prepare a decommissioning plan which will be submitted to the Energy Commission and BLM for approval before decommissioning. In general, the decommissioning plan will attempt to maximize the recycling of project components including selling unused chemicals back to the suppliers or other purchasers or users, draining and shutting down of equipment containing chemicals, and collection and proper disposal of hazardous and nonhazardous wastes.

Decommissioning activities will produce impacts similar to the construction impacts described above, but likely to a lesser extent. Long-term impacts after decommissioning could be substantial, particularly those related to erosion by water and wind, unless the site is restored to a condition similar to the existing condition, or a post-decommissioning maintenance plan is provided to prevent these impacts. Condition of Certification **SOIL&WATER-7** would ensure that decommissioning impacts would be minimized to a level not significant.

C.7.4.3 CEQA LEVEL OF SIGNIFICANCE

Absent any unusual circumstances, staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant hydrology, water use, and water quality impacts would occur. This determination is based on the following:

- **Whether the project would violate water quality standards or waste discharge requirements:** Conditions of Certification **SOIL&WATER-1** (DESCP); **SOIL&WATER-2** (Waste Discharge Requirements); **SOIL&WATER-3** (Storm Water Damage Monitoring and Response Plan) and **SOIL&WATER-6** (Septic System and Leach Field Requirements) will ensure no violation of water quality standards or waste discharge requirements. The applicant has not provided information necessary to complete development of requirements for discharges of brine waters to evaporation ponds, dredge and fill in waters of the state, or sanitary septic systems. Once the applicant provides this information staff can complete development of requirements that will be included in Condition of Certification **SOIL&WATER-2**.
- **Whether the project substantially depletes groundwater supplies or interferes substantially with groundwater recharge such that there is a net deficit in aquifer volume:** The project will not use site groundwater. Minor amounts of groundwater will be obtained from Cadiz Valley. A significant volume of groundwater remains in storage in Cadiz Valley and project use will not significantly impact that storage. Recharge in the Lavic Valley Basin primarily occurs along mountain front and alluvial fan margins. Site grading and disturbance will not result in significant impacts to recharge potential of the Lavic Valley groundwater basin. No impact to groundwater supply or recharge will occur.
- **Whether the project substantially alters existing site or area drainage patterns, including the alteration of stream or river courses, or substantially increases the rate or amount of surface runoff in a manner that results in on- or off-site flooding or substantial erosion or siltation:** Conditions of Certification **SOIL&WATER-1** (DESCP); **SOIL&WATER-2** (Waste Discharge Requirements); **SOIL&WATER-3** (Stormwater Damage Monitoring and Response Plan) will ensure no adverse alteration of drainage patterns. The applicant has not provided information necessary to complete development of requirements for discharges of dredge and fill in waters of the state. Once the applicant provides this information staff can complete development of requirements that will be included in Condition of Certification **SOIL&WATER-2**.
- **Whether the project would create or contribute runoff water that exceeds existing or planned storm water-drainage system capacity or provides substantial additional sources of polluted runoff:** Compliance with LORS, will

insure no adverse impacts to waters of the U.S. Conditions of Certification **SOIL&WATER-1** (DESCP); **SOIL&WATER-2** (Waste Discharge Requirements); **SOIL&WATER-3** (Stormwater Damage Monitoring and Response Plan) will ensure that the project not create or contribute runoff water that exceeds existing or planned storm water-drainage system capacity or provides substantial additional sources of polluted runoff. The applicant has not provided information necessary to complete development of requirements for discharges. Once the applicant provides this information staff can complete development of requirements that will be included in Condition of Certification **SOIL&WATER-2**.

- **Whether the project would lower groundwater levels such that protected species or habitats are affected:** The project will use minor volumes of groundwater. Depth to groundwater in the vicinity of the proposed water supply well is beyond the reach of phreatophitic vegetation and no other species or habitats utilize the resource. No adverse groundwater quantity impacts are expected.
- **Whether the project would substantially degrade surface water or groundwater quality:** Conditions of Certification **SOIL&WATER-1** (DESCP); **SOIL&WATER-2** (Waste Discharge Requirements); **SOIL&WATER-3** (Storm Water Damage Monitoring and Response Plan) and **SOIL&WATER-6** (Septic System and Leach Field Requirements) will ensure no degradation of surface water or groundwater quality. The applicant has not provided information necessary to complete development of requirements for discharges of brine waters to evaporation ponds, dredge and fill in waters of the state, or sanitary septic systems. Once the applicant provides this information staff can complete development of requirements that will be included in Condition of Certification **SOIL&WATER-2**.
- **Whether the project would place structures within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map:** The project will place a substantial number of structures in the floodplain in the form of SunCatchers. No structural buildings are proposed to be located in areas susceptible to flooding resulting from a 100-year storm. Conditions of Certification **SOIL&WATER-3** (Stormwater Damage Monitoring and Response Plan) will ensure that structures within the floodplain are protected and that redirected flows are designed such that they not cause adverse impacts. No adverse impacts to site structures due to flooding are expected.
- **Whether the project would expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam:** The Project's retention basins are designed to intercept and temporarily retain flows as large as those resulting from a 100-year storm. The basins are proposed to be excavated into the ground rather than constructed above ground using levees or dams. No dams or levees exist upgradient of the Project. Therefore, the risk of loss, injury or death resulting from flooding is less than significant.

C.7.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be a 275 MW solar facility located within the boundaries of Phase 2 of the proposed 850 MW project. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

C.7.5.1 SETTING AND EXISTING CONDITIONS

The Reduced Acreage Alternative would consist of 11,000 SunCatchers (rather than the proposed 34,000) with a net generating capacity of approximately 275 MW (rather than the proposed 850 MW) occupying approximately 2,600 acres of land (rather than the proposed 8,230). This alternative would retain 31% of the proposed SunCatchers and would affect 33% of the land of the originally proposed project.

The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**. This area was designed, in the proposed project configuration, to generate 350 MW, but has been reduced in capacity to the amount that could be carried by existing transmission systems. As a result, the components of the Reduced Acreage Alternative could be configured on the site to avoid sensitive cultural and biological resources, as well as desert washes.

Similar to the proposed project, the Reduced Acreage Alternative would transmit power to the grid through the Southern California Edison (SCE) Pisgah Substation and would require infrastructure including water storage tanks, transmission line, road access, main services complex, and substation (SES 2008a). The main services complex for the Reduced Acreage Alternative would be located at the location proposed for the satellite services complex in the proposed project. For the purposes of the Reduced Acreage Alternative, it is assumed that the BNSF Cadiz well would supply water for the project. The water would be supplied as proposed for the Calico Solar Project. The substation and transmission line would be located north of the BNSF railroad line.

As stated above, the Reduced Acreage Alternative is evaluated in this SA/DEIS because it would substantially reduce the impacts of the project. Additionally, the Reduced Acreage Alternative would allow the applicant to demonstrate the success of the Stirling engine technology and construction techniques, while minimizing impacts to the desert environment.

C.7.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Potential impacts identified for both the construction and operation phases of the project include impacts on soil erosion, sedimentation, flooding, water quality, and water supply. All of the potential impacts identified for the proposed project remain with the Reduced Acreage Alternative. However, due to the alternative's reduced physical size and reduction in number of SunCatchers, these potential impacts are proportionately reduced. The location of detention basins in Sections 32 and 33, Township 9 North, Range 6 East would be relocated adjacent to the northern boundary of the Reduced Acreage project area in Sections 5 and 6, Township 8 North, Range 6 East. Relocating these basins would require that they be redesigned and sized to handle increased watershed areas and different flow paths as appropriate.

C.7.5.3 CEQA LEVEL OF SIGNIFICANCE

There would be no change in the CEQA Level of Significance of impacts between the proposed project and the Reduced Acreage alternative.

C.7.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed 850 MW project. This alternative, the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 2**.

C.7.6.1 SETTING AND EXISTING CONDITIONS

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed project. This alternative is analyzed because (1) it eliminates about 15% of the proposed project area so all impacts are reduced, and (2) it would not require use of any lands that were donated to BLM or acquired by BLM through the Land and Water Conservation Fund program. This alternative would be consistent with the May 27, 2009 BLM Interim Policy Memorandum (CA-2009-020) on donated and acquired lands.

The Avoidance of Donated and Acquired Lands Alternative would contain approximately 28,800 SunCatchers with a net generating capacity of approximately 720 MW occupying approximately 7,050 acres of land. This alternative would retain 85% of the proposed SunCatchers and would affect 85% of the land of the proposed 850 MW project.

The boundaries of the Avoidance of Donated and Acquired Lands Alternative are shown in **Alternatives Figure 2**. The easternmost parcel of the alternative is bordered by LWCF acquired lands to the north, south, and west. Because this parcel could not be reached via project lands, access to this section would be limited to use of the existing transmission line access road that forms the eastern boundary of the parcel, therefore avoiding any new direct impacts to LWCF lands.

The Avoidance of Donated and Acquired Lands Alternative would transmit power to the grid through the SCE Pisgah Substation and would require infrastructure including water storage tanks, transmission line, road access, main services complex, and substation. Because the Avoidance of Donated and Acquired Lands Alternative would generate approximately 720 MW of power, it would require a 65-mile upgrade to the SCE Pisgah-Lugo transmission line. Note that the impacts of this transmission line upgrade are analyzed in Sections C and D of this SA/DEIS. The main services complex, primary water well, substation, and transmission line for the Avoidance of Donated and Acquired Lands Alternative would be at the same locations as for the proposed project.

C.7.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The portion of the Avoidance of Donated and Acquired Lands Alternative in the northeastern corner of the originally proposed Calico Solar site occupies the area where flood intercept debris collection and flow detention basins were designed by the applicant to mitigate the 100-year flood impact to the site. Should the Avoidance of Donated and Acquired Lands Alternative be constructed, flood intercept debris collection and flow detention basins would need to be similarly designed and constructed downstream from the southern boundary of that donated parcel.

Another donated parcel is located near the center of the original site. Should the Avoidance of Donated and Acquired Lands Alternative be constructed, onsite drainage control structures will need to be redesigned to avoid that donated parcel, while maintaining site erosion/sedimentation control.

C.7.6.3 CEQA LEVEL OF SIGNIFICANCE

Provided the redesign of the flood control and erosion/sedimentation control structures meet the same standards as for the Calico Solar Project, no change to the CEQA Level of Significance of impacts would occur between the proposed project and the Avoidance of Donated and Acquired Lands Alternative.

C.7.7 NO PROJECT / NO ACTION ALTERNATIVE

There are three No Project / No Action Alternatives evaluated as follows:

No Project / No Action Alternative #1: No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another renewable energy project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If the proposed project is not approved, renewable projects would likely be developed on other sites in San Bernardino County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District.

No Project / No Action Alternative #2: No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. As a result, GHG emissions would result from the construction and operation of the solar technology and would likely be similar to the GHG emissions from the proposed project. Different solar technologies require different amounts of construction and operations maintenance; however, it is expected that all the technologies would provide the more significant benefit, like the proposed project, of displacing fossil fuel fired generation and reducing associated GHG emissions. As such, this No Project/No Action Alternative could result in GHG benefits similar to those of the proposed project.

No Project / No Action Alternative #3: No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the greenhouse gas emissions from the site, including carbon uptake, is not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in the GHG benefits from the proposed project. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.7.8 PROJECT-RELATED FUTURE ACTIONS - SOIL AND WATER RESOURCES

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by SCE as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result these and the types of mitigation measure that may be required to reduce or eliminate significant adverse impacts.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this SA/DEIS. This analysis examines the construction and operational impacts of two upgrade scenarios

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.7.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

The SCE upgrades would be located within the Mojave River area in the southwestern part of the Mojave Desert, in San Bernardino County, California. Characteristic landforms in the Mojave Desert include broad alluvial fans, old dissected terraces, playas, the Mojave River and its flood plain, and scattered mountains. The Mojave River originates where the West Fork of the Mojave River joins the Deep Creek River. The river flows northward and then eastward past the City of Barstow. A flood plain 0.5 to 1.0-mile wide flanks the Mojave River along most of its course.

Natural resources in the Mojave River Area include soils, scenic resources, various mineral deposits, plants, and wildlife communities. Major minerals extracted in this area include gold, silver, feldspar, uranium, copper, iron, tungsten, turquoise, zeolite, barite, and clay. Limestone, sand, and gravel for cement and aggregate used for road construction are found at several locations throughout the area. The majority of the surface in the region is covered by Quaternary-age unconsolidated surficial deposits. These deposits are comprised primarily of alluvial, fluvial, lacustrine, and aeolian derived material (SES 2008a). Soils on the flood plains of the Mojave River are nearly level. Soils on mountainside areas are moderately steep to steep and gently sloping to moderately sloping in the valleys. Soils in the vicinity of the Proposed Project were formed from parent material of mixed alluvium and colluvium derived from a variety of rock types, primarily granite.

Land classified as grazing land comprises approximately 76% of the agricultural resources within the boundaries of the soil surveys of the Mojave River Area (SES 2008a). Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance occur in the vicinity of the project and make up approximately 3% of the land in the project area (SES 2008a).

Soils Resources

The U.S. Department of Agriculture, Natural Resource Conservation Service has published soil surveys for the San Bernardino County Mojave River Area, the West Central Mojave Desert and Marine Corps Air Ground Combat Center Twentynine Palms located in the vicinity of the project area. Detailed reports of the soils present at the northeastern end of the project area near I-40 are not available (SES 2008a). Soils are grouped into mapping units that represent a unique natural landscape. Typically, a map unit consists of one or more major soils and the soils in any map unit may differ from place to place in slope, depth, drainage, and other characteristics that affect management. Because of the large project area, general map units have been grouped for broad interpretive purposes. The western half of the Lugo-Pisgah No. 2 500 kV transmission corridor area would be located within the San Bernardino County Mojave River Area. The San Bernardino County Mojave River Area is comprised of three groups of soil types. The central part of the Lugo-Pisgah No. 2 500 kV transmission line would be located within the West Central Mojave Desert soil survey. Two major soil groupings are identified within this area. Approximately 6 miles of the eastern portion of the Lugo-Pisgah No. 2 500 kV route would pass through the Marine Corp Ground Combat Center Twentynine Palms soil survey area. This area also contains three general types of soil groups (SES 2008a).

Agricultural Resources. The majority of the Lugo-Pisgah No. 2 500 kV transmission corridor is located on areas designated as Grazing Land. Approximately 3 miles near the center of the transmission corridor would pass through and adjacent to an area designated as Farmland of Statewide Importance of less than 1,000 acres. The nearest Prime Farmland and Farmland of Local Importance are approximately 1.6 miles and 1.1 miles south of the transmission line, respectively. Where the line reaches the eastern edge of the Mojave River, approximately 4.6 miles southeast of Hesperia, the transmission line passes adjacent to approximately 206 acres of an area designated as Farmland of Local Importance. The nearest Prime Farmland and Farmland of Statewide Importance are approximately 0.4 miles and 0.7 miles north, respectively (SES 2008a).

Water Resources

Surface Water Resources. Due to the arid nature of the region, surface water is very scarce in the project area. Streams originate high in the mountains ranges (Ord, Granite, Fry, Rodman, and Cady) that surround the project area and may have perennial flow at higher altitudes. As the streams descend to the valley bottoms where the majority of the proposed transmission line would be constructed, virtually no water exists in the streambeds or rivers, except locally after infrequent, heavy cloudbursts. The proposed transmission line would cross numerous dry washes and ephemeral streambeds. The proposed transmission line would cross Lucerne Lake and Rabbit Lake which are actually large playas. Depending on the year, these playas may contain water from runoff for as much as two months of the year. The proposed transmission line would cross the Mojave River south of Hesperia. The Mojave River originates in the San Bernardino and San Gabriel Mountains and has perennial flow in its upper reaches and near Victorville in the vicinity of Camp Cady and in Afton Canyon. In these places, hard rock barriers force the groundwater to the surface. However, where the proposed transmission line would cross the Mojave River, the flow is ephemeral. No floodplains would be affected by the proposed transmission line. Surveys would be conducted to identify any wetlands or Waters of the U.S. that would be regulated by the United States Army Corps of Engineers.

Groundwater Resources. The proposed transmission line corridor includes sections of the Colorado River and South Lahontan Hydrologic regions as defined by DWR (SES 2008a). The boundary between the two hydrologic regions is a series of mountain ranges (Granite, Rodman, and Ord) that divide those watersheds draining south towards the Colorado River and those draining north. Many of the alluvial valleys in these hydrologic regions are underlain by groundwater aquifers. In most of the smaller basins, the groundwater is found in unconfined alluvial aquifers. Some of the larger basins, or near dry lakes (Lucerne Lake and Rabbit Lake), aquifers may be separated by aquitards that create confined groundwater conditions. The basins range in depth from tens to hundreds of feet in smaller basins and up to thousands of feet in the larger basins. The aquifers range in thickness from tens to hundreds of feet (SES 2008a). The chemical character of the groundwater in these hydrologic regions is variable, but commonly is characterized by calcium or sodium bicarbonate. Typically, the edges of the valleys contain lower TDS than groundwater found beneath the central part of the valleys or near dry lakes. Drinking water standards are most often exceeded for TDS, fluoride, or boron content.

Waters of the United States and State Jurisdictional Waters. The project area encompasses four regional watershed hydrologic units: Bessemer, Johnson, Lucerne Lake, and Mojave (see **Soil & Water Table 8**). Using Google Earth aerial images, Calico Solar identified 346 drainage features that would cross the existing and/or proposed transmission corridor (SES 2008a).

Soil & Water Table 8
Regional Watershed Hydrologic Units
of Proposed Transmission Line Corridor

Regional Hydrologic Unit	Acreage
Bessemer	1,546 acres
Johnson	491 acres
Lucerne Lake	5,385 acres
Mojave	6,057 acres
Total Acreage	**13,479 acres**

Source: SES 2008a

Waters of the U.S. The Mojave River is an intrastate water that may be considered jurisdictional by the U.S. Army Corps of Engineers. Four crossings of the Mojave River are vegetated waters that may be federal jurisdictional waters of the U.S. within an ordinary high water mark (OHWM) as defined by 33 CFR 328.3(e). These four areas are sparsely vegetated (<1%) along the fringe of the river with willow (*Salix* sp.) and other riparian vegetation. While final jurisdiction over the Mojave River has not yet been determined by the U.S. Army Corps of Engineers, a preliminary jurisdictional determination was implemented and it is assumed that the U.S. Army Corps would take jurisdiction over this feature.

The U.S. Army Corps may also want to assert jurisdiction over three locations at crossings of the California Aqueduct. A total of 339 other drainage features were determined to be federally non-jurisdictional because they are isolated waters and there is no apparent or likely significant nexus to foreign or interstate commerce. Many of these drainage features also lack an OHWM.

Waters of the State. A total of 41 drainage features were determined to be waters of the state pursuant to Section 1600 of the California Fish and Game Code and the Porter Cologne Water Quality Act. These include the four aforementioned locations that cross sparsely vegetated (<1%) areas of the Mojave River, the three aforementioned locations that traverse sections of the California Aqueduct, and 34 isolated, intrastate waters that fall under CDFG and RWQCB jurisdiction because of the presence of riparian vegetation (e.g., willows) and/or an OHWM.

Other Drainage Features. A total of 305 other drainage features (e.g., swales) were determined to be non-jurisdictional under federal and state regulations because they lacked an OHWM and/or well-defined bed, bank, and channel.

C.7.8.2 ENVIRONMENTAL IMPACTS

For the proposed 500 kV route, new 500 kV lattice steel towers would be installed in the existing and new ROW. Most of the structure sites would likely require minor to substantial grading and new or re-developed access and spur roads. A portion of the 40- to 100-acre expanded Pisgah Substation would consist of impervious materials such as concrete foundations and asphalt concrete paving.

Soils Resources

Construction activities would involve earth disturbance that would increase the potential for erosion. Work sites using larger truck-mounted equipment would likely be limited to areas near angle and/or dead-end towers. Temporary pull and tensioning sites for equipment setup would be susceptible to erosion from minor soil disturbance and compaction as a result of the vehicular traffic and hilly terrain. Impacts associated with soil erosion include increased soil loss and increased sediment yields downstream from disturbed areas. During construction, erosion impacts could result from disturbance or stripping of soils in the area of temporary roadways, which would be subject to wind and water erosion. Minimal erosion would be expected post-construction because the only soil disturbance during operation would be from periodic inspection and maintenance activities when needed. Potential impacts to the project may be caused by flash floods in the existing channels.

Storm Water and Sediment

Construction and operation of the proposed project, including the grading, filling, and rerouting of ephemeral streams, would disturb approximately 8,200 acres of land and increase the transport of storm water and colloidal sediment outside of the project area. Smaller scale projects previously constructed in the project vicinity include the BNSF railroad track, a power transmission line and Interstate Highway 40. Storm water and sediment transport impacts from these developments have been less than significant.

Agricultural Resources. The transmission line would pass adjacent to or through areas designated as Farmland of Statewide Importance and Farmland of Local Importance. These areas account for approximately 1,100 acres, less than 2% of the total acreage of the full build-out option. Thus, the project is not anticipated to contribute to conversion or curtailment of agricultural land use due to the relatively small agricultural areas that the transmission line would pass through (SES 2008a).

Water Resources

The proposed transmission line would only have one major river crossing at the Mojave River. Depending on the transmission route that would be chosen, the crossing would be between 700 and 1,300 feet. This distance would be spanned without affecting the riverbed or the riparian habitat on either side of the river. The proposed transmission line would also cross Rabbit Lake and Lucerne Lake and would span any water bodies or sensitive riparian areas. The rest of the proposed transmission line only crosses dry washes or ephemeral streambeds that would be spanned. Access roads would be designed to minimize impacts to jurisdictional wetlands and Waters of the U.S. Construction activities associated with new structures would not occur within any watercourses; therefore, impacts to water quality for construction and operation of the transmission lines would be less than significant. Implementation of mitigation for temporary erosion control measures would ensure less than significant impacts to soils associated with new structure construction.

Groundwater resources would not be impacted because water tables are located in formations below any of the construction. The appropriate mitigation measures discussed below would ensure that contaminants would not enter the groundwater supply.

C.7.8.3 MITIGATION

The CWA (33 U.S.C. Section 1251 *et seq.*), formerly the Federal Water Pollution Control Act of 1972, regulates discharges through the NPDES permit process (CWA Section 402). In California, the NPDES program is administered by the SWRCB. Pursuant to NPDES permit requirements, SCE would be required to prepare and adhere to a SWPPP that would minimize construction erosion. During construction activities, measures would be in place to insure that contaminates would not be discharged from the construction site. The SWPPP would define areas where hazardous materials, such as concrete, would be stored; where trash would be placed; where rolling equipment would be parked, fueled and serviced and where construction materials such as reinforcing bars and structural steel members would be staged. Erosion control during grading of the unfinished site and during subsequent construction would be in place and monitored as specified by the SWPPP. A silting basin(s) would be established to capture silt and other materials which might otherwise be carried from the site by rainwater surface runoff.

In addition to conformance with SCE’s SWPPP, for temporary disturbance areas, similar mitigation measures to the following are recommended for implementation:

- On completing the work, all work areas except access trails should be scarified or left in a condition that would facilitate natural or appropriate vegetation, provide for proper drainage, and prevent erosion.
- Disturbance and removal of soils and vegetation should be limited to the minimum area necessary for access and construction.
- Vehicles should be inspected daily for fluid leaks before leaving the staging area.
- Implement spill controls and cleanup as needed and as specified in permits and work plans and according to SCE’s guidelines for hazardous waste handling. Spill-control and cleanup procedures and materials should be at hand during construction, and workers should be trained in their use.
- Nonbiodegradable debris should not be deposited in the ROW.

The additional following suggested mitigation measures or similar should be implemented for earth disturbance activities associated with work on tower footings:

- Removed topsoil should be segregated and stockpiled for reuse if practicable.
- All soil excavated for structure foundations should be backfilled and tamped around the foundations, and used to provide positive drainage around the structure foundations.
- Use of ground-disturbing mechanical equipment to remove vegetation should be avoided on slopes over 40%, unless the threat of erosion would be minimal because of bedrock, or reseeding would be performed.
- All activity should be minimized during winter and other wet periods to prevent damage (excessive rutting, unacceptable erosion of fines from road surface, excessive soil compaction).

- Where soil has been severely disturbed and the establishment of vegetation is needed to minimize erosion, appropriate measures, as approved by the land manager, should be implemented to establish an adequate cover of grass or other vegetation as needed. Soil preparation, seeding, mulching, and fertilizing should be repeated as necessary to secure soil stabilization and revegetation acceptable to the land manager.
- Grading should be minimized to the extent possible. When required, grading should be conducted away from watercourses/washes to reduce the potential for material to enter the watercourse.
- Grading operations should be consistent with the San Bernardino County Grading Ordinance. SCE should prepare and implement a detailed Erosion Control Plan before construction, which may be a component of the SWPPP.
- Disturbed areas that would not be covered with structures (e.g., buildings or collectors) or pavement following grading and/or cut-and-fill operations should be stabilized. Stabilization methods should include moisturizing and compacting and/or application of polymeric soil stabilizers.
- Should SCE need to relocate or construct a structure or access/spur road, SCE should consult with the United States Army Corps of Engineers (USACE) to locate all new structures and access roads outside floodplains to the extent feasible.
- Sediment control devices, such as placement of native rock, should be used at all dry wash crossings.
- Run-off control structures, diversion ditches, and erosion-control structures should be cleaned, maintained, repaired, and replaced whenever necessary.
- All discharge water created by construction (e.g., concrete washout, pumping for work area isolation, vehicle wash water, drilling fluids) should be treated before discharge.

The following mitigation measures should be implemented for construction activities in and around any water bodies or desert washes associated with the new tower footings, if necessary:

- Wetland delineation surveys should be conducted before each phase of project construction to identify jurisdictional wetlands and Waters of the U.S.
- Mitigation for the permanent loss of jurisdictional wetlands or Water of the U.S. should be provided per agreement with the US Army Corps of Engineers.
- Access ways should be located to avoid wetlands, where practical; or if they are linear, to cross them at the least sensitive feasible point.
- Any discharge of material (displaced soils and, in certain circumstances, vegetation debris) within waters of the United States may be subject to US Army Corps of Engineers regulations under the Clean Water Act.
- If wet areas cannot be avoided, SCE should use wide-track and/or balloon tire vehicles and equipment and or timber mats.

- Excavated material or other construction materials should not be stockpiled or deposited near or in stream banks or other watercourse perimeters.
- All fill or rip-rap placed within a stream or river channel should be limited to the minimum area required for access or protection of existing SCE facilities.

SCE should be required to coordinate with grazing operators to ensure that agricultural productivity and animal welfare are maintained both during and after construction to the maximum extent feasible. Coordination efforts should address issues including, but not necessarily limited to:

- Interference with access to water (e.g., provide alternate methods for livestock access to water)
- Impairment of cattle movements (e.g., provide alternate routes; reconfigure fencing/gates)
- Removal and replacement of fencing (e.g., during construction install temporary fencing/barriers, as appropriate, and following construction restore equal or better fencing to that which was removed or damaged)
- Impacts to facilities such as corrals and watering structures, as well as related effects such as ingress/egress, and management activities (e.g., replacement of damaged/removed facilities in kind; provide alternate access)

During operation cattle would likely be free to move across the transmission ROW and thus impacts to agricultural resources during operation would be less than significant.

C.7.8.4 CONCLUSION

Significant environmental impacts to soil and water resources would be avoided by implementing best management practices, the SWPPP, and/or similar mitigation, as listed above. The project would not cause a displacement of agricultural land use, and neither construction nor operation of the transmission line would cause a significant impact to agricultural resources.

C.7.9 CUMULATIVE IMPACT ANALYSIS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects could result from individually minor but collectively significant actions taking place over a period of time (40 CFR §1508.7). There is the potential for future development in the Lavic Valley area and throughout the southern Mojave Desert region. Cumulative impacts can occur if implementation of the proposed project could combine with those of other local or regional projects. The locations of existing and reasonably foreseeable developments in the Lavic Valley area are presented in the Cumulative Scenario section of this document, including **Cumulative Scenario Figure 3**.

C.7.9.1 GEOGRAPHIC EXTENT

The area of cumulative effect varies by resource. For example, air quality impacts tend to disperse over a large area, while traffic impacts are typically more localized. For this reason, the geographic scope for the analysis of cumulative impacts must be identified for each resource area.

The analysis of cumulative effects considers a number of variables including geographic (spatial) limits, time (temporal) limits, and the characteristics of the resource being evaluated. The geographic scope of each analysis is based on the topography surrounding the Calico Solar Project and the natural boundaries of the resource affected, rather than jurisdictional boundaries. The geographic scope of cumulative effects will often extend beyond the scope of the direct effects, but not beyond the scope of the direct and indirect effects of the proposed action and alternatives.

In addition, each project in a region will have its own implementation schedule, which may or may not coincide or overlap with the Calico Solar Project's schedule. This is a consideration for short-term impacts from the Calico Solar Project. However, to be conservative, the cumulative analysis assumes that all projects in the cumulative scenario are built and operating during the operating lifetime of the Calico Solar Project.

C.7.9.2 EXISTING CUMULATIVE CONDITIONS

The project site and surrounding vicinity is undeveloped desert. No known users of groundwater exist in the project site vicinity. The BNSF railroad and I-40 are existing structures in the site vicinity. Stormwater runoff is deflected by these structures and constrained to flow through culverts and trestles. This stormwater ultimately flows westerly along I-40 and contributes surface waters to Troy Dry Lake. Project stormwater management, as proposed by the applicant, will prevent stormwater runoff, in addition to existing conditions, from the project to contribute additional flows to the drainage and ultimately to Troy Dry Lake.

The proposed water supply for the project is a groundwater well located in Cadiz, CA. Other users of groundwater in the Cadiz Valley include the Cadiz Co. (agriculture), a private individual (Mr. Chambliss) who sells his well water to nearby residents, and a salt production enterprise located at Cadiz Dry Lake.

C.7.9.3 FUTURE FORESEEABLE PROJECTS

The intensity, or severity, of the cumulative effects should consider the magnitude, geographic extent, duration and frequency of the effects (CEQ, 1997). The magnitude of the effect reflects the relative size or amount of the effect; the geographic extent considers how widespread the effect may be; and the duration and frequency refer to whether the effect is a one-time event, intermittent, or chronic (CEQ, 1997).

Each discipline evaluates the impacts of the proposed project on top of the current baseline; the past, present (existing) and reasonably foreseeable or probable future projects in the Calico Solar vicinity as illustrated in **Cumulative Impacts Figure 3 (Newberry Springs/Ludlow Area Existing and Future/Foreseeable Projects)** and **Cumulative Impacts Tables 2 and 3**.

Reasonably foreseeable projects that could contribute to the cumulative effects scenario depend on the extent of resource effects, but could include projects in the immediate Ludlow area as well as other large renewable projects in the California, Nevada, and Arizona desert regions. These projects are illustrated in **Cumulative Impacts Figures 1, 2,** and **3**. As shown in the map and table, there are a number of projects in the immediate area around Calico Solar whose impacts could combine with those of the proposed project. As shown on **Cumulative Impacts Figure 1** and in **Cumulative Impacts Table 1**, solar and wind development applications for use of BLM land have been submitted for approximately 1 million acres of the California Desert Conservation Area. Additional BLM land in Nevada and Arizona also has applications for solar and wind projects.

Soil & Water Table 9
Renewable Energy Projects in the California Desert District

BLM Field Office	Number of Projects & Acres	Total MW
SOLAR ENERGY		
Barstow Field Office	18 projects 132,560 acres	12,875 MW
El Centro Field Office	7 projects 50,707 acres	3,950 MW
Needles Field Office	17 projects 230,480 acres	15,700 MW
Palm Springs Field Office	17 projects 123,592 acres	11,873 MW
Ridgecrest Field Office	4 projects 30,543 acres	2,835 MW
TOTAL – CA Desert District	63 projects 567,882 acres	47,233 MW
WIND ENERGY		
Barstow Field Office	25 projects 171,560 acres	n/a
El Centro Field Office	9 projects (acreage not given for 3 of the projects) 48,001 acres	n/a
Needles Field Office	8 projects 115,233 acres	n/a
Palm Springs Field Office	4 projects 5,851 acres	n/a
Ridgecrest Field Office	16 projects 123,379 acres	n/a
TOTAL – CA Desert District	62 projects 433,721 acres	n/a

Source: Renewable Energy Projects in the California Desert Conservation Area identifies solar and wind renewable projects as listed on the BLM California Desert District Alternative Energy Website (BLM 2009)

Soil & Water Table 10
Renewable Energy Projects on State and Private Lands

Project Name	Location	Status
SOLAR PROJECTS		
Abengoa Mojave Solar Project (250 MW solar thermal)	San Bernardino County, Harper Lake	Under environmental review
Rice Solar Energy Project (150 MW solar thermal)	Riverside County, north of Blythe	Under environmental review
3 MW solar PV energy generating facility	San Bernardino County, Newberry Springs	MND published for public review
Blythe Airport Solar 1 Project (100 MW solar PV)	Blythe, California	MND published for public review
First Solar's Blythe (21 MW solar PV)	Blythe, California	Under construction
California Valley Solar Ranch (SunPower) (250 MW solar PV)	Carrizo Valley, San Luis Obispo County	Under environmental review
LADWP and OptiSolar Power Plant (68 MW solar PV)	Imperial County, SR 111	Under environmental review
Topaz Solar Farm (First Solar) (550 MW solar PV)	Carrizo Valley, San Luis Obispo County	Under environmental review
AV Solar Ranch One (230 MW solar PV)	Antelope Valley, Los Angeles County	Under environmental review
Bethel Solar Hybrid Power Plant (49.4 MW hybrid solar thermal and biomass)	Seeley, Imperial County	Under environmental review
Mt. Signal Solar Power Station (49.4 MW hybrid solar thermal and biomass)	8 miles southwest of El Centro, Imperial County	Under environmental review
WIND PROJECTS		
Alta-Oak Creek Mojave Project (up to 800 MW)	Kern County, west of Mojave	Under environmental review
PdV Wind Energy Project (up to 300 MW)	Kern County, Tehachapi Mountains	Approved
Solano Wind Project Phase 3 (up to 128 MW)	Montezuma Hills, Solano County	Under environmental review
Hatchet Ridge Wind Project	Shasta County, Burney	Under construction
Lompoc Wind Energy Project	Lompoc, Santa Barbara County	Approved
Pacific Wind (Iberdrola)	McCain Valley, San Diego County	Under environmental review
TelStar Energies, LLC (300 MW)	Ocotillo Wells, Imperial County	Under environmental review
GEOTHERMAL PROJECTS		
Buckeye Development Project	Geyserville, Sonoma	Under environmental review
Orni 18, LLC Geothermal Power Plant (49.9 MW)	Brawley, Imperial County	

Source: CEQAnet [http://www.ceqanet.ca.gov/ProjectList.asp], November 2009.

Soil & Water Table 11
Existing Projects in the Newberry Springs/Ludlow Area

ID	Project Name	Location	Agency/ Owner	Status	Project Description
1	Twentynine Palms Marine Corps Air Ground Combat Center (MCAGCC)	Morongo Basin (to the south of project site)	U.S. Marine Corps	Existing	The Marine Corps' service-level facility for Marine Air Ground Task Force training. It covers 596,000 acres to the south of the SES I project site and north of the city of Twentynine Palms
2	SEGS I and II	Near Daggett (17 miles west of project site)	Sunray Energy, Inc.	Existing	Solar parabolic trough facilities generating 13.8 MW and 30 MW, respectively.
3	CACTUS (formerly Solar One and Solar Two)	Near Daggett (to the west of project site)	University of California Davis	Existing	A non-working 10 MW solar power tower plant converted by UC Davis into an Air Cherenkov Telescope to measure gamma rays hitting the atmosphere. The site is comprised of 144 heliostats. This project had its last observational run in 2005. SCE has requested funds from the California Public Utilities Commission to decommission the Solar Two project. (UC Davis 2009)
4	Mine	2 miles west of project site along I-40		Existing	Small-scale aggregate operation (SES 2009a, p. 5.3-12)
5	Mine	14 miles west of project site along I-40		Existing	Larger aggregate mining operation that produced less than 500,000 tons per year in 2005 (SES 2008a, p. 5.3-12)

Source: These projects were identified through a variety of sources including the project AFC (SES 2008a, Section 5.18) and websites of the San Bernardino County Land Use Services Department, BLM, CEC and individual projects.

In the Cadiz Valley where the project water supply well is located, staff could only identify one reasonably foreseeable project. Cadiz, Inc is proposing to construct and operate a conjunctive water use project known as the Cadiz Water Conservation and Storage Project that would be used to store and recovery imported water and also extract native groundwater. The Cadiz Water Conservation and Storage Project is designed to provide Southern California with as much as 150,000 acre-feet of groundwater during droughts, emergencies or other periods of need and up to 1 million acre-feet of groundwater storage.

Cumulative Impacts to Soil and Storm Water

Construction and operation of the Calico Solar project would result in both temporary and permanent changes to the soil and storm water drainage patterns at the Project site. Without the use of BMPs that would be incorporated into a final DESCP and construction SWPPP, these changes could incrementally increase local soil erosion and storm water runoff. However, as discussed above, these potential impacts would be prevented or reduced to a level of less than significant through the implementation of

BMPs, a final DESCP, and construction SWPPP, and compliance with all applicable erosion and storm water management LORS. Compliance with these LORS would ensure cumulative impacts would be prevented or reduced to a level of less than significant. With the implementation of **SOIL&WATER-1**, **-2** and **-3**, staff believes the Project would not significantly contribute to the cumulative soil erosion and storm water impacts from other development within the vicinity of the proposed Project.

Cumulative Impacts to the Basin Balance

As discussed above, during construction and operation of the Calico Solar project, the groundwater demand would average 77 AFY during construction and 20 AFY during operation. Over the next 40 years, the use of groundwater in the Cadiz Valley is not expected to increase significantly. As discussed above under Construction and Operation Water Supply impacts the proposed project and current agricultural water use do not appear to exceed basin recharge. Staff believes there would be no cumulatively significant impact to the basin balance. Also, as discussed in the water supply impacts section above, there is a wide range of estimates of recharge and inflows to the Cadiz Valley groundwater basin. It is possible that the current agricultural pumping could exceed the dry year or drought period recharge and over the long term there could be pumping that exceeds recharge. In addition it is unclear how the proposed Cadiz Water Conservation and Storage Project would be operated. Current available information indicates the reasonably foreseeable use of the Cadiz Water Conservation and Storage Project could be up to 150,000 AFY from the Cadiz Valley Groundwater basin during drought periods. It is unclear, however, how the basin would be managed and whether water level or basin balance impacts of any magnitude would be allowed. To evaluate the potential cumulative impacts of the Cadiz Water Conservation and Storage Project and existing agricultural uses, additional information is needed on how the project and groundwater basin would be managed. Staff still believes the project pumping is minor in comparison to the existing agricultural pumping and potential pumping of the storage project, and would not be a significant contribution to potential cumulative impacts. To evaluate the effects and potential impacts related to existing and reasonably foreseeable future pumping from the Cadiz Water Conservation and Storage Project, and potential effects on the project pumping well, staff believes the applicant should be required to monitor groundwater in accordance with Condition of Certification **SOIL&WATER-8.** This condition would require monitoring in accordance with the County of San Bernardino's Groundwater Management Ordinance and allow for evaluation of potential changes in the basin balance related to reasonably foreseeable projects and project pumping in the basin.

Cumulative Impacts to Wells

The Calico Solar project would not cause a cumulatively considerable impact to water levels in other wells in the Cadiz Valley. The reasonably foreseeable groundwater use by other proposed projects in the Cadiz Valley are not expected to increase except where the Cadiz Water Conservation and Storage Project may be developed. As discussed above under Project Construction and Operation Water Supply impacts the project pumping would not result in significant changes in water levels in the basin. Since project pumping in the basin would not result in significant drawdown impacts and the current agricultural pumping has not resulted in any observed impacts staff believes there would not be any significant cumulative effects on water levels. If the reasonably foreseeable Cadiz Water Conservation and Storage Project is developed it is possible there could be cumulatively significant impacts to water levels. Staff believes that given the current understanding of potential water use and pumping for the Cadiz Water Conservation and Storage Project, the project pumping would not likely be a significant contribution to cumulative impacts on water levels. The applicant should be required to monitor groundwater in accordance with Condition of Certification **SOIL&WATER-8**. This condition would require monitoring in accordance with the County of San Bernardino's Groundwater Management Ordinance and allow for evaluation of changes and trends in water levels related to reasonably foreseeable projects and project pumping in the basin.

C.7.10 COMPLIANCE WITH LORS

Clean Water Act

The applicant has not provided information necessary to complete development of requirements for discharges of brine waters to evaporation ponds, sanitary septic systems, and dredge and fill in waters of the state. Once the applicant provides this information, staff can complete development of requirements that will be included in Condition of Certification **SOIL&WATER-2**.

Public Resources Code, Sections 25300 through 25302

Through compliance with Conditions of Certification **SOIL&WATER-4**, information required by staff to conduct assessments and forecasts of potable and industrial water consumption by power plants is achieved. The Commission also promotes "all feasible means" of water conservation and "all feasible uses" of alternative water supply sources (*Section 25008*).

Energy Commission Policy

Sources of Policy

The Energy Commission has four sources for statements of policy relating to water use in California applicable to power plants. They are the California Constitution, the Warren-Alquist Act, the Commission's restatement of the state's water policy in the 2003 Integrated Energy Policy Report ("IEPR") and the State Water Resources Control Board ("SWRCB" or "Board") resolutions (in particular Resolutions 75-58 and 88-63).

California Constitution

California's interest in conserving water is so important to our thirsty state that in 1928, the common law doctrine of reasonable use became part of the state Constitution. Article X, Section 2 calls for water to be put to beneficial use, and that "waste or unreasonable use or unreasonable *method of use* be prevented." (Cal. Const., art. X, § 2; emphasis added.) The article also limits water rights to reasonable use, including reasonable methods of use. (*Ibid*.) Even earlier in the 20th Century, a state Supreme Court case firmly established that groundwater is subject to reasonable use. (*Katz v. Walkinshaw* (1903) 141 Cal. 116.) Thus, as modern technology has made dry-cooling of power plants feasible, the Commission may regard wet-cooling as an unreasonable method of use of surface or groundwater, and even as a wasteful use of the state's most precious resource.

Warren-Alquist Act

Section 25008 of the Commission's enabling statutes echoes the Constitutional concern, by promoting "all feasible means" of water conservation and "all feasible uses" of alternative water supply sources. (Pub. Resources Code § 25008.)

Integrated Energy Policy Report

In the 2003 Integrated Energy Policy Report ("IEPR" or "Report"), the Commission reiterated certain principles from SWRCB's Resolution 75-58, discussed below, and clarified how they would be used to discourage use of fresh water for cooling power plants under the Commission's jurisdiction. The Report states that the Commission will approve the use of fresh water for cooling purposes only where alternative water supply sources or alternative cooling technologies are shown to be "'environmentally undesirable'" or "'economically unsound.'" (IEPR (2003), p. 41.) In the Report, the Commission interpreted "environmentally undesirable" as equivalent to a "significant adverse environmental impact" under CEQA, and "economically unsound" as meaning "economically or otherwise infeasible," also under CEQA. (IEPR, p. 41.) CEQA and the Commission's siting regulations define feasible as "capable of being accomplished in a successful manner within a reasonable amount of time," taking into account economic and other factors. (Cal. Code Regs., tit. 14, § 15364; tit. 20, § 1702, subd. (f).) At the time of publication in 2003, dry cooling was already feasible for three projects — two in operation and one just permitted. (IEPR, p. 39.)

The Report also notes California's exploding population, estimated to reach more than 47 million by 2020, a population that will continue to use "increasing quantities of fresh water at rates that cannot be sustained." (IEPR, p. 39.)

State Water Resources Control Board Resolutions

The SWRCB not only considers quantity of water in its resolutions, but also the quality of water. In 1975, the Board determined that water with total dissolved solids ("TDS") of 1,000 mg/l or less should be considered fresh water. (Resolution 75-58.) One express purpose of that Resolution was to "keep the consumptive use of fresh water for powerplant cooling to that *minimally essential*" for the welfare of the state. (*Ibid*; emphasis added.) In 1988, the Board determined that water with TDS of 3,000 mg/l or less should be protected for and considered as water for municipal or domestic use. (Resolution 88-63.)

When evaluating solar projects, Staff was unsure exactly how to integrate these decisions for water with TDS between 1,000 and 3,000 mg/l. In November, 2009, Staff requested direct help from the Board for a contemporary interpretation of those Resolutions

The Board's response first established that, generally, Commission staff should consider "multiple factors" in its decisions regarding water supplies for power plants. In other words, staff should consider the impacts on the relevant basin, impacts on other basins, the quantity of use proposed, the quality of the water proposed for use, the project’s requirements as understood by staff, whether there are any other competing uses for the water supply, and other relevant factors when analyzing a proposed project’s water use.

Water with TDS between 1,000 to 3000 mg/l should be generally considered fresh when it involves surface water, and generally not when it involves groundwater. The Board concluded that groundwater should only be used for renewable energy power plants “upon a demonstration that the use of other water supplies or *other methods of cooling* would be ‘environmentally undesirable or economically unsound.’” While the Board did not define “economically unsound,” it explained that the Water Code compels use of recycled water for industrial uses if recycled water is available, and its cost is equal to or less expensive than using fresh water. Staff also notes that dry-cooling has been amply demonstrated to be feasible and, thus, a potential method of cooling that could avoid the use of groundwater. While staff can independently determine if dry cooling is environmentally undesirable, applicants are in a better position to demonstrate that using dry cooling would be economically unsound. In addition to the operational projects mentioned in the 2003 IEPR that use dry-cooling, owners and applicants continue to demonstrate that dry cooling is feasible and economically sound for their California power plants, including renewables.

San Bernardino County Ordinance 3872 (Code Title 3, Division 3, Chapter 6, Article 5)

To help protect groundwater resources in San Bernardino County, the County enacted Ordinance 3872. This ordinance requires a permit to locate, construct, operate, or maintain a new groundwater well within the unincorporated, unadjudicated desert region of San Bernardino County. CEQA compliance must also be completed prior to issuance of a permit. The article does not apply to “groundwater wells located on Federal lands unless otherwise specified by inter-agency agreement.” The BLM and County entered into a MOU that provides that the BLM will require conformance with Article 5 for all projects proposing to use groundwater from beneath public lands. The MOU provides that the County and BLM will work cooperatively together to ensure conformance with applicable LORS by project developers on BLM land. As part of meeting the requirements of the County’s permitting process, the County may require the project owner to prepare a groundwater monitoring plan in accordance with the County’s “*Guidelines for Preparation of a Groundwater Monitoring Plan*” dated January 1998. Condition of Certification **SOIL&WATER-8** would require the project owner to ensure that all onsite groundwater wells would be installed in accordance with the County of San Bernardino requirements and to submit a well construction packet to the County for comment and written evaluation. The project owner would also be required to submit well completion reports to the DWR in accordance with the DWR well completion reporting requirements.

Calico Solar Project

The applicant for the Calico Solar Power Project proposes the use of 34,000 SunCatchers, each containing a single Stirling engine. The Stirling engines are designed to use closed loop air cooled radiators, which achieves maximum water conservation associated with cooling. Other than dust suppression and potable consumption, water use would be limited to mirror washing and hydrogen gas generation. During operation, the applicant estimates approximate 20 acre-feet of water will be required each year. Groundwater is the only available source of water and the closest location available to provide water for the project is located in Cadiz, approximately 64 miles away from the site. Water is the only feasible means of cleaning the mirrors, which must be clean to maintain efficiency of output of Stirling Engine power plants.

Groundwater occurrence and quality varies significantly within the Mojave Desert. The applicant conducted field explorations adjacent to the project site to evaluate groundwater resource characteristics. The applicant found that drilling was difficult, groundwater was not abundant and what groundwater that was encountered was of relatively poor quality (high TDS). The applicant pursued alternate water sources and discovered a well in Cadiz that had previously been used to provide water for steam locomotives, but now sat idle. Documentation indicates that the well penetrates a high capacity aquifer of good quality water.

State, SWRCB and Energy Commission water policies encourage the use of the least amount of the lowest quality water feasibly available. As discussed in Section C.7.4.4, site groundwater has contained elevated concentration of TDS. In addition, preliminary results of ongoing near- site groundwater resource exploration have indicated limited availability of site groundwater. While lower quality groundwater water was discovered adjacent to the site, due to its limited availability it was considered by the applicant to be unfeasible for power plant use. Other sources of water were considered and evaluated, and were considered unfeasible for this project. Therefore, due to the inadequate supply of degraded water, the low volume of water required for project operation, the absence of a need for water used in power plant cooling and the relatively high output generated (850 MW), staff believes the proposed project complies with the State, SWRCB and Energy Commission water policies.

C.7.11 NOTEWORTHY PUBLIC BENEFITS

Staff has not identified any noteworthy public benefits associated with hydrology, water use, and water quality.

C.7.12 FACILITY CLOSURE

According to Section 3.12 of the applicant’s project description, the solar generating facility is expected to have a lifespan of 40 years. At any point during this time, temporary or permanent closure of the solar facility could occur. Temporary closure would be a result of necessary maintenance, hazardous weather conditions, or damage due to a natural disaster. Permanent closure would be result of damage that is beyond repair, adverse economic conditions, or other significant reasons.

Both temporary and permanent closures would require the applicant to submit to the Energy Commission and BLM a contingency plan or a decommissioning plan, respectively. A contingency plan would be implemented to ensure compliance with applicable LORS, and appropriate shutdown procedures depending on the length of the cessation. A decommissioning plan would be implemented to ensure compliance with applicable LORS, removal of equipment and shutdown procedures, site restoration, potential decommissioning alternatives, and the costs and source of funds associated with decommissioning activities.

After the end of the project's useful life, it would be decommissioned as described in the applicant's Draft Closure, Revegetation, and Rehabilitation Plan. The facility would be removed to a depth of 3 feet below grade, original contours restored, and the site revegetated. However, the removal of the existing facility could cause substantial disturbance to soil and water resources. The project closure would require many of the same resource protection plans as required for construction, and thus, staff concludes that the impacts to soil and water resources would be less than significant.

C.7.13 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

DRAINAGE EROSION AND SEDIMENTATION CONTROL PLAN

SOIL & WATER-1 Prior to site mobilization, the project owner shall obtain both BLM's Authorized Officer and the CPM's approval for a site specific Drainage, Erosion and Sediment Control Plan (DESCP) that ensures protection of water quality and soil resources of the project site and all linear facilities for both the construction and operation phases of the project. This plan shall address appropriate methods and actions, both temporary and permanent, for the protection of water quality and soil resources, demonstrate no increase in off-site flooding potential, and identify all monitoring and maintenance activities. The project owner shall complete all necessary engineering plans, reports, and documents necessary for both BLM's Authorized Officer and the CMP to conduct a review of the proposed project and provide a written evaluation as to whether the proposed grading, drainage improvements, and flood management activities comply with all requirements presented herein. The plan shall be consistent with the grading and drainage plan as required by Condition of Certification **CIVIL-1** and shall contain the following elements:

- **Vicinity Map:** A map shall be provided indicating the location of all project elements with depictions of all major geographic features to include watercourses, washes, irrigation and drainage canals, major utilities, and sensitive areas.
- **Site Delineation:** The site and all project elements shall be delineated showing boundary lines of all construction areas and the location of all existing and proposed structures, underground utilities, roads, and drainage facilities. Adjacent property owners shall be identified on the plan maps. All maps shall be presented at a legible scale
- **Drainage:** The DESCP shall include the following elements:

  a. Topography. Topography for offsite areas is required to define the existing upstream tributary areas to the site and downstream to provide enough definition to map the existing storm water flow and flood hazard. Spot elevations shall be required where relatively flat conditions exist.

b. Proposed Grade. Proposed grade contours shall be shown at a scale appropriate for delineation of onsite ephemeral washes, drainage ditches, and tie-ins to the existing topography.

c. Hydrology. Existing and proposed hydrologic calculations for onsite areas and offsite areas that drain to the site; include maps showing the drainage area boundaries and sizes in acres, topography and typical overland flow directions, and show all existing, interim, and proposed drainage infrastructure and their intended direction of flow.

d. Hydraulics. Provide hydraulic calculations to support the selection and sizing of the onsite drainage network, diversion facilities and BMPs.

- **Watercourses and Critical Areas:** The DESCP shall show the location of all onsite and nearby watercourses including washes, irrigation and drainage canals, and drainage ditches, and shall indicate the proximity of those features to the construction site. Maps shall identify high hazard flood prone areas.
- **Clearing and Grading:** The plan shall provide a delineation of all areas to be cleared of vegetation, areas to be preserved, and areas where vegetation would be cut to allow clear movement of the heliostats. The plan shall provide elevations, slopes, locations, and extent of all proposed grading as shown by contours, cross-sections, cut/fill depths or other means. The locations of any disposal areas, fills, or other special features shall also be shown. Existing and proposed topography tying in proposed contours with existing topography shall be illustrated. The DESCP shall include a statement of the quantities of material excavated at the site, whether such excavations or fill is temporary or permanent, and the amount of such material to be imported or exported or a statement explaining that there would be no clearing and/or grading conducted for each element of the project. Areas of no disturbance shall be properly identified and delineated on the plan maps.
- **Soil Wind and Water Erosion Control:** The plan shall address exposed soil treatments to be used during construction and operation of the proposed project for both road and non-road surfaces including the specific identification of all chemical-based dust palliatives, soil bonding, and weighting agents appropriate for use at the proposed project site that would not cause adverse effects to vegetation. BMPs shall include measures designed to prevent wind and water erosion including application of chemical dust palliatives after rough grading to limit water use. All dust palliatives, soil binders, and weighting agents shall be approved by both BLM's Authorized Officer and the CPM prior to use. With regard to erosion risk and stormwater runoff, debris and detention basins shall be installed which are sized and located to intercept storm water flow from off-site areas as it enters the project site. On-site roadways and other infrastructure shall be designed and located to avoid existing and proposed flow paths to the extent feasible.

- **Project Schedule:** The DESCP shall identify on the topographic site map the location of the site-specific BMPs to be employed during each phase of construction (initial grading, project element construction, and final grading/stabilization). Separate BMP implementation schedules shall be provided for each project element for each phase of construction. This scheduling should require the installation of debris basins, detention/ infiltration basins, swales, and related storm water management facilities before construction commences on each phase.
- **Best Management Practices:** The DESCP shall show the location, timing, and maintenance schedule of all erosion- and sediment-control BMPs to be used prior to initial grading, during project element excavation and construction, during final grading/stabilization, and after construction. BMPs shall include measures designed to control dust and stabilize construction access roads and entrances. The maintenance schedule shall include post-construction maintenance of treatment-control BMPs applied to disturbed areas following construction.
- **Erosion Control Drawings:** The erosion-control drawings and narrative shall be designed, stamped and sealed by a professional engineer or erosion-control specialist.
- **Agency Comments:** The DESCP shall include copies of recommendations, conditions, and provisions from the County of San Bernardino, California Department of Fish and Game (CDFG), and Lahontan Regional Water Quality Control Board (RWQCB).
- **Monitoring Plan:** Monitoring activities shall include routine measurement of the volume of accumulated sediment in the onsite drainage ditches, and storm water diversions and the requirements specified in Appendix B, C, and D.

Verification: The DESCP shall be consistent with the grading and drainage plan as required by Condition of Certification **CIVIL-1**, and relevant portions of the DESCP shall clearly show approval by the chief building official (CBO). In addition, the project owner shall do all of the following:

a. No later than ninety (90) days prior to start of site mobilization, the project owner shall submit a copy of the DESCP to the County of San Bernardino, the RWQCB, the BLM’s authorized officer, and CMP for review and comment. Both BLM’s Authorized Officer and the CPM shall consider comments received from San Bernardino County and RWQCB.

b. During construction, the project owner shall provide an analysis in the monthly compliance report on the effectiveness of the drainage-, erosion- and sediment-control measures and the results of monitoring and maintenance activities.

c. Once operational, the project owner shall provide in the annual compliance report information on the results of storm water BMP monitoring and maintenance activities.

d. Provide BLM’s Authorized Officer and the CPM with two (2) copies each of all monitoring or other reports required for compliance with San Bernardino County, CDFG, and RWQCB.

WASTE DISCHARGE REQUIREMENTS

SOIL&WATER-2 Requirements for discharges of brine waters to evaporation ponds, dredge and fill in waters of the state, and sanitary septic systems, are pending receipt of information to be submitted by the applicant. Once this information has been submitted, requirements will be developed and included in the SSA/DEIS.

STORM WATER DAMAGE MONITORING AND RESPONSE PLAN

SOIL&WATER-3 The project owner shall ensure that all SunCatcher pole foundations are designed to withstand storm water scour from surface erosion and/or channel migration. The project owner shall also develop a Storm Water Damage Monitoring and Response Plan to evaluate potential impacts from storm water, including pole foundations that fail due to storm water flow or otherwise break and scatter mirror debris and other SunCatcher components on to the ground surface. The Storm Water Damage Monitoring and Response Plan shall include the following elements:

- Detailed maps showing the installed location of all SunCatcher pole foundations within each project phase, including existing and proposed drainage channels.
- Each SunCatcher pole foundation should be identified by a unique ID number marked to show initial ground surface at its base, and the depth to the tip of the pole below ground.
- Minimum Depth Stability Threshold to be maintained of SunCatcher pole foundations to meet long-term stability for applicable wind, water and debris loading effects;
- Above and below ground construction details of a typical installed SunCatcher pole foundation.
- BMPs to be employed to minimize the potential impact of broken mirrors to soil resources.
- Methods and response time of mirror cleanup and measures that may be used to mitigate further impact to soil resources from broken mirror fragments.

Monitor and Inspect Periodically, Before First Seasonal and After Every Storm Event:

- Security and Tortoise Exclusion Fence: Inspect for damage and buildup of sediment or debris
- SunCatcher Pole Foundations within Drainages or Subject to Drainage Overflow: Inspect for tilting, mirror damage, depth of scour compared to foundation depth below ground and the Minimum Depth Stability Threshold, collapse, and downstream transport.
- Drainage Channels: Inspect for substantial migration or changes in depth, and transport of broken mirror glass.

- Constructed Diversion Channels: Inspect for scour and structural integrity issues caused by erosion, and for sediment and debris buildup.

Short-Term Incident-Based Response:

- Security and Tortoise Exclusion Fence: repair damage, and remove build-up of sediment and debris.
- SunCatcher Pole Foundations: Remove broken glass, damaged structures, and wiring from the ground, and for foundations no longer meeting the Minimum Depth Stability Threshold, either replace/reinforce or remove the SunCatcher to avoid exposure for broken glass.
- Drainage Channels: no short-term response necessary unless changes indicate risk to facility structures.
- Constructed Diversion Channels: repair damage, maintain erosion control measures and remove built-up sediment and debris.

Long-Term Design-Based Response:

- Propose operation/BMP modifications to address ongoing issues. Include proposed changes to monitoring and response procedures, frequency, or standards.
- Replace/reinforce SunCatcher Pole Foundations no longer meeting the Minimum Depth Stability Threshold or remove the SunCatchers to avoid exposure for broken glass.
- Propose design modifications to address ongoing issues. This may include construction of active storm water management diversion channels and/or detention ponds.

Inspection, short-term incident response, and long-term design-based response may include activities both inside and outside of the approved right-of-way. For activities outside of the approved right-of-way, the applicant will notify BLM and acquire environmental review and approval before field activities begin.

Verification: At least sixty (60) days prior to commercial operation, the project owner shall submit to both BLM's Authorized Officer and the CPM a copy of the Storm Water Damage Monitoring and Response Plan for review and approval prior to commercial operation. The project owner shall retain a copy of this plan onsite at the power plant at all times. The project owner shall prepare an annual summary of the number of heliostats failed, cause of the failure, and cleanup and mitigation performed for each failed heliostat.

CONSTRUCTION AND OPERATIONS WATER USE

SOIL&WATER-4 The proposed project's use of groundwater for all construction activities shall not exceed 245 AFY. The proposed project's use of groundwater for all operational activities shall not exceed 20 AFY. Prior to the use of groundwater for construction, the project owner shall install and maintain metering devices as part of the water supply and distribution system to document project water use and to monitor and record in gallons per day the total volume(s) of water supplied to the project from the water source. The metering devices shall be operational for the life of the project.

Verification: At least sixty (60) days prior to the start of construction of the proposed project, the project owner shall submit to both BLM's Authorized Officer and the CPM a copy of evidence that metering devices have been installed and are operational.

Beginning six (6) months after the start of construction, the project owner shall prepare a semi-annual summary of amount of water used for construction purposes. The summary shall include the monthly range (daily minimum and daily maximum) and monthly average of daily water usage in gallons per day.

The project owner shall prepare an annual summary, which will include daily usage, monthly range and monthly average of daily water usage in gallons per day, and total water used on a monthly and annual basis in AF. For years subsequent to the initial year of operation, the annual summary will also include the yearly range and yearly average water use by source. For calculating the total water use, the term "year" will correspond to the date established for the annual compliance report submittal.

ASSURED WATER SUPPLY

SOIL&WATER-5 The project owner shall provide the Authorized Officer (AO) and the Compliance Project Manager (CPM) two copies of an executed Water Purchase Agreement (agreement) with the water purveyor (BNSF) for the long-term supply (30-35 years) of fresh water to the Project. The project shall not begin construction without a long term agreement for water delivery for project use. The agreement shall specify a delivery rate to meet the Project's maximum operation requirements and all terms and costs for the delivery and use of water at the Project. The Project shall not begin construction and initiate operation without the final agreement in place and submitted to the AO and CPM.

Verification: No later than 60 days prior to beginning construction, the project owner shall submit two copies of the executed agreement for the supply and on-site use of water at the Calico Solar Project. The agreement shall specify that the water purveyor can deliver water at a maximum rate up to 175,000 gpd at least through the construction phase and would provide the Project a minimum of 20 acre-feet per year for operation.

SEPTIC SYSTEM AND LEACH FIELD REQUIREMENTS

SOIL&WATER-6 Prior to the start of construction, the project owner shall comply with the County of San Bernardino requirements for the construction and operation of the project's proposed sanitary waste septic system and leach field. Project construction shall not proceed until documentation equivalent to the County's required wastewater treatment system permits are issued by the County and approved by both BLM's AO and the CPM. The project owner shall remain in compliance with the County requirements for the life of the project.

Verification: The Project owner will submit all necessary information and the appropriate fee to the County of San Bernardino to ensure that the County can assess the project's compliance with the County's sanitary waste disposal facilities requirements. A written assessment prepared by the County of San Bernardino of the project's compliance with these requirements must be provided to the CPM sixty (60) days prior to the start of operation.

DECOMMISSIONING PLAN

SOIL&WATER-7 The Project owner shall identify likely decommissioning scenarios and develop specific decommissioning plans for each scenario that will identify actions to be taken to avoid or mitigate long-term impacts related to water and wind erosion after decommissioning. Actions may include such measures as a decommissioning SWPPP, revegetation and restoration of disturbed areas, post-decommissioning maintenance, collection and disposal of project materials and chemicals, and access restrictions.

Verification: At least 90 days prior to the start of site mobilization, the project owner shall submit decommissioning plans to the AO and CPM for review and approval prior to site mobilization. The project owner shall amend these documents as necessary, with approval from the AO and CPM, should the decommissioning scenario change in the future.

GROUNDWATER LEVEL MONITORING AND REPORTING PLAN

SOIL&WATER-8 The project owner shall submit a Groundwater Level Monitoring and Reporting Plan to San Bernardino County for review and both BLM's Authorized Officer and the CPM for review and approval in accordance with the County of San Bernardino Code Title 2, Division 3, Chapter 6, Article 5 (Desert Groundwater Management Ordinance). The Groundwater Level Monitoring and Reporting Plan shall provide detailed methodology for monitoring background and site groundwater levels. Monitoring shall include pre-construction, construction, and project operation water use. The primary objective for the monitoring is to establish pre-construction and project related groundwater level trends that can be quantitatively compared against observed and simulated trends near the project pumping well and existing wells.

Prior to project construction, monitoring shall commence to establish pre-construction base-line conditions and shall incorporate any existing monitoring and reporting data collected in the project area. The monitoring network shall be designed to incorporate any ongoing monitoring and reporting program currently occurring in the Cadiz Valley groundwater basin. The monitoring plan and network may make use of existing wells in the basin that would satisfy the requirements for the monitoring program.

Verification: The project owner shall complete the following:

1. At least two (2) months prior to construction, a Groundwater Level Monitoring and Reporting Plan shall be submitted to the County of San Bernardino for review and comment before completion of Condition of Certification **SOIL& WATER-3**, and a copy of the County's comments and the plan shall be submitted to both BLM's Authorized Officer and the CPM for review and approval. The plan shall include a scaled map showing the site and vicinity, existing well locations, and proposed monitoring locations (both existing wells and new monitoring wells proposed for construction). The map shall also include relevant natural and man-made features

(existing and proposed as part of this project). The plan also shall provide: (1) well construction information and borehole lithology for each existing well proposed for use as a monitoring well; (2) description of proposed drilling and well installation methods; (3) proposed monitoring well design; and, (4) schedule for completion of the work.

2. At least one (1) month prior to construction, a Well Monitoring Installation and Groundwater Level Network Report shall be submitted to both BLM's Authorized Officer and the CPM. The report shall include a scaled map showing the final monitoring well network. It shall document the drilling methods employed, provide individual well construction as-builds, borehole lithology recorded from the drill cuttings, well development, and well survey results. The well survey shall measure the location and elevation of the top of the well casing and reference point for all water level measurements, and shall include the coordinate system and datum for the survey measurements. Additionally, the report shall describe the water level monitoring equipment employed in the wells and document their deployment and use.
3. As part of the monitoring well network development, any newly constructed monitoring wells shall be permitted and constructed consistent with San Bernardino County and State specifications.
4. At least one (1) week prior to project construction, all water level monitoring data shall be provided to both BLM's Authorized Officer and the CPM. The data transmittal shall include an assessment of pre-project water level trends, a summary of available climatic information (monthly average temperature and rainfall records from the nearest weather station), and a comparison and assessment of water level data.
5. After project construction and during project operations, the project owner shall submit the monitoring data annually to both BLM's Authorized Office and the CPM. The summary shall document water level monitoring methods, the water level data, water level plots, and a comparison between pre- and post-project start-up water level trends. The report shall also include a summary of actual water use conditions, monthly climatic information (temperature and rainfall), and a comparison and assessment of water level data.

C.7.14 CONCLUSIONS

With the information provided to date, staff has determined that construction, operation, and decommissioning of the proposed project under NEPA could potentially impact soils, surface water drainage, flooding, surface water quality, ground water quality, and groundwater supply. Where these potential impacts have been identified, staff has proposed mitigation measures to reduce identified impacts to levels that are less than significant under CEQA. The mitigation measures, as well as specifications for LORS conformance, are included herein as conditions of certification. The conditions of certification referred to herein address the CEQA requirements for the Energy Commission's analysis and BLM's needs for a NEPA analysis. The project would conform to all applicable LORS. Staff's conclusions based on analysis of the information submitted to-date are as follows:

1. The proposed project would be located in the Mojave Desert of San Bernardino County in an area characterized by braided stream channels, flash flooding, alluvial fan conditions, low rainfall, sparse vegetation, and the potential for wind erosion/ deposition.
2. The project proposes to place more than 34,000 solar dishes, known as SunCatchers, within areas known to be subject to flash flooding and erosion. Project-related changes to the braided and alluvial fan stream hydraulic conditions could result in on-site erosion, stream bed degradation or aggradation, and erosion and sediment deposition impacts to adjacent land. SunCatchers within the stream courses could be subject to destabilization by stream scour. Impacts to soils related to wind erosion and runoff-borne erosion are potentially significant, as are impacts to surface water quality from sedimentation and the introduction of foreign materials, including potential contaminants, to the project area.
3. The applicant completed a hydrologic study and hydraulic modeling of the major stream channels on the project. Based on this work and subsequent analysis by staff, the project can be designed to withstand flash flood flows with minimal damage to SunCatchers. Condition of Certification **SOIL&WATER-3** ensures such a design.
4. A Draft Drainage, Erosion, and Sedimentation Control mitigates the potential project-related storm water and sediment impacts. However, the calculations and assumptions used to evaluate potential storm water and sedimentation impacts are imprecise and have limitations and uncertainties associated with them such that the magnitude of potential impacts that could occur cannot be determined precisely. Based on these factors, the proposed project could result in impacts that would be significant with respect to California Environmental Quality Act significance criteria specified herein and National Environmental Policy Act significance criteria specified in 40 CFR 1508.27. Therefore, Conditions of Certification **SOIL&WATER-1, SOIL&WATER-2** and **SOIL&WATER-3** have been developed that define specific methods of design analysis, development of best management practices, and monitoring and reporting procedures to mitigate impacts related to flooding, erosion, sedimentation, and stream morphological changes. Compliance with LORS, particularly the Clean Water Act requirements, will insure no adverse impacts to waters of the U.S. With implementation of these Conditions, the potential effects of the proposed project would be less than significant. The applicant has not provided information necessary to complete development of requirements for dredge and fill in waters of the state. Once the applicant provides this information staff can complete development of requirements that will be included in Condition of Certification **SOIL&WATER-2.**
5. Surface water and ground water quality could be affected by construction activities, ongoing activities on the project site including mirror washing, vehicle use and fueling , storage of oils and chemicals, the proposed septic and leach field system for sanitary wastes, and wastes from the water treatment system. These impacts are potentially significant. Compliance with laws, ordinances, regulations and standards and Conditions of Certification **SOIL&WATER-1, SOIL&WATER-2, SOIL&WATER-3** and **SOIL&WATER-6** will mitigate to a level less than significant. The applicant has not provided information necessary to complete development of requirements for discharges of brine waters to evaporation ponds or sanitary septic systems. Once the applicant provides this information staff can complete

development of requirements that will be included in Condition of Certification **SOIL&WATER-2.**

6. Impacts to groundwater supply and groundwater quality during construction and operations would be less than significant. SunCatcher mirrors will be spray washed on a regular basis. Mirror washing and dust control watering will comprise the primary water use for the project. Daily maximum water use is estimated to be 43.7gallons per minute (gpm) during construction, with total annual use of approximately 20 AF for operation. Conditions of Certification **SOIL&WATER-2**, **SOIL&WATER-3**, and **SOIL&WATER-4** are proposed by staff to ensure this water supply and treatment system comply with laws, ordinances, regulations and standards and not pose adverse impacts to water quality or supply. The applicant has not provided information necessary to complete development of requirements for discharges of brine waters to evaporation ponds or sanitary septic systems. Once the applicant provides this information staff can complete development of requirements that will be included in Condition of Certification **SOIL&WATER-2**.
7. The proposed project would use air-cooled radiators fitted on each individual engine for heat rejection. Use of this technology would substantially reduce potential water use and is consistent with Energy Commission water policy.

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SES 2009p – Stirling Energy Systems/C. Champion (tn 52956). Applicants' Response to Energy Commission & Bureau of Land Management's Data Requests 113-127 of Data Requests Set 1, Part 2, dated August 20, 2009. Submitted to CEC/Docket Unit on August 24, 2009.

SES 2009r – Stirling Energy Systems/C. Champion (tn 53067). Applicant's Responses to Energy Commission & Bureau of Land Management's Data Request 1-91 of Data Request Set 1, Part 1, dated August 28, 2009. Submitted to CEC/Docket Unit on August 28, 2009.

SES 2009t – Stirling Energy Systems/C. Champion (tn 53093). Applicant's Responses to Energy Commission and Bureau of Land Management's Data Requests 1-48, 81, and 109-112 of Set 1 Parts 1 and 2, dated August 31, 2009. Submitted to CEC/Docket Unit August 31, 2009.

SES 2009u – Stirling Energy Systems/C. Champion (tn 53094). Applicant's Response to Energy Commission and Bureau of Land Management's Data Requests 81- Drainage, Erosion, and Sediment Control Plan, dated August 31, 2009. Submitted to CEC/Docket Unit on August 31, 2009.

SES 2009cc – Stirling Energy Systems/C. Champion (tn 54099). Applicant's Response to CURE Data Requests 276-380 of Set 3, dated November 12, 2009. Submitted to CEC/Docket Unit on November 13, 2009.

SES 2009dd – Stirling Energy Systems/F. Bellows (tn 54229). Applicants' Responses to Energy Commission & Bureau of Land Management's Data Request Set 1, Part 2 Cultural Resources Data Responses & 25% Submittal, dated November 19, 2009. Submitted to CEC/Docket Unit on November 20, 2009.

SES 2009ee – Stirling Energy Systems/C. Champion (tn 54272). Applicant's Response to Energy Commission & Bureau of Land Management's Data Requests Set 1, Part 1 & Set 2, Part 1 Data Requests 71-73, 76-79, 85 & 128-141, dated November 23, 2009. Submitted to CEC/Docket Unit on November 24, 2009.

SES 2009ff – Stirling Energy Systems/F. Bellows (tn 54322). Transcript from the September 16th Data Request & Issue Resolution Workshop, dated November 30, 2009. Submitted to CEC/Docket Unit on December 2, 2009.

SES 2009gg – URS/C. Lytle (tn 54352). Applicant's Response to CURE Data Requests Set 4, dated December 1, 2009. Submitted to CEC/Docket Unit on December 3, 2009.

SES 2009ii – Stirling Energy Systems/C. Champion (tn 54386). Applicant's Response to Energy Commission & Bureau of Land Management's Data Requests Set 2, dated December 4, 2009. Submitted to CEC/Docket Unit on December 4, 2009.

SES 2009jj – Stirling Energy Systems/F. Bellows (tn 54427). Applicant's Updated Project Map, dated December 10, 2009. Submitted to CEC/Docket Unit on December 14, 2009.

SES 2009mm – Stirling Energy Systems/C. Champion (tn 54580). Applicant's Letter Describing Project Updates, dated December 21, 2009. Submitted to CEC/Docket Unit on December 21, 2009.

SES 2010c – URS/C. Lytle (tn 54836). Applicant's Submittal of Additional Alternatives Analysis, dated January 7, 2010. Submitted to CEC/Docket Unit on January 7, 2010.

SES 2010d – URS/C. Lytle (tn 54738). Applicants Submittal of the Geotechnical Engineering Report, dated January 8, 2010. Submitted to CEC/Docket Unit on January 8, 2010.

Thompson 1929 – Thompson, D.G. 1929, The Mojave Desert Region, California: USGS Water Supply Paper 578, 795 pp.

TS 2010h – Tessera Solar/F. Bellows (tn 55391). Drainage Layout Figure, dated February 12, 2010. Submitted to CEC/Docket Unit on February 16, 2010.

TS 2010j – Tessera Solar/F. Bellows (tn 55663). Applicant's Responses to Energy Commission Data Requests Set 1 Part 2 – Data Requests 102 and 103, dated February 24, 2010. Submitted to CEC/Docket Unit on February 24, 2010.

TS 2010l – Tessera Solar/C. Champion (tn 55779). Information from Applicant Regarding Water & Waste, dated February 19, 2010. Submitted to CEC/Docket Unit on March 8, 2010.

TS 2010m – Tessera Solar/F. Bellows (tn 55802). Applicant's Application for Clean Water Act 401 Water Quality Certification and/or Waste Discharge Requirements & Submittal of Notification of Lake or Streambed Alteration, dated March 4, 2010. Submitted to CEC/Docket Unit on March 8, 2010.

TS 2010n – Tessera Solar/F. Bellows (tn 55823). Applicant's Submittal of the Revised Calico Solar Project Layout Figure, date March 8, 2010. Submitted to CEC/Docket Unit on March 10, 2010.

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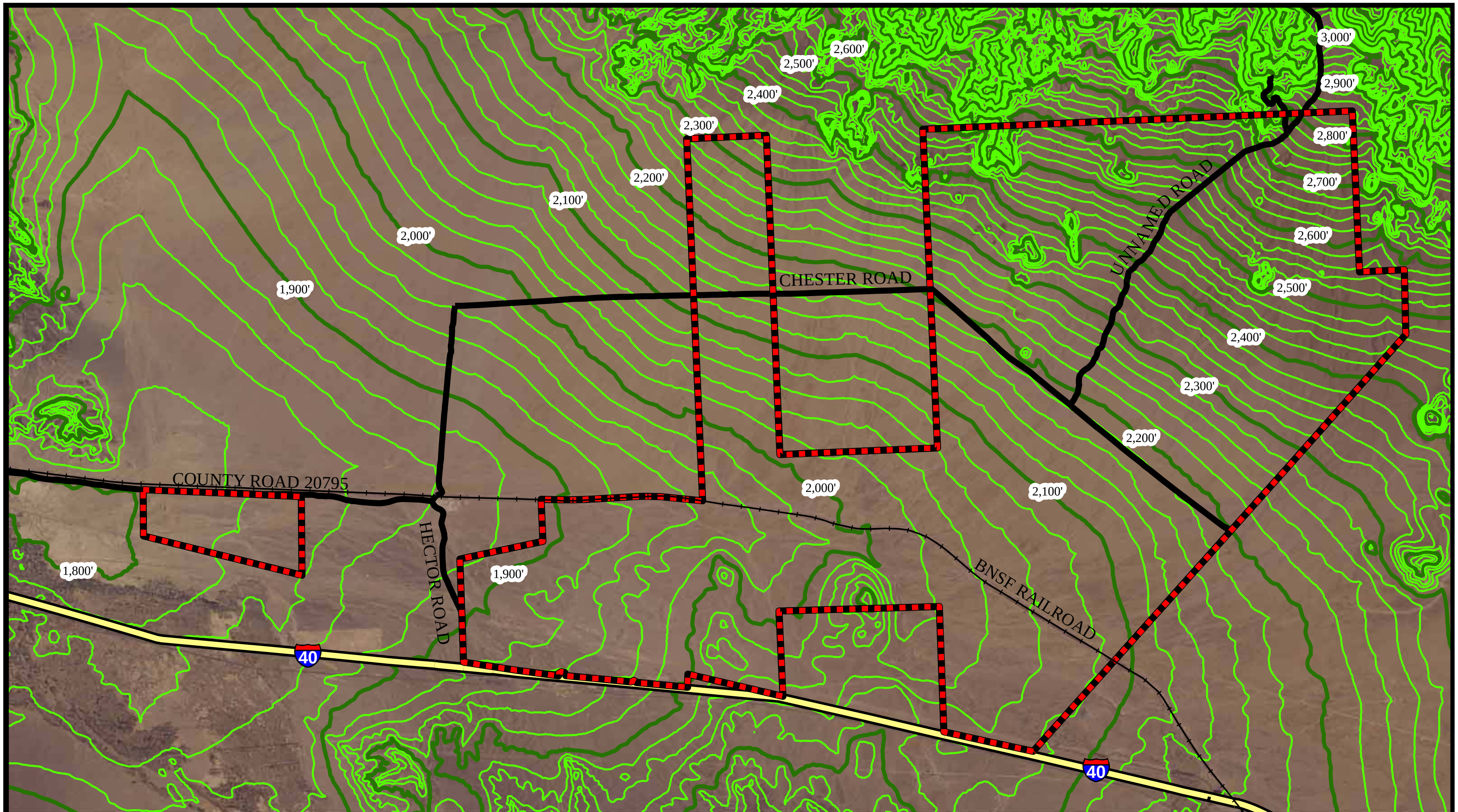
SOIL AND WATER RESOURCES – APPENDIX A
ACRONYMS USED
IN THE SOIL AND WATER RESOURCES SECTION

AF	acre-feet
AFY	acre-feet per year
BFE	Base Flood Elevation
BNSF	Burlington North Santa Fe
BMP	Best Management Practices
Caltrans	California Department of Transportation
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CPM	Compliance Project Manager
CLOMR	Conditional Letter of Map Revision
CSDD	Capitol Storm Design Discharge
CVWD	Coachella Valley Water District
CWA	Clean Water Act
CWC	California Water Code
DESCP	Drainage, Erosion, and Sediment Control Plan
DFIRM	Digital Flood Insurance Rate Map
DTSC	Department of Toxic Substances Control
DWA	Desert Water Agency
DWR	Department of Water Resources
FEMA	Federal Emergency Management Agency
FIS	Flood Insurance Study
FIRMS	Flood Insurance Rate Maps
FSA	Final Staff Assessment
gpd	Gallons per day
gpm	gallons per minute
IEPR	Integrated Energy Policy Report
KCWA	Kern County Water Agency
LORS	laws, ordinances, regulations, and standards
mg/l	milligrams per liter
MW	megawatt
MWD	Metropolitan Water District of Southern California
NFIP	National Flood Insurance Program
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System

NRCS	National Resources Conservation Services
NWS	National Weather Service
NOAA	National Oceanic and Atmospheric Administration
Porter-Cologne	Porter-Cologne Water Quality Control Act
PSA	Preliminary Staff Assessment
RCRA	Resource Conservation and Recovery Act
RWQCB	Regional Water Quality Control Board
SFHA	Special Flood Hazard Area
SPRR	Southern Pacific Railroad
SSG	Solar Steam Generator
STG	Steam Turbine Generator
SWP	State Water Project
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
WQMP	Water Quality Management Plan
WSP	Water Supply Plan
WWTP	wastewater treatment plant
ZLD	zero liquid discharge

SOIL AND WATER RESOURCES - FIGURE 1
Calico Solar Project - Site Topography



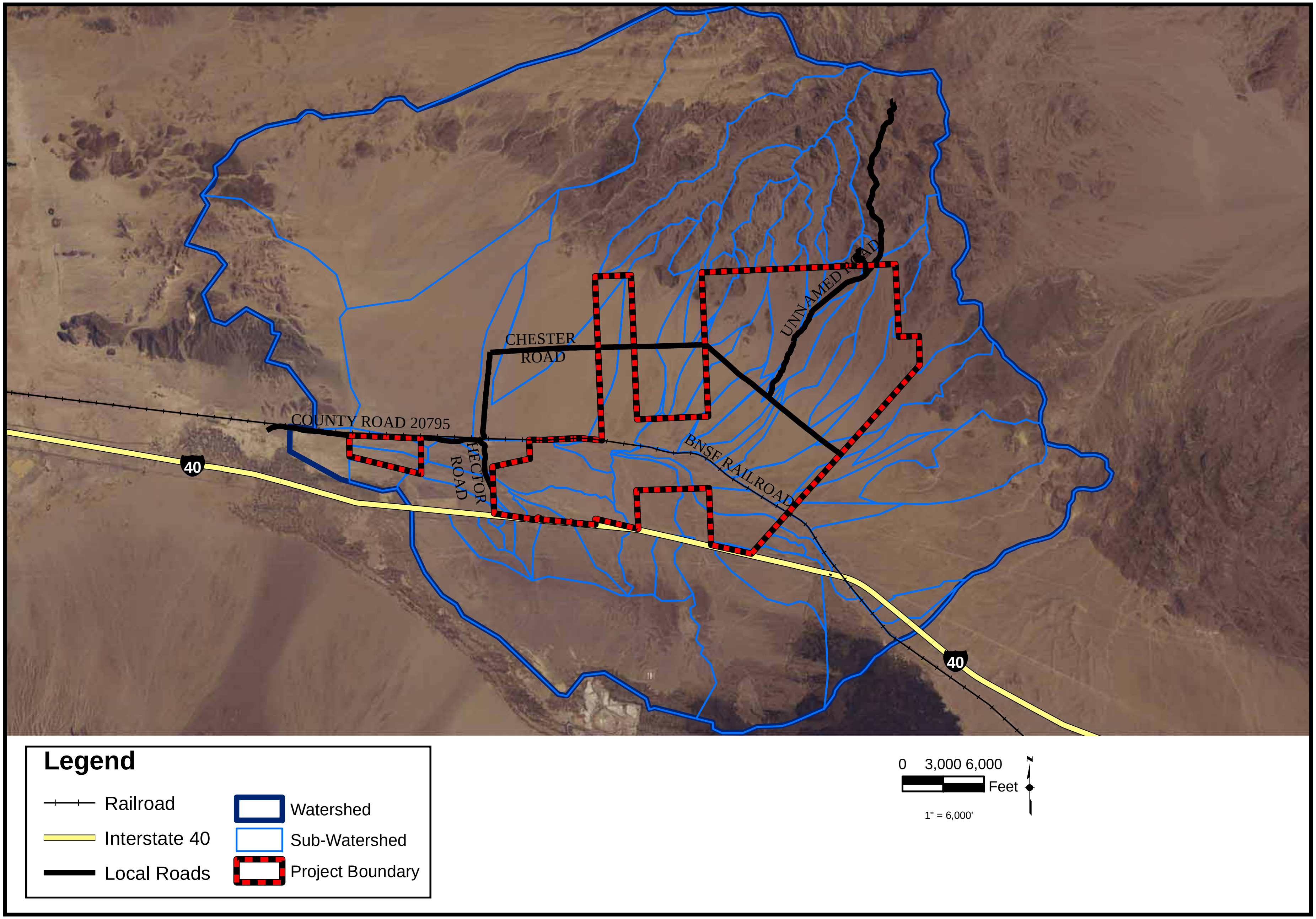
Legend
Railroad
Contours
Interstate 40
Project Boundary
Local Roads

0 1,500 3,000
Feet
1" = 3,000'

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010
SOURCE: Winzler & Kelly

SOIL AND WATER RESOURCES - FIGURE 2

Calico Solar Project - Regional Watersheds



MARCH 2010

SOIL AND WATER RESOURCES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

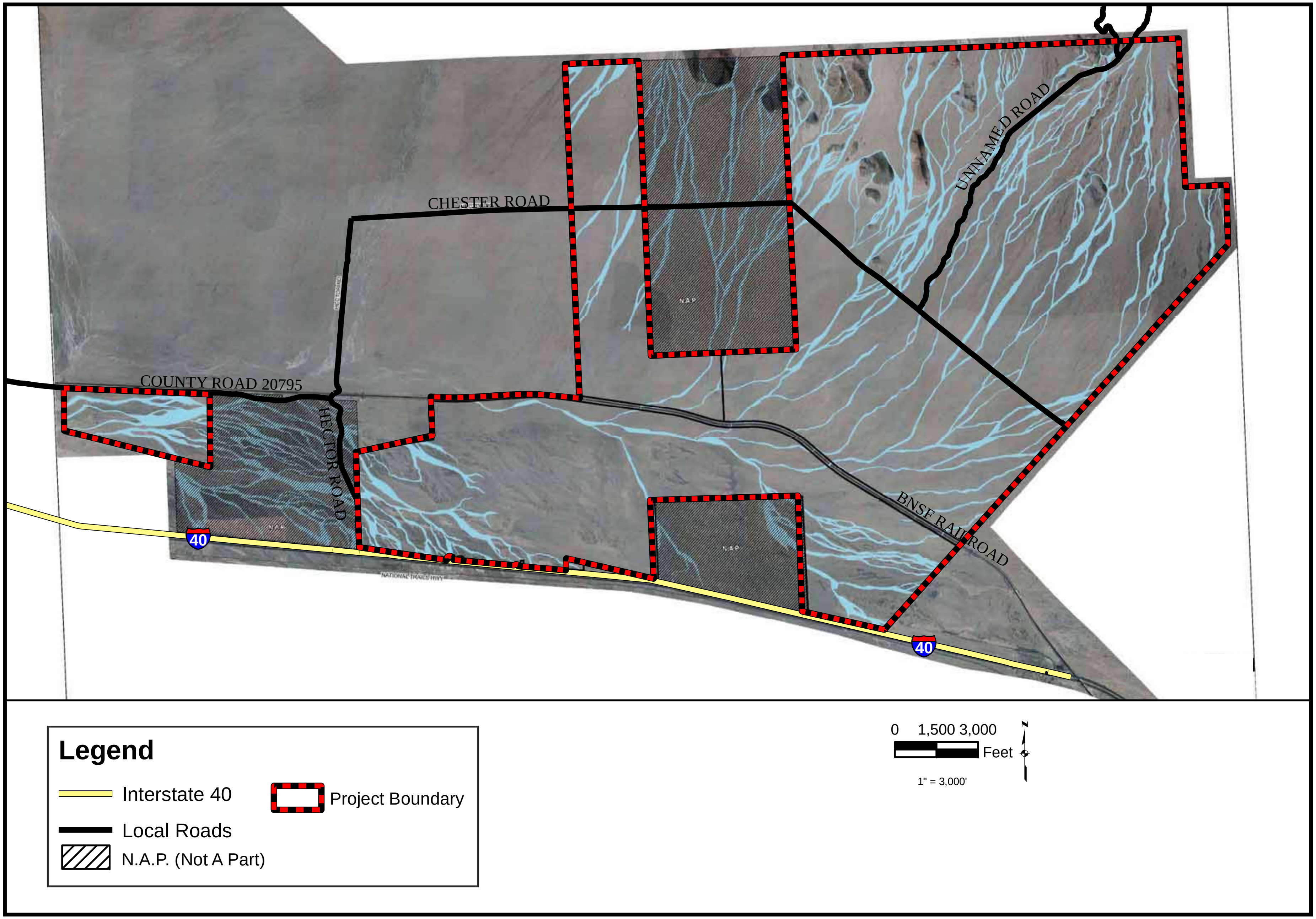
SOURCE: Winzler & Kelly, URS, 2008 and Huitt-Zolairs, 2009

SOIL AND WATER RESOURCES - FIGURE 3

Calico Solar Project - Existing CDFG Flow Paths

MARCH 2010

SOIL AND WATER RESOURCES

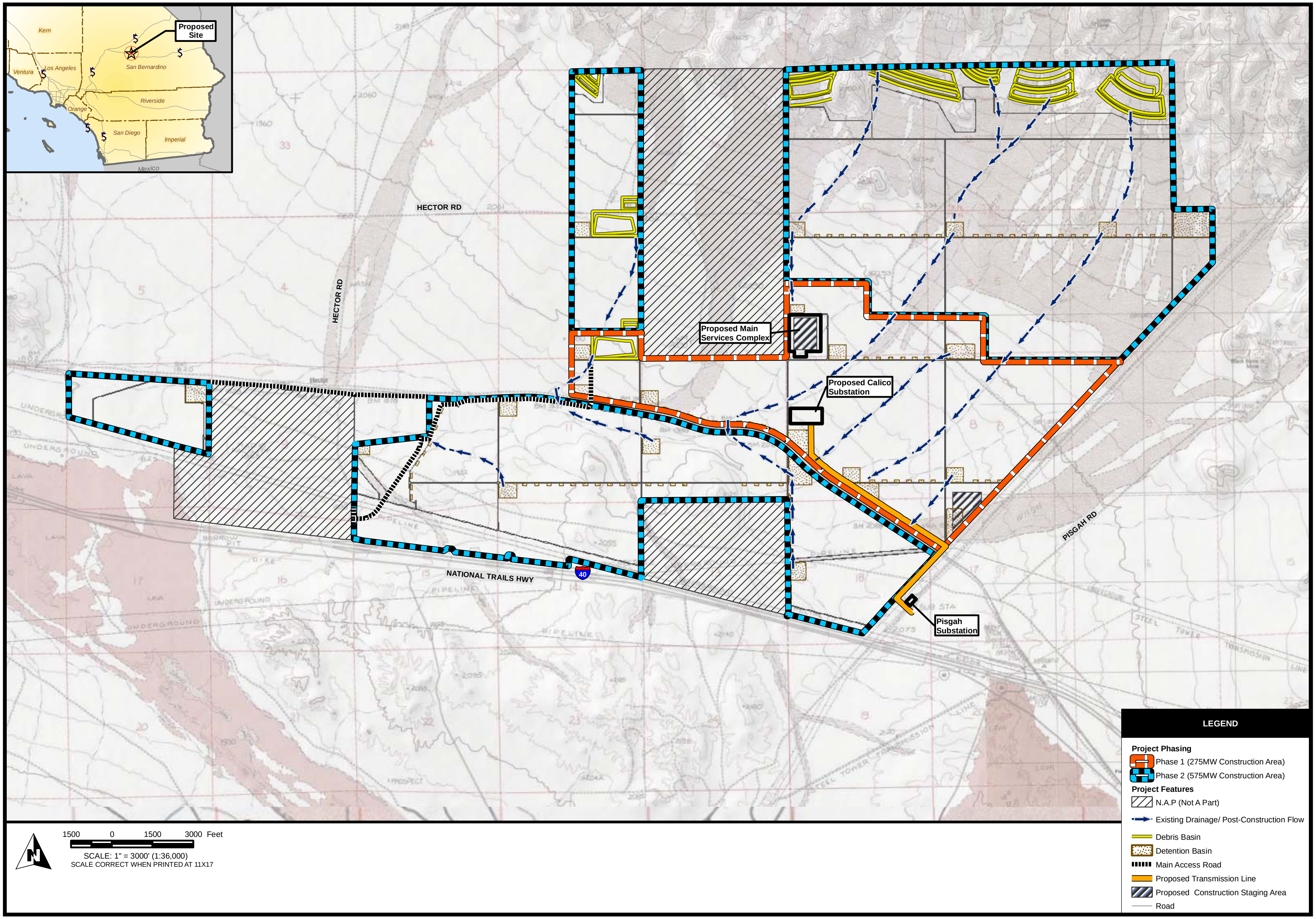


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: Winzler & Kelly, URS 2010

SOIL AND WATER RESOURCES - FIGURE 4

Calico Solar Project - Drainage Layout

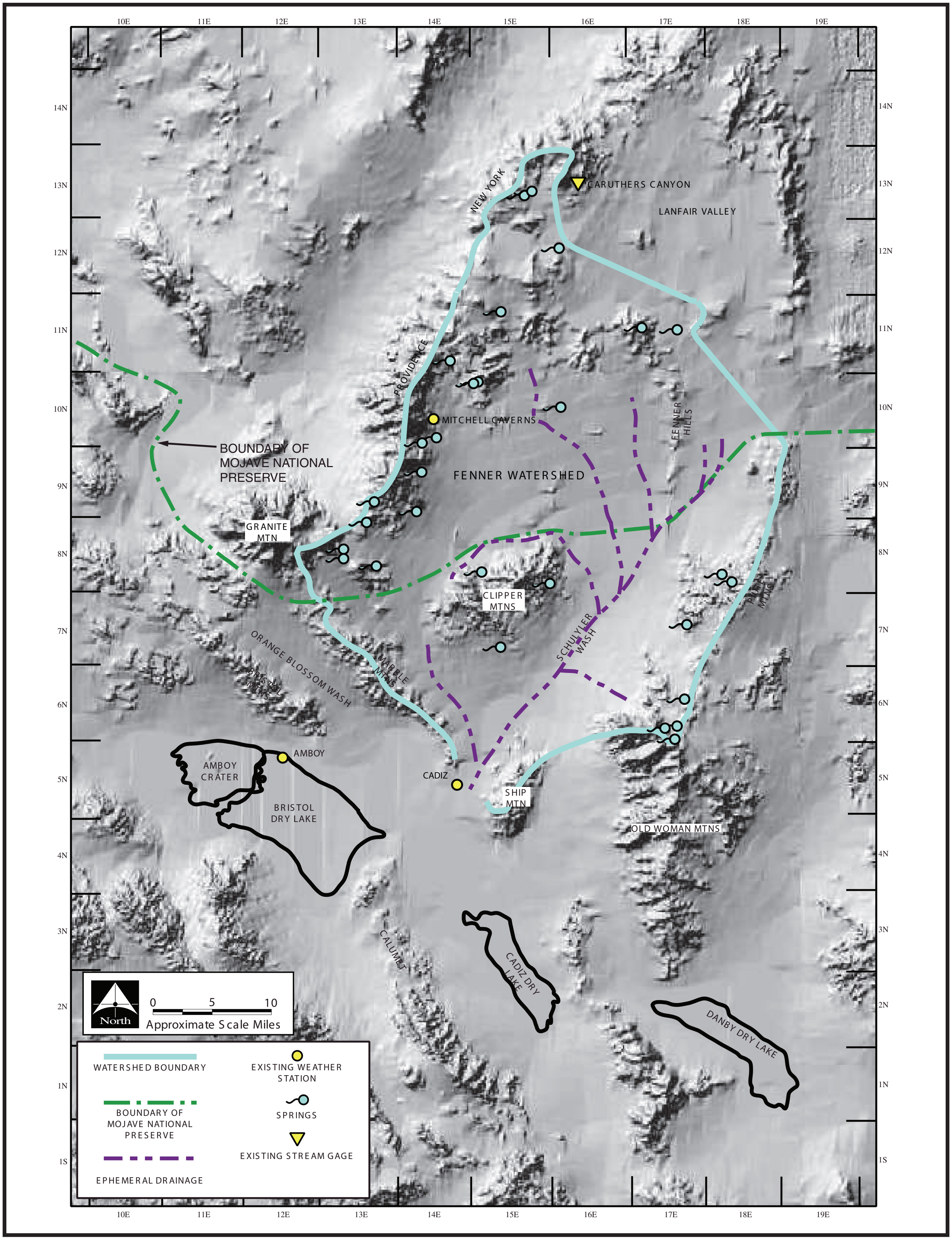


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: URS, 2/11/2010

SOIL AND WATER RESOURCES - FIGURE 5

Calico Solar Project - Hydrologic Features in Water Supply Well Vicinity



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: FEIR/EIS, Cadiz Groundwater Storage & Dry-Year Supply Program, Figure 5.5-9

C.8 – LAND USE, RECREATION, AND WILDERNESS

Testimony of Negar Vahidi and Susanne Huerta

C.8.1 SUMMARY OF CONCLUSIONS

The U.S. Bureau of Land Management (BLM) and Energy Commission staff (hereafter jointly referred to as "staff") have reviewed the proposed Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) in accordance with the requirements of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). This section addresses land use issues related to agriculture and rangeland resources; wilderness and recreation resources; horses and burros; and compatibility with existing land uses and consistency with the applicable laws, ordinances, regulations, and standards (LORS).

Implementation of the proposed Calico Solar Project (Calico Solar or "proposed project") would not result in adverse impacts to agricultural lands, rangeland resources, or horses and burros. The conversion of approximately 8,230 acres of land to support the proposed project's components and activities could disrupt wilderness resources and recreational activities in established federal, state, and local recreation areas. Potential impacts from the proposed project would indirectly affect the Cady Mountains Wilderness Study Area (WSA); however, numerous wilderness and recreation areas surround the project site. Therefore, this indirect impact would not be adverse.

The applicant has submitted an application to the BLM requesting a right-of-way (ROW) to construct the proposed project and its related facilities. Pursuant to the California Desert Conservation Area (CDCA) Plan (1980, as amended), sites associated with power generation or transmission not identified in the CDCA Plan are considered through the Plan Amendment process. Therefore, the proposed project would require a BLM ROW grant and a project-specific plan amendment for consistency with the CDCA Plan. However, in an interim policy dated May 28, 2009, the State Director of the BLM issued an Instruction Memorandum regarding management of donated land and lands acquired by Land and Water Conservation Funds (LWCF), which requires LWCF lands to be managed as avoidance/exclusion areas for land use authorizations that could result in surface disturbing activities (BLM 2009a). Construction and operation of the proposed project would not comply with this policy.

For purposes of CEQA compliance, the level of significance of each impact of the proposed project on land use resources has been determined and is discussed in detail in Section C.8.4.3 (CEQA Level of Significance). In summary, impacts on agricultural lands and rangelands would be less than significant, and there would be no impacts related to Williamson Act contracts. Impacts to recreation and wilderness resources would be less than significant. Impacts to horses and burros would be less than significant. Impacts related to LORS compliance would be significant and unavoidable.

Under NEPA, impacts to land use, recreation and wilderness would be minimal. No Herd Management Area is affected by the proposed project.

Also included is the analysis of two project alternatives. The Reduced Acreage Alternative would be approximately 2,600 acres or 33 percent of the lands affected by the proposed project; and both the Reduced Acreage Alternative and the Avoidance of Donated and Acquired Lands Alternative would eliminate any construction on LWCF lands. In contrast to the proposed project, both of these alternatives would comply with all applicable LORS, in particular the BLM's Interim Policy Memorandum regarding management of donated LWCF mitigation lands. Otherwise, in general, the impacts associated with these alternatives would be similar to the proposed project, but proportionally less intense.

Because the Calico Solar Project would have no impacts on agricultural resources, rangelands, horses and burros, it would have no potential to contribute to cumulative impacts in this respect. However, the proposed project would combine with other past and reasonably foreseeable future projects to substantially reduce scenic values of wilderness areas and recreational resources in the Mojave Desert and southern California desert region and therefore, would result in a significant and unavoidable cumulative land use impact in this regard.

C.8.2 INTRODUCTION

The land use analysis focuses on the project's consistency with environmental resources, land use plans, ordinances, regulations, policies, and the project's compatibility with existing or reasonably foreseeable land uses. In addition, an energy generating system and its related facilities generally have the potential to create impacts in the areas of air quality, noise, dust, public health, traffic and transportation, and visual resources. These individual resource areas are discussed in detail in separate sections of this document.

C.8.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The analysis of proposed project effects must comply with both CEQA and NEPA requirements given the respective power plant licensing and land jurisdictions of the California Energy Commission and U.S. Bureau of Land Management (BLM). CEQA requires that the significance of individual effects be determined by the Lead Agency; however, the use of specific significance criteria is not required by NEPA. Because this document is intended to meet the requirements of both NEPA and CEQA, the methodology used for determining environmental impacts of the proposed project includes a consideration of guidance provided by both laws. CEQA requires a list of criteria that are used to determine the significance of identified impacts. A significant impact is defined by CEQA as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project" (State CEQA Guidelines Section 15382).

In comparison, NEPA states that "'Significantly' as used in NEPA requires considerations of both context and intensity…" (40 CFR 1508.27). Therefore, thresholds serve as a benchmark for determining if a project action will result in a significant adverse environmental impact when evaluated against the baseline. NEPA requires that an Environmental Impact Statement (EIS) is prepared when the proposed federal action (project) as a whole has the potential to "significantly affect the quality of the human environment."

Thresholds for determining significance in this section are based on Appendix G of the CEQA Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission staff. In addition, staff's evaluation of the environmental effects of the proposed project on land uses (i.e., those listed below) includes an assessment of the context and intensity of the impacts, as defined in the Council on Environmental Quality Regulations for implementing the Procedural Provisions of the NEPA (see regulations 40 CFR Part 1508.27). Effects of the proposed project on the land uses and the environment (and in compliance with both CEQA and NEPA) have been determined using the thresholds listed below.

Agricultural Lands and Rangeland Management

- Conversion of Farmland or Rangeland.
- Conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.
- Conflict with existing zoning for agricultural use, or a Williamson Act contract.
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural uses.

Wilderness, Areas of Critical Environmental Concern (ACEC) and Recreation

- Directly or indirectly disrupt activities in established federal, state, or local recreation areas and/or wilderness areas.
- Substantially reduce the scenic, biological, cultural, geologic, or other important factors that contribute to the value of federal, state, local, or private recreational facilities or wilderness areas.

Horses and Burros

- Involve changes in the existing environment which, due to their nature or location, result in interference with BLM's management of Herd Management Areas (HMAs).

Land Use Compatibility and LORS Compliance

- Directly or indirectly divide an established community or disrupt an existing or recently approved land use.
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction, or that would normally have jurisdiction, over the project adopted for the purpose of avoiding or mitigating environmental effects.

Land Use Table 1 provides a general description of the land use LORS applicable to the proposed project. The proposed project's consistency with these LORS is discussed in **Land Use Table 2**.

Land Use Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	
Federal Land Policy and Management Act (FLPMA), 1976 – 43 CFR 1600	Establishes public land policy; guidelines for administration; and provides for the management, protection, development, and enhancement of public lands. In particular, the FLPMA's relevance to the proposed project is that Title V, Section 501 establishes BLM's authority to grant rights-of-way for generation, transmission, and distribution of electrical energy (FLPMA 2001).
Bureau of Land Management - California Desert Conservation Area (CDCA) Plan, 1980 as Amended (BLM 1980)	The 25 million-acre CDCA contains over 12 million acres of public lands spread within the area known as the California Desert, which includes the following three deserts: the Mojave, the Sonoran, and a small portion of the Great Basin. The 12 million acres of public lands administered by the BLM are half of the CDCA. The CDCA Plan is a comprehensive, long-range plan with goals and specific actions for the management, use, development, and protection of the resources and public lands within the CDCA, and it is based on the concepts of multiple use, sustained yield, and maintenance of environmental quality. The plan's goals and actions for each resource are established in its 12 elements. Each of the plan elements provides both a desert-wide perspective of the planning decisions for one major resource or issue of public concern as well as a more specific interpretation of multiple-use class guidelines for a given resource and its associated activities.
Public Rangelands Improvement Act (1978) (PRIA 1978)	Establishes and reaffirms the national policy and commitment to inventory and identify current public rangeland conditions and trends; manage, maintain and improve the condition of public rangelands so that they become as productive as feasible for all rangeland values in accordance with management objectives and the land use planning process; and continue the policy of protecting wild free-roaming horses and burros from capture, branding, harassment, or death, while at the same time facilitating the removal and disposal of excess wild free-roaming horses and burros which pose a threat to themselves and their habitat and to other rangeland values.

Applicable LORS	Description
Wild and Free-Roaming Horse and Burro Act (1971) (BLM 2009j)	The BLM protects, manages, and controls wild horses and burros under the authority of the Wild Free-Roaming Horses and Burros Act of 1971 (Act) to ensure that healthy herds thrive on healthy rangelands. The BLM manages these animals as part of its multiple-use mission under the 1976 Federal Land Policy and Management Act. One of the BLM's key responsibilities under the Act is to determine the "appropriate management level" (AML) of wild horses and burros on the public rangelands.
State	
None	
Local	
None	

Cumulative Land Use Effects

- Individual environmental effects, which, when considered with other impacts from the same project or in conjunction with impacts from other closely related past, present, and reasonably foreseeable future projects, are considerable, compound, or increase other environmental impacts.

C.8.4 PROPOSED PROJECT

C.8.4.1 SETTING AND EXISTING CONDITIONS

Proposed Project

The proposed Calico Solar site is approximately 8,230 acres and is located in San Bernardino County approximately 37 miles east of Barstow. The site consists primarily of public land administered by the BLM. Within the site boundaries are 2,246 acres of undeveloped private land under the jurisdiction of San Bernardino County; however, the private land would not be a part of the proposed project. This private land, as well as non-BLM lands within one mile of the project, is designated as Resource Conservation by county zoning. The southern boundary of the proposed project site is adjacent to Interstate Highway 40 (I-40), and the northern side of the project site borders the Cady Mountains.

The applicant submitted an updated project boundaries map dated August 12, 2009. Staff requested the applicant to submit a formal description of the new boundaries, which has not been provided. As such, the project boundaries described above are from the AFC, and will be revised upon receipt of an updated description.

The Calico Solar site primarily consists of undeveloped desert land. Existing onsite land uses include the Burlington Northern Santa Fe (BNSF) railroad right-of-way (ROW), which traverses the site from east to west; several underground high pressure gas pipelines generally parallel to I-40 and the railroad; Hector Road which enters the site from I-40 and traverses it for approximately 0.5 mile; and Southern California Edison's (SCE) Pisgah Substation and overhead transmission line which are adjacent to the southeast border of the project site. In addition, approximately 775 acres on the northeast portion of the project site have been designated as Land and Water Conservation Fund mitigation lands (BLM 2009a).

The proposed project would occur in two phases. Phase I would consist of the construction of up to 11,000 SunCatchers and would require approximately 2,320 acres of BLM land. Phase II would expand the project to a total of 34,000 SunCatchers and would require approximately an additional 5,910 acres of BLM land. In addition to the proposed project site and construction areas, there are other features and facilities associated with the proposed project (the majority of which are located on the proposed project site or construction laydown areas), including:

- approximately 34,000, 38-foot solar dish Stirling systems (i.e., SunCatchers) and associated equipment and infrastructure within a fenced boundary;
- a 220-kV substation in the center of the project site;
- approximately one mile within the project site of twelve to fifteen 220-kV transmission line structures (90 to 110 feet tall) from the proposed Calico Solar Substation to SCE's Pisgah Substation;
- a Main Services Complex including an administration building (30,000 sq. ft.) and a maintenance building (45,000 sq. ft.);
- two 175,000-gallon water storage tanks (40 feet in diameter) and two 17,000-gallon water storage tanks (18 feet in diameter);
- main roads with a combination of roadway dips and elevated sections across drainage features;
- a buried septic tank system with a dual sanitary leach field;
- temporary access to the project site for construction-related vehicles to be provided off of I-40 east of the project site and east of the Pisgah Substation; and
- permanent access to the project site to be provided by a bridge over the BSNF railroad along Hector Road.

Surrounding Area

The surrounding area consists of undeveloped desert land and mountain terrain with small rural communities in the vicinity. The closest community is Newberry Springs located approximately 10 miles west of the project site, and the closest residence is located approximately 2 miles east of the project site. In addition, north of the BNSF railway is private land, which has been accessed by Hector Road where it crosses the BNSF railroad ROW. This includes the private properties in Section 1, Township 8 North, Range 5 East, and Section 36, Township 9 North, Range 5 East (Jackson 2009b). Since the summer of 2008, BNSF and Calico Solar entered into an Agreement for Private Crossing. Because this crossing is private, gates and barricades have been placed at this crossing to ensure public safety and prevent public use of this crossing (SES 2009x).

Agricultural Lands and Rangelands

The project site is located within the desert region of central San Bernardino County, which is not notable for productive agricultural land. The United States Department of Agriculture's (USDA) Natural Resource Conservation Service (NRCS) provides information on the designation of soils in areas with agricultural lands, including farmland classifications such as Prime Farmland and Farmland of Statewide Importance (NRCS 2009). However, data for the project site was not available through the NRCS's Web Soil Survey (WSS). Similarly, the California Department of Conservation's (DOC) Farmland Mapping and Monitoring Program (FMMP) provides designations and statistics on the conversion of farmland to non-agricultural uses throughout the State. However, the proposed project site is not within the survey boundaries of the FMMP. As such, no agricultural land is within the project boundaries.

Rangeland allotments are designated BLM pastures for wildlife and livestock (BLM 2009b). The majority of the proposed project is located within the Cady Mountains rangeland allotment. According to BLM's online GIS mapping program (Geocommunicator), the southwest boundary of this allotment follows the BNSF railroad. As such, approximately 6,400 acres of the project site that is north of the BNSF railroad is within the Cady Mountains rangeland allotment (BLM 2009c). There is currently no grazing permit issued within the proposed project area. In addition, the northern boundary of the Ord Mountain allotment is approximately 0.75 mile south of the project site.

Wilderness and Recreation

Wilderness land in San Bernardino County is administered by the BLM. According to the federal Wilderness Act, a designated Wilderness Area is defined as having four primary characteristics, including the following:

- a natural and undisturbed landscape;
- extensive opportunities for solitude and unconfined recreation;
- at least 5,000 contiguous acres; and
- feature(s) of scientific, educational, scenic, and/or historic value (US Code 2009).

As noted in the AFC, adjacent to the northern boundary of the project site is the Cady Mountains Wilderness Study Area (WSA). This is an area designated and managed by the BLM, where limited recreational activities are permitted including camping and off-road vehicle use (SES 2008a). Each WSA has been documented by wilderness study reports that show the location of the individual WSAs, a description of its wilderness values, and BLM's recommendation for its future suitability as wilderness as proposed by the Secretary of Interior on June 12, 1991 (BLM 2009c). In addition, as noted above, the northwest border of the Pisgah ACEC is adjacent to the southeast boundary of the proposed project site along the SCE transmission line ROW. The Pisgah ACEC contains the Pisgah Crater and lava flow, and supports several sensitive species. While no direct impacts would occur to this ACEC, indirect impacts may occur. The Ord-Rodman Desert Wildlife Management Area (DWMA) is located adjacent to the southwest portion of the project site. This DWMA, which includes federally designated critical habitat for the desert tortoise, was established by the Western Mojave Plan.

Public lands within DWMAs are designated as ACECs. While no direct project impacts would occur to this DWMA, indirect impacts may occur to this ACEC.

The wilderness areas in the vicinity of the proposed project site are the Rodman Mountains Wilderness located approximately 8 miles southwest of the project site, the Bristol Mountains Wilderness and Kelso Dunes Wilderness located approximately 10 miles east of the project site, and the Newberry Mountains Wilderness located approximately 15 miles southwest of the project site. The Rodman Mountains Wilderness are approximately 34,320 acres where a series of ridges and valleys climbing from 2,000 feet to almost 5,000 feet are the result of faults which cross this wilderness (BLM 2009e). Camping, hunting, fishing, and horseback riding are allowed in the Rodman Mountains Wilderness. The Bristol Mountains Wilderness is approximately 71,385 acres and the adjacent Kelso Dunes Wilderness is approximately 144,915 acres. This area provides ample space for recreation activities including hiking, horseback riding, hunting, camping, rockhounding, and photography (BLM 2009f, 2009g). The Newberry Mountains Wilderness is approximately 26,102 acres and are noted for rugged volcanic mountains and deep, maze-like canyons, where camping, hunting, fishing, and horseback riding are allowed (BLM 2009h).

Approximately 32 miles east of the project site is the Mojave National Preserve which is a 1.6-million acre park managed by the U.S. National Park Service (NPS 2009). Within the Mojave National Preserve is the Providence State Recreation Area (SRA) which is managed by California State Parks. This area also provides space for recreational activities; in particular, nature hikes and cavern tours are the main attractions of this park.

As noted above, various recreational activities occur throughout the wilderness areas surrounding the project site. In addition, the Cady Mountains and Pisgah Crater are known destinations for rockhounding. The Cady Mountains are characterized by agate, chalcedony, geodes, and jasper, and the Pisgah Crater is characterized by lava and volcanic bombs (BLM 2009i). Off-highway vehicle recreational use is also a recreational activity within the boundaries of the project site. In general, off-highway vehicles are limited to designated routes of travel in Limited use areas. OHV use is also allowed in designated Open OHV Areas. The Rasor Off-Highway Vehicle Area is a 22,500-acre state designated area for off-highway vehicle use located adjacent to and west of the Mojave National Preserve. There are no designated open OHV use areas within the project site.

Horses and Burros

The BLM administers wild horses and burros as guided by the Wild and Free-Roaming Horse and Burro Act of 1971. This includes the management of Herd Areas (HA) and Herd Management Areas (HMAs), which are geographic areas where wild horse or burro populations were found at the passage of the Act in 1971 (BLM 2009j). California contains 33 HAs and 22 HMAs. According to BLM maps, the Granite-Providence Mountains is the closest HA located approximately 32 miles east of the project site within the Mojave Preserve. In addition, the Cima Dome, Lava Beds, and Woods-Hackberry HAs are located within the Mojave Preserve approximately 40 to 45 miles east of the proposed project site (BLM 2009k). No HMAs are within the vicinity of the project site. As such, the proposed project would not traverse any established HMAs or HAs.

Land Use and LORS Compliance

The majority of the proposed project site is located within the “Moderate” (Class M) use category of the BLM’s CDCA Plan, with some areas designated as “Limited” (Class L) (SES 2008a). Multiple Use Class M (Moderate Use) is based upon a controlled balance between higher intensity use and protection of public lands. This class provides for a wide variety of present and future uses such as mining, livestock grazing, recreation, energy and utility development. Class M management is also designed to conserve desert resources and mitigate damage to those resources which permitted uses may cause. Multiple Use Class L (Limited Use) protects sensitive, natural, scenic, ecological and cultural resource values. Public lands designated as Class L are managed to provide for generally lower-intensity, carefully controlled multiple use resources, while ensuring that sensitive values are not significantly diminished (CDCA Plan, 1999 reprint). In addition, approximately 2,246 acres of the private lands under San Bernardino County jurisdiction surrounded by the proposed project site, but are not a part of the proposed project. Thus, there are no lands within the project site that are under local jurisdiction.

C.8.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Construction and Operation

Agricultural Lands and Rangelands

As described in detail above under the section entitled **Agricultural Lands**, multiple governmental agencies at the federal, state, and local level have information regarding the agricultural lands relating to the proposed project and the surrounding area. To summarize, the following is a list of the various designations or categorizations these multiple governmental agencies have provided for the proposed project site and construction laydown area:

- **USDA NRCS:** The NRCS’s Web Soil Survey does not have data for the project site, and therefore does not provide a farmland classification.
- **California DOC:** The project site is not with the survey boundaries of the FMMP mapping criteria.
- **San Bernardino County:** The private land adjacent to the project site is under the county’s jurisdiction, and is within the Resource Conservation zoning district.
- **Williamson Act**: The project site is not located in an area that is under a Williamson Act contract.

Based on the lack of federal, state or local farmland/agricultural designations, the proposed project would not convert important farmland, would not conflict with agricultural zoning designations or Williamson Act contracts, and would not result in a change in the existing environment that would lead to a conversion of farmland. Therefore, the proposed project would not adversely impact agricultural land.

However, as noted in the “Setting and Existing Conditions,” the project would be located within the Cady Mountains grazing allotment. This allotment consists of 177,293 acres which is designated by BLM as available for grazing livestock (BLM 2009l, BLM 2009m). According to the West Mojave Plan, the allotment was identified as an area that would benefit from voluntary relinquishment. Therefore, grazing is not currently authorized on this allotment. The proposed project would convert approximately 6,400 acres of the Cady Mountains rangeland allotment to another use, which accounts for approximately three percent of the allotment. Therefore, the proposed project is not expected to result in an adverse impact to inactive livestock grazing. For discussion of impacts to the desert bighorn sheep, please see the **Biological Resources** section of this document.

Wilderness and Recreation

Recreational activities, including camping and off-road vehicle use, are permitted in the Cady Mountains WSA located just north of the project site. In addition, the project would be approximately eight miles north of the closest wilderness area (the Rodman Mountains). As such, the proposed project would not directly disrupt wilderness or recreation activities. However, the proposed project could indirectly impact the recreational and wilderness values of the Cady Mountains WSA by changing the natural and undisturbed landscape; and construction and operation activities would have the potential to degrade the qualities of solitude and unconfined wilderness and recreation in this remote area of the Mojave Desert. The CDCA Plan amendment associated with the proposed project would not affect the wilderness characteristic values of the WSA since the proposed project site is not located within the WSA area. Nonetheless, as described in the “Setting and Existing Conditions,” numerous wilderness and recreation areas are in the vicinity of the project site, which provide alternative options for recreation and wilderness destinations. Therefore, potential indirect impacts from the proposed project would not be adverse from a land use perspective. Please refer to the **Biological Resources**, **Cultural Resources**, and **Visual Resources** sections for detailed discussions of proposed project effects on scenic, biologic, and cultural amenities.

Horses and Burros

The proposed project would not contain or traverse any established BLM HAs or HMAs. As discussed in the “Setting and Existing Conditions,” the Granite-Providence HA is the closest HA, which is located approximately 32 miles east side of the proposed project site. Therefore, the proposed project would not result in an interference with BLM’s management of an HMA or HA. For a discussion of the proposed project’s consistency with Chapter 3 of the BLM’s CDCA Plan, Wild Horses and Burros Element, please see **Land Use Table 2** (below). Please refer to the **Biological Resources** section.

Land Use Compatibility and LORS Compliance

Physical Division of an Existing Community

The proposed project site is located on undeveloped lands under the jurisdiction of the BLM, which is not located within or near an established community. Therefore, neither the size nor the nature of the project would result in a physical division or disruption of an established community. In addition, due to the temporary nature of construction activities, construction generated nuisances such as dust and noise are not expected to adversely affect existing land uses in the area. For a detailed analysis of construction-related nuisance impacts, please see the **Air Quality, Public Health, Traffic and Transportation,** and **Noise** sections of this document**.**

Conflict with any Applicable Land Use Plan, Policy, or Regulation

As required by California Code of Regulations, Title 20, Section 1744, Energy Commission staff evaluates the information provided by the project owner in the AFC (and any amendments), project design, site location, and operational components to determine if elements of the proposed project would conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project, or that would normally have jurisdiction over the project except for the Energy Commission's exclusive authority. As part of the licensing process, the Energy Commission must determine whether a proposed facility complies with all applicable state, regional, and local LORS (Public Resources Code section 25523[d][1]). The Energy Commission must either find that a project conforms to all applicable LORS or make specific findings that a project's approval is justified even where the project is not in conformity with all applicable LORS (Public Resources Code section 25525).

In addition, the applicant has submitted an application to the BLM requesting a ROW to construct the proposed project and its related facilities. Pursuant to the

California Desert Conservation Area (CDCA) Plan (1980, as amended), sites associated with power generation or transmission not identified in the CDCA Plan are considered through the Plan Amendment process. Under Federal law, BLM is responsible for processing requests for ROWs to authorize such proposed projects and associated transmission lines and other appurtenant facilities on land it manages. The CDCA Plan, while recognizing the potential compatibility of solar generation facilities on public lands, requires that all sites associated with power generation or transmission not identified in the Plan be considered through the Plan Amendment process. BLM would use the following Planning Criteria during the Plan Amendment process:

- The plan amendment process would be completed in compliance with the Federal Land Policy and Management Act (FLPMA), NEPA, and all other relevant Federal law, executive orders, and management policies of the BLM;
- The plan amendment process would include an EIS (i.e., this joint CEC Staff Assessment/BLM EIS) to comply with NEPA standards;
- Where existing planning decisions are still valid, those decisions may remain unchanged and be incorporated into the new plan amendment;
- The plan amendment would recognize valid existing rights;
- Native American Tribal consultations would be conducted in accordance with policy, and Tribal concerns would be given due consideration. The plan amendment process would include the consideration of any impacts on Indian trust assets (please see the **Cultural Resources** section);

- Consultation with the State Office of Historic Preservation (SHPO) would be conducted throughout the plan amendment process (please see the **Cultural Resources** section); and
- Consultation with the US Fish and Wildlife Service (USFWS) would be conducted throughout the plan amendment process (please see the **Biological Resources** section).

If the ROW and proposed land use plan amendment are approved by BLM, the proposed solar thermal power plant facility on public lands would be authorized in accordance with Title V of the FLMPA of 1976 and the Federal Regulations at 43 CFR part 2800. This Environmental Impact Statement (EIS) acts as the mechanism for meeting NEPA requirements, and also provides the analysis required to support a Plan Amendment identifying the site location within the Plan.

An additional LORS compliance issue was raised by the public during the scoping process for this document. According to some private landowners, the public and private landowners have been using Hector Road at the railway crossing to access the land north of the BNSF railway for over fifty years. This includes the private properties in Section 1, Township 8 North, Range 5 East, and Section 36, Township 9 North, Range 5 East (Jackson 2009b). However, according to these private landowners, recently-placed gates and barricades at the crossing have blocked access to these lands. Private landowners assert that Hector Road has been in use prior to the passage of the FLPMA, and therefore, is a county road, and blocking access is a violation of the Unlawful Enclosures of Public Lands Act of 1885 and the CDCA Plan, which classifies the project site as an “open area” (Jackson 2009a).

As the proposed project developer, Tessera Solar responded to the private landowners by explaining that due to additional safety requirements, BNSF requires gates to be installed at all crossings where an entity other than BNSF (i.e., the applicant) would have access (SES 2009x). The private crossing granted to Calico Solar/Tessera is for the purposes of establishing an access to the western side of the proposed project site. As such, in addition to installation of the gate and barricades, the applicant had to acquire insurance for potential damage to BNSF property and attend a safety course. Tessera complied with these conditions and was granted access, which established the need for gates and barricades (SES 2009x). In addition, at the December 22, 2009 Staff Workshop, BLM representatives stated that the crossing was established as a BNSF ROW for access to, and maintenance of, the rail line and, and therefore, the crossing is not a legal road with authorized access for the public (CEC 2009). As such, the crossing is a physical access and not a legal access, and has been used in a passive and unauthorized manner. Therefore, the recent blockage of this crossing does not result in a conflict with any applicable LORS. For a detailed discussion of impacts related to access and public safety, please refer to the **Traffic and Transportation** and **Public Health and Safety** sections (respectively) of this document.

Staff’s analysis of the proposed project’s (and project alternatives) consistency with applicable federal land use LORS is presented in **Land Use Table 2.** Note that there are no State or local land use LORS applicable to the proposed project. Based on staff’s independent review of applicable LORS documents, the proposed project would not be consistent with certain applicable land use LORS; in particular the current BLM Interim Policy Memorandum regarding LWCF mitigation lands (see discussion in the table below). However, implementation of the Reduced Acreage Alternative or the Avoidance of Donated and Acquired Lands Alternative would avoid LWCF lands and would be consistent with the BLM Interim Policy (see Sections C.8.5 and C.8.6, below, for a discussion of these alternatives).

Land Use Table 2
Project Compliance with Adopted Land Use LORS

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
Federal			
Federal Land Policy and Management Act, 1976 – 43 CFR 1600, Sec. 501. [43 U.S.C. 1761]	(a) The Secretary, with respect to the public lands … are authorized to grant, issue, or renew rights-of-way over, upon, under, or through such lands for: (4) systems for generation, transmission, and distribution of electric energy, except that the applicant shall also comply with all applicable requirements of the Federal Energy Regulatory Commission under the Federal Power Act, including part I thereof (41 Stat. 1063, 16 U.S.C. 791a-825r) [P.L. 102-486, 1992]	YES	The FLPMA authorizes the issuance of a right-of-way grant for electrical generation facilities and transmission lines. In addition, based on staff's review of the Federal Power Act, the requirements would not be applicable to the proposed project as they are not related to renewable resources, and are otherwise related to administrative procedures. Therefore, the proposed project would be in compliance with this policy.
Farmland Protection Policy Act, Section 658.1	As required by section 1541(b) of the [Farmland Protection Policy] Act, 7 U.S.C. 4202(b), Federal agencies are (a) to use the criteria to identify and take into account the adverse effects of their programs on the preservation of farmland, (b) to consider alternative actions, as appropriate, that could lessen adverse effects, and (c) to ensure that their programs, to the extent practicable, are compatible with State and units of local government and private programs and policies to protect farmland.	YES	As discussed above in detail in Section C.8.4.2 (under the subsection entitled "Agricultural Lands and Rangelands"), the farmland conversion impacts of the proposed project would not be adverse. In addition, construction of the proposed project and its onsite linear facilities would be temporary, and the project would not involve other changes in the existing environment that could result in conversion of farmland, to non-agricultural uses. Therefore, proposed project would be consistent with the FPPA.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
Bureau of Land Management – California Desert Conservation Area (CDCA) Plan (BLM 1980)	**Chapter 2 – Multiple-Use Classes** **MULTIPLE-USE CLASS GUIDELINES** **MULTIPLE-USE CLASS L (Limited Use)** 6. Electrical Generation Facilities – Electric generation may be allowed. (See wind/solar/ geothermal, below) – Wind/Solar May be allowed after NEPA requirements are met. 7. Transmission Facilities – New gas, electric, and water facilities and cables for interstate communication may be allowed only within designated corridors (see Energy Production and Utility Corridors Element). NEPA requirements will be met. [#5,85]	YES (with BLM's project-specific CDCA Plan Amendment)	The proposed project site is administered by the BLM and is managed under multiple use Class L (Limited Use) categories in conformance with the CDCA Plan (SES 2008a). The proposed project consists of an electrical generating facility, a substation, a transmission line, and ancillary facilities. As such, development of the proposed project is an allowed use under the Multiple-Use Class Guidelines. In addition, the CDCA Plan, while recognizing the potential compatibility of solar generation facilities on public lands, requires that all sites associated with power generation or transmission not identified in the Plan be considered through the Plan Amendment process. Therefore, the BLM would undertake a project-specific CDCA Plan amendment along with the ROW grant for the proposed Calico Solar Project. Upon BLM's amendment of the CDCA plan for the Calico Solar Project, the proposed project would be fully compliant with the CDCA Plan. This Environmental Impact Statement (EIS) acts as the mechanism for meeting NEPA requirements, and also provides the analysis required to support a Plan Amendment identifying the facility within the Plan.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	MULTIPLE-USE CLASS M (Moderate Use) 6. Electrical Generation Facilities All types of electrical generation plants may be allowed in accordance with State, Federal, and local laws. —Wind/Solar May be allowed after NEPA requirements are met. 7. Transmission Facilities — New gas, electric, and water facilities and cables for interstate communication may be allowed only within designated corridors (see Energy Production and Utility Corridors Element). NEPA requirements will be met. [#5,85]	YES (with BLM's project-specific CDCA Plan Amendment)	The proposed project site is on lands administered by the BLM, and is located within the "Moderate" (Class M) use category of the BLM's CDCA Plan, with some areas designated as "Limited" (Class L). These lands are managed under the Multiple-Use Class M and Class L categories in conformance with the CDCA Plan (SES 2008a). The proposed project consists of an electrical generating facility, a substation, a transmission line, and ancillary facilities. As such, development of the proposed project is an allowed use under the Multiple-Use Class Guidelines. In addition, The CDCA Plan, while recognizing the potential compatibility of solar generation facilities on public lands, requires that all sites associated with power generation or transmission not identified in the Plan be considered through the Plan Amendment process. Therefore, the BLM would undertake a project-specific CDCA Plan amendment along with the ROW grant for the proposed Calico Solar Project. Upon BLM's amendment of the CDCA plan for the Calico Solar Project, the proposed project would be fully compliant with the CDCA Plan. This Environmental Impact Statement (EIS) acts as the mechanism for meeting NEPA requirements, and also provides the analysis required to support a Plan Amendment identifying the facility within the Plan.
	Chapter 3 **Wild Horse and Burros Element** Goal 2. Protect wild horses and burros on public lands by conducting surveillance to prevent unauthorized removal or undue harassment of animals.	YES	As noted in the "Setting and Existing Conditions" subsection above, the proposed project site is not in the vicinity of an HA or HMA; therefore, the project site and surrounding area are not notable for the presence of wild horses or burros. As such, the proposed project would not result in any interference with BLM's management of an HMA, and would be consistent with this element of the CDCA Plan.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	Chapter 3 **Energy Production and Utility Element** Goal 1. Fully implement the network of joint-use planning corridors to meet projected utility needs to the year 2000. Specific electrical and natural gas right-of-way or power plant site applications made under the provisions of this element should be consistent with adopted California Energy Commission forecasts, which are reviewed biennially. Decision criteria are to: (1) Minimize the number of separate rights-of-way by utilizing existing rights-of-way as a basis for planning corridors; (2) Encourage joint use of corridors for transmission lines, canals, pipelines, and cables; (3) Provide alternative corridors to be considered during processing of applications; (4) Avoid sensitive resources wherever possible; (5) Conform to local plans whenever possible; (6) Consider wilderness values and be consistent with final wilderness recommendations; (7) Complete the delivery-systems network; (8) Consider ongoing projects for which decisions have been made, for example, the Intermountain Power Project; and (9) Consider corridor networks which take into account power needs and alternative fuel resources.	YES	The proposed project's linear facilities would be within the project site, and would interconnect at the SCE Pisgah Substation which is adjacent to the eastern boundary of the project site. Therefore, the proposed project would utilize existing ROWs, and would be consistent with this element of the CDCA Plan.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	Addendum B: Interim Management Guidelines Chapter III. Guidelines for Specific Activities Lands Actions – Disposal, Rights-of-Way, Access and Withdrawals 2. Rights-of-Way: Existing rights-of-way may be renewed if they are still being used for their authorized purpose. New rights-of-way may be approved only for temporary uses that satisfy the non-impairment criteria. 3. Right-of-Way Corridors: Right-of-way corridors may be designated on lands under wilderness review.	YES	The non-impairment standard, directs that "until Congress has determined otherwise" the lands under review be managed so as not to impair their suitability as wilderness (CRS 2004). As the proposed project would not traverse an established Wilderness Area or Wilderness Study Area, the project would be in compliance with this guideline of the CDCA Plan.
Federal Wilderness Act, 16 U.S.C. § 1131-1136	(a) Establishment; Congressional declaration of policy; wilderness areas; administration for public use and enjoyment, protection, preservation… provisions for designation as wilderness areas In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness.	YES	As the proposed project would not traverse an established Wilderness Area, the project would be consistent with this guideline.
Public Rangelands Improvement Act	Establishes and reaffirms the national policy and commitment to inventory and identify current public rangeland conditions and trends; manage, maintain and improve the condition of public rangelands so that they become as productive as feasible for all rangeland values in accordance with management objectives and the land use planning process; and continue the policy of protecting wild free-roaming horses and burros.	YES	As noted in "Setting and Existing Conditions," the project site would be located within the Cady Mountains rangeland allotment. However, according the BLM's Rangeland Specialist from the Barstow Field Office, the land is currently permitted for grazing, and is identified in the West Mojave (WEMO) Plan, for voluntary relinquishment (BLM 2009n). Therefore, the proposed project would not interfere with the Cady Mountains rangeland allotment.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
Wild and Free-Roaming Horse and Burro Act	Establishes BLM's authority to protect, manage, and control wild horses and burros to ensure that healthy herds thrive on healthy rangelands. BLM determines the "appropriate management level" (AML) of wild horses and burros on the public rangelands.	YES	As discussed above in detail in Section C.8.4.2, the proposed project would not contain or traverse an established HMA. As such, the proposed project would be consistent with this Act.
BLM Interim Policy Memorandum (CA-2009-020)	• Lands acquired by BLM under donation agreements, acquired for mitigation/ compensation purposes and with LWCF funds, are to be managed as avoidance/ exclusion areas for land use authorizations that could result in surface disturbing activities. • Should BLM–California managers have use authorizations applications pending, or receive new applications on lands that meet the above criteria, they are required to notify the State Director and set up a briefing to address how to respond to those applications. • Should managers have inquiries related to pre-application activities for any land use authorizations on lands that meet the above criteria, please notify applicants regarding the location of these lands as soon as possible and advise them to avoid these lands or provide details on how they would plan to operate or mitigate their project in a manner consistent with the values of the lands donated or acquired for conservation purposes.	INCONSISTENT (for the proposed project) CONSISTENT (for Reduced Acreage Alternative) CONSISTENT (for Avoidance of Donated and Acquired Lands Alternative)	As noted in the "Setting and Existing Conditions," approximately 775 acres of the proposed project site have been acquired for mitigation/ compensation purposes by LWCF funds. In an Interim policy dated May 28, 2009, the State Director of the BLM issued an Instruction Memorandum regarding management of donated land and lands acquired by LWCF funds. As a result, LWCF lands are to be managed as avoidance/exclusion areas for land use authorizations that could result in surface disturbing activities (BLM 2009a). Construction and operation of the proposed project would not be in compliance with this policy. However, the both the Reduced Acreage Alternative and the Avoidance of Donated and Acquired Lands Alternative (discussed below in Sections C.8.5 and C.8.6, respectively) would avoid LWCF lands, and therefore, would not result in surface disturbing activities in the avoidance/exclusion areas. As such, both of these alternatives would be consistent with this BLM Interim Policy and its requirements.
State			
None			
Local			
None			

Project Closure and Decommissioning

According to Section 3.12 of the applicant's project description, the solar generating facility is expected to have a lifespan of 40 years. At any point during this time, temporary or permanent closure of the solar facility could occur. Temporary closure would be a result of necessary maintenance, hazardous weather conditions, or damage due to a natural disaster. Permanent closure would be a result of damage that is beyond repair, adverse economic conditions, or other significant reasons.

Both temporary and permanent closures would require the applicant to submit to the CEC a contingency plan or a decommissioning plan, respectively. A contingency plan would be implemented to ensure compliance with applicable LORS, and appropriate shutdown procedures depending on the length of the cessation. A decommissioning plan would be implemented to ensure compliance with applicable LORS, removal of equipment and shutdown procedures, site restoration, potential decommissioning alternatives, and the costs and source of funds associated with decommissioning activities.

Upon closure of the facility or decommissioning, it is likely that the applicant would be required to restore lands affected by the project to their pre-project state. Given the fact that the proposed project site is located on undeveloped land, staff anticipates that project decommissioning would have impacts similar in nature to proposed project construction activities. Therefore, given the temporary nature of decommissioning activities and the eventual return of the lands to their current state, the effects of decommissioning on land use is not expected to be adverse.

C.8.4.3 CEQA LEVEL OF SIGNIFICANCE

For the purposes of CEQA compliance, the level of significance of each identified impact of the proposed project has been determined. The CEQA Lead Agency is responsible for determining whether an impact is significant and is required to adopt feasible mitigation measures to minimize or avoid each significant impact. Conclusions in this section are presented to identify the level of significance of each identified impact (as required by CEQA) as follows: less-than-significant (i.e., adverse, but not significant); less-than-significant with mitigation (i.e., can be mitigated to a level that is not significant); or significant and unavoidable (i.e., cannot be mitigated to a level that is not significant).

Agricultural Lands and Rangelands

As discussed above in detail in Section C.8.4.2 (under the subsection entitled "Agricultural Lands and Rangelands"), the farmland conversion impacts of the proposed project would "not result in an adverse impact," and the project would not involve other changes in the existing environment which could result in conversion of Farmland to non-agricultural uses. In addition, the proposed project would not be located on lands under Williamson Act contracts or zoned for agriculture. Therefore, proposed project impacts on agricultural lands would be less-than-significant.

In regards to rangelands, as noted in the "Setting and Exiting Conditions," the northeastern portion of the proposed project would be located within the Cady Mountains rangeland. The allotment is not currently permitted for grazing, and is identified in the West Mojave (WEMO) Plan for voluntary relinquishment (BLM 2009n). Therefore, the proposed project is not expected to interfere with the Cady Mountains rangeland allotment. However, the rangeland is currently vacant and scheduled for voluntary relinquishment at some time in the future. Therefore, impacts to rangelands due to construction or operation of the proposed project would be less than significant under CEQA.

Finally, the project site is not located in an area that is under a Williamson Act Contract, and there would be no impacts.

Wilderness and Recreation

As discussed above in detail in Section C.8.4.2 (under the subsection entitled "Wilderness and Recreation"), wilderness, wilderness study areas, or recreation lands would not be directly affected by the project, but would be in the vicinity, and therefore, could be indirectly affected. In particular, potential impacts from the proposed project would indirectly affect the Cady Mountains WSA. Nonetheless, as described in the "Setting and Existing Conditions," there are numerous wilderness and recreation areas surrounding the project site, which would be available to the public. Therefore, potential indirect impacts from the proposed project would be less than significant.

Horses and Burros

As discussed above in detail in Section C.8.4.2 (under the subsection entitled "Horses and Burros"), the proposed project would not contain or traverse any established BLM HMAs. Therefore, the proposed project would not result in any interference with BLM's management of an HMA. There would be no impacts.

Land Use Compatibility and LORS Compliance

As discussed above in detail in Section C.8.4.2 (under the subsection entitled "Land Use Compatibility"), the project would not physically divide or disrupt an established community, and there would be no impact.

Staff's analysis of the proposed project's consistency with applicable federal land use LORS is presented in **Land Use Table 2** (state and local LORS are not applicable). With BLM's issuance of a project-specific CDCA Plan Amendment, the proposed project would fully comply with the Plan. However, the proposed project would not be in compliance with BLM Interim Policy Memorandum; therefore, impacts associated with compliance with this federal land use LORS would be significant and unavoidable.

Cumulative Land Use Effects

Section C.8.8 (below) provides a detailed analysis of cumulative impacts. As discussed below, the potential combined development of approximately one million acres of land, would all combine to result in adverse effects on agricultural lands (one of the state's most important resources), and recreational resources. Although the development of renewable resources in compliance with federal and state mandates is important and required, the conversion of thousands of acres of open space would result in a significant and unavoidable impact. In general, the land conversion impacts to these lands would preclude numerous existing land uses including recreational activities, rangeland management, and open space.

Because the Calico Solar Project would have no impacts on agricultural resources or rangelands, horses and burros, it would have no potential to contribute to cumulative impacts in this respect. However, the proposed project would combine with other past and reasonably foreseeable future projects to substantially reduce scenic values of wilderness areas and recreational resources in the Mojave Desert and southern California desert region and therefore, would result in a significant and unavoidable cumulative land use impact in this regard.

C.8.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would be located within the central portion of the proposed 850 MW project site. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**. The CEC-proposed configuration of the Reduced Acreage Alternative avoids BLM acquired (LWCF) and donated lands, and minimizes impacts to biological and cultural resources.

C.8.5.1 SETTING AND EXISTING CONDITIONS

The setting for this alternative would be approximately 2,600 acres or 33 percent of the lands affected by the proposed project. Lands affected by this alternative would be located generally in the center of the proposed project site, and would be entirely under the jurisdiction of the BLM. In addition, as this alternative would retain 31 percent of the SunCatchers proposed under the proposed project, the net generating capacity would be approximately 275 MW. This alternative would require SCE to expand the existing Pisgah Substation, and install a fiber optic communications link along the existing e 65-mile Pisgah-Lugo and Pisgah-Gale transmission lines. Please see the discussion existing conditions within affected BLM lands under Section C.8.4.1.

C.8.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Agricultural Lands and Rangelands

With a 67 percent reduction in the site, any land conversion impact would also be proportionately less. As discussed above in detail in Section C.8.4.2 (under the subsection entitled "Agricultural Lands and Rangelands") the proposed project would not result in a conversion of farmland. Similarly, this alternative would not affect farmlands, and would not be located on land under Williamson Act contracts.

Similar to the proposed project, this alternative would not adversely affect the Cady Mountains rangeland allotment since the allotment is currently vacant and is scheduled for voluntary relinquishment. Therefore, the types of effects on agricultural lands and rangelands resulting from this alternative would be similar to the proposed project.

Wilderness and Recreation

The conversion of 2,600 acres of land to support the components and activities associated with this alternative would indirectly disrupt current wilderness areas and recreational activities in established federal and state areas, which would result in adverse effects on recreational users of these lands. However, this effect would be proportionally less than the 8,230 acres affected by the proposed project.

Horses and Burros

Similar to proposed project, this alternative would not contain or traverse any established BLM HMAs. Therefore, this alternative would not result in any interference with BLM's management of an HMA.

Land Use Compatibility and LORS Compliance

Similar to the proposed project, this alternative would not physically divide or disrupt an established community.

Staff's analysis of the proposed project's consistency with applicable federal land use LORS is presented in **Land Use Table 2.** These federal LORS would apply to this alternative. This alternative would be consistent with applicable federal land use LORS, including BLM's Interim Policy Memorandum (CA-2009-020) for avoiding LWCF lands. With BLM's issuance of a project-specific CDCA Plan Amendment, the proposed project would fully comply with the Plan. As discussed in **Land Use Table 2,** the proposed project would not be consistent with this policy. Therefore, this alternative would have no land use LORS inconsistencies compared to the proposed project, which is not consistent with BLM's Interim Policy Memorandum for avoiding LWCF lands..

Cumulative Land Use Effects

This alternative would result in the conversion of 2,600 acres of undeveloped open space with an industrial utility use (i.e., a 275 MW power plant and associated infrastructure). When compared to the proposed project, this alternative would result in 67 percent less land conversion to industrial uses; nonetheless, the cumulative effects of this amount of land conversion along with all other existing, planned, and proposed projects would result in adverse cumulative land conversion. Section C.8.8 (below) provides a detailed analysis of cumulative impacts. The potential combined development of approximately one million acres of land, would all combine to result in adverse effects on agricultural lands (one of the state's most important resources), and recreational resources. Although the development of renewable resources in compliance with federal and state mandates is important and required, the conversion of thousands of acres of open space would result in a significant and unavoidable impact. In general, the land conversion impacts to these lands would preclude numerous existing land uses including recreational activities, rangeland management, and open space. Because the Calico Solar Project would have no impacts on agricultural resources, rangelands, horses and burros, it would have no potential to contribute to cumulative impacts in this respect. However, the proposed project would combine with other past and reasonably foreseeable future projects to substantially reduce scenic values of wilderness areas and recreational resources in the Mojave Desert and southern California desert region and therefore, would result in a significant and unavoidable cumulative land use impact in this regard.

C.8.5.3 CEQA LEVEL OF SIGNIFICANCE

Agricultural Lands and Rangelands

As discussed above in subsection C.8.5.2, and similar to the proposed project, there would be no impacts on agricultural and rangelands resulting from this alternative.

Wilderness and Recreation

As discussed above in subsection C.8.5.2, and similar to the proposed project, impacts resulting from this alternative to wilderness and recreation would be less-than-significant.

Horses and Burros

As discussed above in subsection C.8.5.2, and similar to the proposed project, there would be no impacts on horses and burros resulting from this alternative.

Land Use Compatibility and LORS Compliance

This alternative would comply with all federal LORS, including the BLM Interim Policy Memorandum (CA-2009-020), and any land use LORS consistency impacts would be less-than-significant.

Cumulative Land Use Effects

As discussed above in subsection C.8.5.2, and similar to the proposed project, the cumulative land use impacts of this alternative would be significant and unavoidable.

C.8.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed 850 MW project site. This alternative, and the associated transmission line, substation, construction laydown, and control facilities are shown in Alternatives Figure 2.

C.8.6.1 SETTING AND EXISTING CONDITIONS

The alternative would include approximately 7,050 acres or 85 percent of the lands affected by the proposed project. The BLM lands affected by this alternative would be the same as the proposed project site, with the elimination of the 1,180 acres of those lands. In addition, the net generating capacity would be 720 MW, which would require the eventual 65-mile upgrade of the existing Pisgah-Lugo transmission line. Please see the discussion of existing conditions within affected BLM lands under Section C.8.4.1.

C.8.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Agricultural Lands and Rangelands

With a 15 percent reduction in the site, any land conversion impact would also be proportionately less. As discussed above in detail in Section C.8.4.2 (under the subsection entitled "Agricultural Lands and Rangelands"), the proposed project would not result in a conversion of farmland. Similarly, this alternative would not affect farmlands, and would not be located on land under Williamson Act contracts.

Similar to the proposed project, this alternative would not adversely affect the Cady Mountains rangeland allotment since the allotment is currently vacant and is scheduled for voluntary relinquishment. Therefore, the types of effects on agricultural lands and rangelands resulting from this alternative would be similar to the proposed project.

Wilderness and Recreation

The conversion of 7,050 acres of land to support the components and activities associated with this alternative would indirectly disrupt current wilderness areas and recreational activities in established federal and state areas, which would result in adverse effects on recreational users of these lands. However, this effect would be proportionally less than the 8,230 acres affected by the proposed project.

Horses and Burros

Similar to proposed project, this alternative would not contain or traverse any established BLM HMAs. Therefore, this alternative would not result in any interference with BLM's management of an HMA.

Land Use Compatibility and LORS Compliance

Similar to the proposed project, this alternative would not physically divide or disrupt an established community.

Staff's analysis of the proposed project's consistency with applicable federal land use LORS is presented in **Land Use Table 2.** These federal LORS would apply to this alternative. This alternative would be consistent with applicable federal land use LORS, including BLM's Interim Policy Memorandum (CA-2009-020) for avoiding LWCF lands. With BLM's issuance of a project-specific CDCA Plan Amendment, the proposed project would fully comply with the Plan. As discussed in **Land Use Table 2,** the proposed project would not be consistent with the BLM's Interim Policy Memorandum (CA-2009-020). However, this alternative would avoid LWCF land, and therefore, would not result in surface disturbing activities in the avoidance/exclusion areas. As such, the Avoidance of Donated and Acquired Lands Alternative would be consistent with all applicable LORS; and in particular the BLM's Interim Policy Memorandum (CA-2009-020). This alternative would have no land use LORS inconsistencies, compared to the proposed project.

Cumulative Land Use Effects

This alternative would result in the conversion of 7,050 acres of undeveloped open space with an industrial utility use (i.e., a 720 MW power plant and associated infrastructure). When compared to the proposed project, this alternative would result in 15 percent less land conversion to industrial uses; nonetheless, the cumulative effects of this amount of land conversion along with all other existing, planned, and proposed projects would result in adverse cumulative land conversion. Section C.8.8 (below) provides a detailed analysis of cumulative impacts. The potential combined development of approximately one million acres of land, would all combine to result in adverse effects on agricultural lands (one of the state's most important resources), and recreational resources. Although the development of renewable resources in compliance with federal and state mandates is important and required, the conversion of thousands of acres of open space would result in a significant and unavoidable impact. In general, the land conversion impacts to these lands would preclude numerous existing land uses including recreational activities, rangeland management, and open space. Because the Calico Solar Project would have no impacts on agricultural resources, rangelands, horses and burros, it would have no potential to contribute to cumulative impacts in this respect. However, the proposed project would combine with other past and reasonably foreseeable future projects to substantially reduce scenic values of wilderness areas and recreational resources in the Mojave Desert and southern California desert region and therefore, would result in a significant and unavoidable cumulative land use impact in this regard.

C.8.6.3 CEQA LEVEL OF SIGNIFICANCE

Agricultural Lands and Rangelands

As discussed above in subsection C.8.5.2, and similar to the proposed project, there would be no impacts on agricultural and rangelands resulting from this alternative.

Wilderness and Recreation

As discussed above in subsection C.8.5.2, and similar to the proposed project, impacts resulting from this alternative to wilderness and recreation would be less-than-significant.

Horses and Burros

As discussed above in subsection C.8.5.2, and similar to the proposed project, there would be no impacts on horses and burros resulting from this alternative.

Land Use Compatibility and LORS Compliance

This alternative would comply with all applicable federal land use LORS, including the BLM's Interim Policy Memorandum (CA-2009-020). Therefore, impacts related to LORS compliance would be less-than-significant.

Cumulative Land Use Effects

As discussed above in subsection C.8.5.2, and similar to the proposed project, the cumulative impacts of this alternative would be significant and unavoidable.

C.8.7 NO PROJECT/NO ACTION ALTERNATIVE

NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on the Calico Solar Project Application and on CDCA Land Use Plan Amendment

With the No Project/No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project/No Action Alternative would be the following:

- The impacts of the proposed project would not occur;
- The land on which the project is proposed may or may not become available to other uses (including another solar project), depending on BLM's actions with respect to the amendment of the California Desert Conservation Area Plan;
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM, and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no new ground disturbance. As a result, no loss or degradations to land use resources (including agricultural lands, rangelands, wilderness, recreation resources, horses and burros, and issues related to land use compatibility and LORS compliance) from construction or operation of the proposed project would occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

If this project is not approved, renewable projects would likely be developed on other sites in the California Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are large solar and wind projects proposed on BLM land along the Interstate 40 corridor within a few miles of the Calico Solar Project site. In addition, there are currently over 70 applications for solar projects covering over 650,000 acres pending with BLM in California.

NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on Calico Solar Project and Amend the CDCA Land Use Plan to Make the Area Available for Future Solar Development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM, and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with a different solar technology. As a result, ground disturbance would result from the construction and operation of the facility providing different solar technology and would likely result in a loss or degradation to land use resources. Different solar technologies require different amounts of grading and maintenance; however, it is expected that all solar technologies require some grading and ground disturbance. As such, this No Project/No Action Alternative could result in impacts to land use resources similar to the impacts under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on the Calico Solar Project Application and Amend the CDCA Land Use Plan to Make the Area Unavailable for Future Solar Development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM, and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no corresponding land disturbance. As a result, the land use resources of the site are not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in impacts to land use resources. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.8.7.1 SETTING AND EXISTING CONDITIONS

The land use setting for the No Project/No Action Alternative would include lands that would contain the proposed project site, which would become available for other uses that are consistent with BLM's land use plans. Subsection C.8.4.1 (above) describes the existing setting of these lands in detail.

C.8.7.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

With the No Project /No Action Alternative, the construction- and operation-related impacts of the proposed project would not occur. However, if the No Project/No Action Alternative #2 were approved, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, potentially including other renewable energy projects, recreational activities, etc. For example, according to **Cumulative Impacts Table 1A,** there are 35 solar energy projects and 33 wind energy projects proposed on BLM land within the area served by the BLM Barstow and Needles Field Offices, and there are currently 125 applications for solar projects covering approximately one million acres pending with BLM in the California Desert District.

Under the No Project/No Action alternative, the land use-related impacts of the Calico Solar project would not occur at the proposed site. The conversion of 8,230 acres of land that would be converted as a result of the proposed project would not occur, and a project-specific CDCA Plan amendment would not be necessary. Although, it is possible that the proposed project site could be developed with power generation and/or utility uses in the future given the existing and planned energy-related infrastructure in the area (i.e., SCE Pisgah Substation), the specific size, type, and timing of such use would be unknown. With the No Project/No Action Alternative, the effects on land use would be similar to what is currently occurring (undeveloped open space) at the proposed project site and in the surrounding area.

C.8.7.3 CEQA LEVEL OF SIGNIFICANCE

Under the No Project/No Action alternative land use impacts to the proposed project site and area would be similar to those currently occurring under the existing conditions in the area. Given that there would be no significant change over the existing conditions, there would be no land use impacts related to the No Project/No Action alternative.

C.8.8 PROJECT-RELATED FUTURE ACTIONS - LAND USE, RECREATION, AND WILDERNESS

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison (SCE) as a result of the Calico Solar project. The SCE upgrades are a reasonably foreseeable event, if the Calico Solar project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission (CPUC). Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar project.

C.8.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

The transmission line would follow a generally southwesterly route between the SCE Pisgah Substation (near Interstate 40 [I-40]) and the SCE Lugo Substation (south of the City of Hesperia) for approximately 67 miles. The line would be built within the existing SCE ROW of the Lugo-Pisgah 220 kV No. 2 transmission line except for approximately the last 10 miles south of Hesperia where a new ROW would be required. Under the 275 MW Early Interconnection option, the existing Pisgah Substation (approximately 5 acres) would be expanded to the northwest by an area approximately 270 feet by 100 feet within SCE's existing 220 kV ROW. Under the 850 MW Full Build-Out, the Pisgah Substation would be expanded from 40 to 100 acres adjacent or nearby to the existing substation to accommodate new electrical and communication facilities and future growth.

The early interconnection option would be located within existing SCE facilities and ROWs and the full build-out would be located primarily within SCE ROW on BLM land within the Barstow Field Office. The area where the new 500 kV transmission line would be constructed is primarily open, undeveloped land within the Mojave Desert. Communities near the proposed transmission line include Hesperia, Apple Valley, and Victorville at the southwestern end of the line, and Hector, Pisgah, Lavic, and Ludlow along the northeastern portion.

The project area is located within the Desert Planning Region identified in the County of San Bernardino 2007 General Plan (San Bernardino 2007). The Desert Planning Region includes about 93 percent (18,735 square miles) of the land within San Bernardino County and much of the Mojave Desert. Approximately 81 percent of the County’s total land area is controlled by federal or State agencies, with the BLM managing approximately 47 percent of the county's land base. Publicly-owned lands are distributed throughout the Desert Planning Region and tend to be interspersed with privately owned lands. Approximately 4 percent of the county land area is within one of 24 incorporated communities, with the remaining 15 percent or 1.9 million acres of private land distributed throughout the unincorporated parts of the county (San Bernardino 2007). In addition to the County of San Bernardino General Plan, the southwesterly portion of the proposed upgrades area may fall within the City of Hesperia General Plan. Where possible, the line would be constructed within existing ROWs.

The transmission line route would traverse open desert where agricultural land is not prevalent. According to the DOC's FMMP, the majority of land traversed by the proposed transmission line is designated as "Other Land," with smaller areas within "Urban and Built-Up Land" designations (DOC 2008). The transmission route also would border the Rodman Mountains Wilderness Area, as well as the Ord Mountain and Johnson Valley rangeland allotments (BLM 2009o).

C.8.8.2 ENVIRONMENTAL IMPACTS

The proposed upgrades would not physically divide an existing community. Most of the transmission route and telecommunication facilities upgrades are proposed to be sited within or adjacent to existing SCE ROWs. The upgrades would require access to the existing ROWs by construction vehicles and equipment, which would use existing access roads, where possible. However, SCE would need to acquire rights for any new spur or access roads. Any additional impacts to land use would be temporary and confined to the work areas. There likely would be no displacement of any existing land uses given the undeveloped nature of the majority of the proposed ROW. The development of spur roads would not be considered a significant impact to land uses in the area, because the spur roads would be along an existing ROW. Furthermore, since the utility corridor and the substations are established land uses, upgrading most of the Lugo-Pisgah line and installing the 220/500 kV switchrack are not expected to conflict with applicable LORS.

In addition, the approximately 10 miles of new ROW would be in communities with planning and zoning requirements that would likely prevent any physical divisions. The upgrades would likely be constructed in accordance with the applicable land use plans, including, but not limited to the San Bernardino County and City of Hesperia planning and zoning requirements as defined in the respective General Plans. Access to all uses would be fully restored once construction of the upgrades is complete.

The linear route of the proposed transmission line would not be expected to affect agricultural lands since the majority of the transmission line would traverse open desert areas that are not designated as Important Farmland by the DOC. However, the route would traverse the Ord Mountain and Johnson Valley rangeland allotments. Nonetheless, any permanent disturbance to agricultural or rangeland would be limited to the tower footings, and it is assumed that agricultural/rangeland activities would be allowed within the transmission line ROW.

The transmission route would border the Rodman Mountains Wilderness Area, and the existing ROW corridor would pass through the Johnson Off-Highway Vehicle Area, the largest open area for OHVs in California. The noise and presence of heavy equipment associated with project construction may temporarily reduce visitation to these wilderness and recreational areas. Recreationists may cancel or schedule their visits to avoid construction periods thereby resulting in temporarily reduced visitation where construction could pose a safety hazard to OHV users and other recreationists. However, due to the size and available stock of the recreation areas in this desert region, and the relatively small portion crossed by the proposed upgrades, it is assumed that recreationists would not be precluded from recreational activities.

From an operational perspective, presence of the transmission line and associated facilities would not disrupt actual use of existing residential properties or structures. Access to all uses would be fully restored once construction of the upgrades is complete.

C.8.8.3 MITIGATION

To minimize land use impacts, the transmission line route should follow existing SCE ROWs where feasible, and any new ROWs should be developed along parcel edges and in accordance with all applicable land use LORS. Authorization and use would be subject to administrative review at the time of issuance of a final BLM decision regarding the authorization or use.

SCE should post notices on the ROW or at other sites where the public would be affected by construction activities. Notices should be posted approximately one month prior to commencing work. At ROW ingress and egress points, postings should be placed along the ROW and at work sites approximately two weeks prior to the closing of public access. Recommended mitigation should require SCE to identify and provide a public liaison person before and during construction to respond to public concerns about construction disturbances.

C.8.8.4 CONCLUSION

The SCE upgrades would not cause a significant change in land use. Once construction is completed, there would not be a change in access for recreation in and across the transmission line corridor. Since the transmission line and telecommunication upgrades would mostly be within an existing and established ROW, on existing, retrofitted, or replaced towers, or would be underground, the project components would not permanently disrupt or divide the physical arrangement of an established community. Also for these reasons, the SCE upgrades would not restrict existing or future land uses along the route.

C.8.9 CUMULATIVE IMPACT ANALYSIS

C.8.9.1 AGRICULTURAL LANDS AND RANGELANDS

Section B.3, Cumulative Scenario, provides detailed information on the potential cumulative solar and other development projects in the project area. Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis for the proposed project. In summary, these projects are:

- Renewable energy projects on BLM, State, and private lands, as shown on **Cumulative Figures 1 and 2** and in **Cumulative Tables 1A and 1B.** Although not all of those projects are expected to complete the environmental review processes, or be funded and constructed, the list is indicative of the large number of renewable projects currently proposed in California.
- Foreseeable future projects in the immediate area, as shown on **Cumulative Impacts Figure 3 and Cumulative Tables 2 and 3**. Table 2 presents existing projects in this area and Table 3 presents future foreseeable projects in the Newberry Springs/Ludlow Area. Both tables indicate project name and project type, its location and its status.

These projects are defined within a geographic area that has been identified by the Energy Commission and BLM as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all resource elements or environmental parameters. Most of these projects have, are, or will be required to undergo their own independent environmental review under CEQA and/or NEPA. Even if the cumulative projects described in Section B.3 have not yet completed the required environmental processes, they were considered in the cumulative impacts analyses in this SA/Draft EIS.

<u>Geographic Extent</u>

The geographic scope for the analysis of cumulative impacts related to agricultural lands and rangelands includes the desert region of San Bernardino County. The county's community plans map defines the desert region as the entire area north and northeast of the San Bernardino National Forest, which accounts for the majority of the county (SBC 2009a).

Cumulative impacts include the conversion of agricultural land and/or rangelands that would conflict with existing land uses. Projects related to agriculture and rangelands consist of all construction activities, and residential, and industrial developments within the region. For the purpose of this analysis, in addition to the projects listed in **Cumulative Impacts Tables 2 and 3,** data obtained from the DOC and the BLM's online GIS maps were considered when identifying activities that could contribute to cumulative impacts.

As noted above in the "Setting and Existing Conditions," agricultural lands are not present on the proposed project site, and the nearest area with agricultural development is approximately 10 miles west in the community of Newberry Springs. In addition, according to DOC's Important Farmland maps of San Bernardino County, the majority of the desert region is outside of the survey boundaries; and the areas that are surveyed include the valley region south of the San Bernardino National Forest and the southwestern portion of the desert region. Designations for the desert region primarily consist of "Grazing Land," with a concentration of "Urban and Built-Up Land" designations within the cities of Barstow, Victorville, and Hesperia. The area surrounding Newberry Springs is mostly designated as "Other Land"; and isolated

"Prime farmland" and "Farmland of Statewide Importance" designations are located throughout the surveyed area, with a few small areas of concentration.

The proposed project would be located within the Cady Mountains rangeland allotment; in addition, numerous rangeland allotments are located throughout the desert region of San Bernardino County. The Cronese Lake allotment is located directly north of Cady Mountains, and the following allotments are located on the west side of the desert region: Ord Mountain, Johnson Valley, Stoddard Mountain, Rattlesnake Canyon, Round Mountain, Shadow Mountains, Buckhorn Canyon, Shadow Mountains, Goldstone, Superior Mountains, Harper Lake, Gravel Hills, Monolith Cantil, Pilot Knob, Lava Mountains, Spangler Hills, Boron Sheep, and Cantil Common. The following allotments are located on the east side of the desert region: Valley View, Kessler Springs, Valley Wells, Clark Mountain, Jean Lake, Horsethief Springs, Lanfair Valley, Crescent Peak, Piute Valley, and Lazy Daisy (BLM 2009o).

Existing Cumulative Conditions

Agricultural land is not prevalent within the desert region of San Bernardino County; however, north of I-40, within the communities of Daggett and Newberry Springs, FMMP-designated Farmland is present. According to the San Bernardino County General Plan maps, the primary land use zoning designation in this area is Rural Living with intermittent areas with Agriculture designations (SBC 2009b). As such, the existing development described in **Cumulative Impacts Table 2,** which includes solar energy facilities, has potentially interfered with agricultural activities. In addition, as noted above, BLM rangeland allotments are located throughout the desert region of the county. Existing development is located either within an allotment or in the vicinity of an allotment. As a result, past and present development has contributed to the conversion of existing rural and open space land uses, including agriculture and rangeland.

Future Foreseeable Projects

Foreseeable Projects in the Project Area. As described in **Cumulative Impacts Figure 3** and **Cumulative Impacts Table 3**, four solar and three wind energy projects are proposed in the Newberry Springs/Ludlow area which would convert approximately 90,000 acres of desert lands to industrial uses. Also, the U.S. Marine Corps is expected to expand the existing 596,000-acre Twentynine Palms military base by 400,000 acres. Although this desert region is not a highly productive agricultural area, there are areas designated by the State and county for agricultural land uses.

In addition, as described in **Cumulative Impacts Figure 2** and **Table 1A,** the desert region of San Bernardino County is within the jurisdiction of BLM's Barstow and Needles District Offices. Cumulative impacts to rangeland allotments would be significant, since 35 solar energy projects and 33 wind energy projects have been proposed in or near designated allotments noted in the "Geographic Extent" subsection. As such, future foreseeable development would contribute to the conversion of existing rural and open space land uses, including agriculture and rangeland.

Foreseeable Renewable Projects in the California Desert. As shown on **Cumulative Impacts Figures 1** and **2** and **Table 1**, a total of 63 projects and 567,882 acres are proposed for development of solar energy, and 62 projects and 433,721 acres of wind energy development in the California Desert. This represents a worst-case scenario and not all of these projects would be ultimately developed. Nonetheless, multiple projects would result in the conversion of rangeland allotments to industrial uses.

Conclusion

Although, the proposed project by itself would not convert agricultural land to nonagricultural uses, the conversion of lands due to past and present projects, and the potential development of the approximately one million acres of land, would all combine to result in adverse effects on agricultural lands (one of the state's most important resources) and rangeland. Therefore, although the development of renewable resources in compliance with federal and State mandates is important and required, this conversion would contribute to a significant and unavoidable cumulative impact to agricultural resources.

C.8.9.2 WILDERNESS AND RECREATION

Geographic Extent

The geographic scope for the analysis of cumulative impacts related to wilderness and recreation includes the local and regional wilderness areas and recreation facilities within the desert region of San Bernardino County. **Cumulative Impacts Figure 2** illustrates the wilderness areas and major State and national parks in this desert region.

As noted above in the "Setting and Existing Conditions" subsection, adjacent to the northern boundary of the project site is the Cady Mountains WSA, and wilderness areas in the vicinity of the proposed project site include the Rodman Mountains, Bristol Mountains, Kelso Dunes, and Newberry Mountains. Wilderness areas provide ample opportunities for recreation activities. In addition, approximately 32 miles east of the project site is the Mojave National Preserve which is a 1.6-million acre park managed by the U.S. National Park Service (NPS 2009). Within the Mojave Preserve is the Providence State Recreation Area (SRA), which is managed by the California State Parks. This area also provides space for recreational activities; in particular, nature hikes and cavern tours are the main attractions to this park. Other recreational facilities primarily include OHV and camping sites located throughout the county.

Existing Cumulative Conditions

As illustrated in **Cumulative Impacts Figure 2**, existing projects in the Newberry Springs/Ludlow area, in particular the Department of Defense expansion, occupy significant portions of land in the project area.

Future Foreseeable Projects

Foreseeable Projects in the Project Area. As shown in **Cumulative Impacts Figure 3** and **Cumulative Impacts Table 3**, four solar and three wind energy projects are proposed in the Newberry Springs/Ludlow area which would convert approximately 90,000 acres of desert lands to industrial uses. Also, the U.S. Marine Corps is expected to expand the existing 596,000-acre Twentynine Palms military base by 400,000 acres.

In addition, as shown in **Cumulative Impacts Figure 2** and **Table 1A,** the desert region of San Bernardino County is within the jurisdiction of BLM's Barstow and Needles District Offices, where 35 solar energy projects and 33 wind energy projects have been proposed in project area. As such, future foreseeable development would contribute to the conversion of existing rural and open space land uses, including wilderness and recreation.

Foreseeable Renewable Projects in the California Desert. As shown on **Cumulative Impacts Figures 1** and **2** and **Table 1**, a total of 63 projects and 567,882 acres are proposed for development of solar energy, and 62 projects and 433,721 acres of wind energy development in the California Desert. This represents a worst-case scenario and not all of these projects would be ultimately developed. Nonetheless, multiple projects would result in the conversion of rangeland allotments to industrial uses.

Conclusion

In addition to the proposed Calico Solar facility, there are many past, present, or reasonably foreseeable future actions that contribute to impacts to recreation and wilderness areas. Regionally, there have been both positive and negative impacts to recreational and wilderness resources as a result of development projects within San Bernardino County. Development of highway access to the region has provided direct vehicular access to open desert scenery for residents throughout southern California. This increased access has improved the recreational experience for some users by making the area more accessible, but has also detracts from the recreational experience for other users who prefer remote camping, hiking, and hunting away from populated areas.

Presently, as noted above, numerous energy-related development projects, including the proposed project, would remove large acreages of land from potential recreational use, and would have adverse effects on the viewscape that would result in some users seeking out other areas of the desert for their activities (see the cumulative analysis in the **Visual Resources** section). Similarly, within wilderness areas, the attraction of hiking, camping, and other outdoor activities is likely to decrease due to the increased human activity in the region, and the consequent impact of development on the viewscape. The proposed project would permanently change the nature of land use at the proposed project site from Government Special Public Limited Use and Moderate Use to an intensive utility use for the generation of power. Therefore, the combined effect of the overall cumulative past, present, and proposed and reasonably foreseeable projects, including the proposed project, in the desert region of San Bernardino County would adversely affect recreation and wilderness resources, resulting in a significant and unavoidable under CEQA.

C.8.9.3 HORSES AND BURROS

Geographic Extent

Cumulative impacts would result in changes in the existing environment which, due to their nature or location, result in interference with BLM's management of HMAs. The cumulative analysis of wild horses and burros was conducted using BLM maps of HMAs within San Bernardino County.

Existing Cumulative Conditions

The Chemehuevi HMA is the closest management area and is the only HMA within San Bernardino County. The HMA is located approximately 100 miles southeast of the project site near the California-Nevada border. This area is not notable for significant past or present development.

Future Foreseeable Projects

Foreseeable Projects in the Project Area. As shown in **Cumulative Impacts Figure 3** and **Cumulative Impacts Table 3**, four solar and three wind energy projects are proposed in the Newberry Springs/Ludlow area which would convert approximately 90,000 acres of desert lands to industrial uses. Also, the U.S. Marine Corps is expected to expand the existing 596,000-acre Twentynine Palms military base by 400,000 acres. However, as no HMAs are in the vicinity of the proposed project, it is unlikely that future projects within the project area would impact horses or burros.

Foreseeable Renewable Projects in the California Desert. As shown on **Cumulative Impacts Figures 1** and **2** and **Table 1,** solar and wind applications for use of BLM and private land, cover approximately 1 million acres of the California Desert Conservation Area. However, as shown on BLM maps of the HMAs, there are only three HMAs in the California Desert, of which Chocolate Mule Mountains would be the only HMA in the vicinity of proposed renewable energy projects (BLM 2009k).

Conclusion

Although the proposed Calico Solar facility would not adversely impact horses or burros, there are other present or reasonably foreseeable future actions that could contribute to impacts to HMAs within the region. Authorized and unauthorized vehicle use, and maintenance and construction of utility rights-of-way can have a slight impact to burros by removal of vegetation utilized for forage, and there is always a danger of vehicles colliding with burros. The impact of the proposed and probable development projects would cumulatively remove and isolate potential grazing sites for burros. However, in areas of close proximity to HMAs, development projects would be required to consider impacts related to wild horses and burros. Therefore, cumulative impacts would be less than significant.

C.8.9.4 LAND USE COMPATIBILITY AND LORS COMPLIANCE

Geographic Extent

The geographic scope for the analysis of cumulative impacts related to land use compatibility and LORS compliance are the local and regional communities and sensitive receptors. Cumulative impacts could result from the physical division of an established community or conflict with any applicable land use plan, policies, or regulation adopted for the purpose of avoiding or mitigating environmental impacts.

Existing Cumulative Conditions

As described in **Cumulative Impacts Table 2,** past and present projects occurring in the vicinity of the proposed project site include two solar energy generating facilities, the expansion of the Twentynine Palms Marine base, and two aggregate mining operations.

In addition, the surrounding area consists of undeveloped desert land and mountain terrain with small rural communities in the vicinity. The closest community is Newberry Springs located approximately 10 miles west of the project site, where the dominant land use designation is Rural Living and intermittent areas of agricultural activities.

Future Foreseeable Projects

Foreseeable Projects in the Project Area. As shown in **Cumulative Impacts Figure 3** and **Cumulative Impacts Table 3**, four solar and three wind energy projects are proposed in the Newberry Springs/Ludlow area which would convert approximately 90,000 acres of desert lands to industrial uses. Also, the U.S. Marine Corps is expected to expand the existing 596,000-acre Twentynine Palms military base by 400,000 acres.

In addition, as shown in **Cumulative Impacts Figure 2** and **Table 1A,** the desert region of San Bernardino County is within the jurisdiction of BLM's Barstow and Needles District Offices, where 35 solar energy projects and 33 wind energy projects have been proposed in the project area. As such, future foreseeable development would contribute to the conversion of existing rural and open space land uses.

Foreseeable Renewable Projects in the California Desert. As shown on **Cumulative Impacts Figures 1** and **2** and **Table 1**, a total of 63 projects and 567,882 acres are proposed for development of solar energy, and 62 projects and 433,721 acres of wind energy development in the California Desert. This represents a worst-case scenario and not all of these projects would be ultimately developed. Nonetheless, multiple projects would result in the convert existing land uses to an industrial use.

Conclusion

Proposed developments near the project site that would have the potential to induce cumulative impacts include solar and wind energy generation projects, and the expansion of the existing military base. In consideration of cumulative land use compatibility impacts, the implementation of renewable projects in southern California would occur mostly in undeveloped desert lands or areas of rural development and open space, and therefore, would not create physical divisions of established residential communities. Nonetheless, as noted above, approximately one million acres of land are proposed for solar and wind energy development in the southern California desert lands. The conversion of these lands would preclude numerous existing land uses including recreation, wilderness, rangeland, and open space, and therefore, would result in a significant cumulative land conversion impact. The proposed project's conversion of approximately 8,230 acres in an undeveloped portion of San Bernardino County and on BLM lands in combination with the land conversion impacts of past, present, and reasonably foreseeable future projects in the area would be cumulatively considerable, and a significant and unavoidable impact under CEQA.

C.8.10 COMPLIANCE WITH LORS

A detailed discussion of the proposed project's compliance with LORS applicable to land use, recreation, and wilderness is provided above in subsection C.8.4.2, and **Land Use Table 2** (Project Compliance with Adopted Land Use LORS).

C.8.11 NOTEWORTHY PUBLIC BENEFITS

The proposed project would permanently change the nature of land use at the project site from open space lands, to an intensive utility for the generation of power. Therefore, from a land use perspective, development of the proposed project would not result in any noteworthy public benefits because:

- the Calico Solar Project site would be developed with 34,000 SunCatchers and associated ancillary facilities and linear components on approximately 8,230 acres of undeveloped land in San Bernardino County, which would result in the conversion of BLM-administered public land to an industrial use;
- the proposed project would disturb LWCF (donated) lands that have been prohibited from development by the BLM and intended to mitigate the impacts of past projects; and
- the proposed project would contribute to the cumulative conversion of approximately one million acres of open space, recreation, wilderness, and agricultural lands in the southern California desert for the purposes of renewable energy development.

Therefore, although the development of the proposed project is intended to address the requirements of federal and State mandates for renewable energy, the land conversion and associated land use impacts would not yield any noteworthy public benefits related to land use, recreation, or wilderness resources.

C.8.12 PROJECT CLOSURE AND DECOMMISSIONING

According to Section 3.12 of the applicant's project description, the solar generating facility is expected to have a lifespan of 40 years. At any point during this time, temporary or permanent closure of the solar facility could occur. Temporary closure would be a result of necessary maintenance, hazardous weather conditions, or damage due to a natural disaster. Permanent closure would be a result of damage that is beyond repair, adverse economic conditions, or other significant reasons.

Both temporary and permanent closures would require the applicant to submit to the CEC a contingency plan or a decommissioning plan, respectively. A contingency plan would be implemented to ensure compliance with applicable LORS, and appropriate shutdown procedures depending on the length of the cessation. A decommissioning plan would be implemented to ensure compliance with applicable LORS, removal of equipment and shutdown procedures, site restoration, potential decommissioning alternatives, and the costs and source of funds associated with decommissioning activities.

Upon closure of the facility or decommissioning, it is likely that the applicant would be required to restore lands affected by the project to their pre-project state. Given the fact that the proposed project site is located on undeveloped land, staff anticipates that project decommissioning would have impacts similar in nature to proposed project construction activities. Therefore, given the temporary nature of decommissioning activities and the eventual return of the lands to their current state, the effects of decommissioning on land use is not expected to be adverse.

C.8.13 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

No Conditions of Certification/Mitigation Measures are proposed for the area of Land Use, Recreation, and Wilderness.

C.8.14 CONCLUSIONS

- No farmland or rangeland conversion impacts are expected as a result of the proposed project, and the project would not involve other changes in the existing environment which could result in conversion of farmland to non-agricultural uses.
- The proposed project would indirectly impact the recreational and wilderness values of the Cady Mountains WSA. However, due to the numerous wilderness and recreation areas throughout the county and in the vicinity of the project site, this indirect impact would not be adverse. .
- The proposed project would not contain or traverse any established BLM HAs or HMAs.
- The proposed project would not disrupt or divide the physical arrangement of an established community.
- The applicant has submitted an application to the BLM requesting a right-of-way (ROW) to construct the proposed project and its related facilities. Pursuant to the California Desert Conservation Area (CDCA) Plan (1980, as amended), sites associated with power generation or transmission not identified in the CDCA Plan are considered through the Plan Amendment process. Under Federal law, BLM is responsible for processing requests for ROWs to authorize such proposed projects and associated transmission lines and other appurtenant facilities on land it manages. If the ROW and proposed land use plan amendment are approved by BLM, the proposed solar thermal power plant facility on public lands would be authorized in accordance with Title V of the FLMPA of 1976 and the Federal Regulations at 43 CFR part 2800.
- Based on staff's independent review of applicable federal, state, and local LORS documents, the proposed project would not be consistent with a BLM Interim Policy prohibiting surface disturbing activities on LWCF lands within the proposed project boundaries. However, implementation of the two project alternatives (the Reduced Project Alternative and the Avoidance of Donated and Acquired Lands Alternative) would both avoid this LORS inconsistency.
- The implementation of renewable projects in Southern California would occur mostly in undeveloped desert lands or areas of rural development, and therefore, would not create physical divisions of established residential communities. Nonetheless, approximately one million acres of land are proposed for solar and wind energy development in the Southern California desert lands. Because the Calico Solar Project would have no impacts on agricultural resources, rangelands, horses and burros, it would have no potential to contribute to cumulative impacts in this respect. However, the proposed project would combine with other past and reasonably foreseeable future projects to substantially reduce scenic values of wilderness areas

and recreational resources in the Mojave Desert and southern California desert region and therefore, would result in a significant and unavoidable cumulative land use impact in this regard.

- The land use impacts associated with the Reduced Acreage Alternative would be similar to the proposed project, but less intense given that 67 percent less lands would be affected. In addition, this alternative would not result in the disturbance of LWCF mitigation lands, and therefore, would be in compliance with the BLM's Interim Policy Memorandum.
- The land use impacts associated with the Avoidance of Donated and Acquired Lands Alternative would be similar to the proposed project; however, this alternative would not result in the disturbance of LWCF mitigation lands, and therefore, would be in compliance with the BLM's Interim Policy Memorandum.

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C.9 – NOISE AND VIBRATION

Testimony of Erin Bright

C.9.1 SUMMARY OF CONCLUSIONS

California Energy Commission staff concludes that the Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) can be built and operated in compliance with all applicable noise and vibration laws, ordinances, regulations, and standards and, if built in accordance with the conditions of certification proposed below, would produce no significant adverse noise impacts on people within the affected area, either direct, indirect, or cumulative.

C.9.2 INTRODUCTION

The construction and operation of any power plant creates noise, or unwanted sound. The character and loudness of this noise, the times of day or night that it is produced, and the proximity of the facility to sensitive receptors combine to determine whether the facility would meet applicable noise control laws and ordinances and whether it would cause significant adverse environmental impacts under CEQA. In some cases, vibration may be produced as a result of power plant construction practices, such as blasting or pile driving. The groundborne energy of vibration has the potential to cause structural damage and annoyance.

The purpose of this analysis is to identify and examine the likely noise and vibration impacts from the construction and operation of the Calico Solar Project and to recommend procedures to ensure that the resulting noise and vibration impacts would be adequately mitigated to comply with applicable laws, ordinances, regulations, and standards (LORS) and to avoid creation of significant adverse noise or vibration impacts. For an explanation of technical terms and acronyms employed in this section, please refer to **Noise Appendix A** immediately following.

C.9.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

California Environmental Quality Act

The California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified and that such impacts be eliminated or mitigated to the extent feasible. Section XI of Appendix G of CEQA Guidelines (See Cal. Code Regs., tit. 14, Section 15063) sets forth some characteristics that may signify a potentially significant impact. Specifically, a significant effect from noise may exist if a project would result in:

1. exposure of persons to, or generation of, noise levels in excess of standards established in the local General Plan or noise ordinance or applicable standards of other agencies;
2. exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;

3. substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or
4. substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The Energy Commission staff, in applying item 3 above to the analysis of this and other projects, has concluded that a potential for a significant noise impact exists where the noise of the project plus the background exceeds the background by 5 dBA or more at the nearest sensitive receptor.

Staff considers it reasonable to assume that an increase in background noise levels up to 5 dBA in a residential setting is insignificant; an increase of more than 10 dBA is considered significant. An increase between 5 and 10 dBA should be considered adverse, but may be either significant or insignificant, depending on the particular circumstances of the case.

Factors to be considered in determining the significance of an adverse impact as defined above include:

1. the resulting combined noise level;[1]
2. the duration and frequency of the noise;
3. the number of people affected;
4. the land use designation of the affected receptor sites; and
5. public concern or controversy as demonstrated at workshops or hearings or by correspondence.

Noise due to construction activities is usually considered to be insignificant in terms of CEQA compliance if:

- the construction activity is temporary;
- use of heavy equipment and noisy activities are limited to daytime hours; and
- all industry-standard noise abatement measures are implemented for noise-producing equipment.

Staff uses the above method and threshold to protect the most sensitive populations.

[1] For example, a noise level of 40 dBA would be considered quiet in many locations. A noise limit of 40 dBA would be consistent with the recommendations of the California Model Community Noise Control Ordinance for rural environments and with industrial noise regulations adopted by European jurisdictions. If the project would create an increase in ambient noise no greater than 10 dBA at nearby sensitive receptors, and the resulting noise level would be 40 dBA or less, the project noise level would likely be insignificant.

Laws, Ordinances, Regulations, and Standards

Noise Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal (OSHA): 29 U.S.C. § 651 et seq.	Protects workers from the effects of occupational noise exposure.
State (Cal/OSHA): Cal. Code Regs., tit. 8, §§ 5095–5099	Protects workers from the effects of occupational noise exposure.
Local	
San Bernardino County General Plan Noise Element	Establishes noise limits as specified in the Development Code (below)
San Bernardino County Development Code, Ch. 83.01	Establishes property line noise limits for various receiving uses. Exempts construction noise during certain hours. Establishes vibration limits.

FEDERAL

Under the Occupational Safety and Health Act of 1970 (29 USC § 651 et seq.), the Department of Labor, Occupational Safety and Health Administration (OSHA) has adopted regulations designed to protect workers against the effects of occupational noise exposure (29 CFR § 1910.95). These regulations list permissible noise exposure levels as a function of the amount of time during which the worker is exposed (see **NOISE Appendix A, Table A4** immediately following this section). The regulations further specify a hearing conservation program that involves monitoring the noise to which workers are exposed, assuring that workers are made aware of overexposure to noise, and periodically testing the workers' hearing to detect any degradation.

There are no federal laws governing off-site (community) noise.

The only guidance available for evaluation of power plant vibration is guidelines published by the Federal Transit Administration (FTA) for assessing the impacts of groundborne vibration associated with construction of rail projects. These guidelines have been applied by other jurisdictions to assess groundborne vibration of other types of projects. The FTA-recommended vibration standards are expressed in terms of the "vibration level," which is calculated from the peak particle velocity measured from groundborne vibration. The FTA measure of the threshold of perception is 65 VdB,[2] which correlates to a peak particle velocity of about 0.002 inches per second (in/sec). The FTA measure of the threshold of architectural damage for conventional sensitive structures is 100 VdB, which correlates to a peak particle velocity of about 0.2 in/sec.

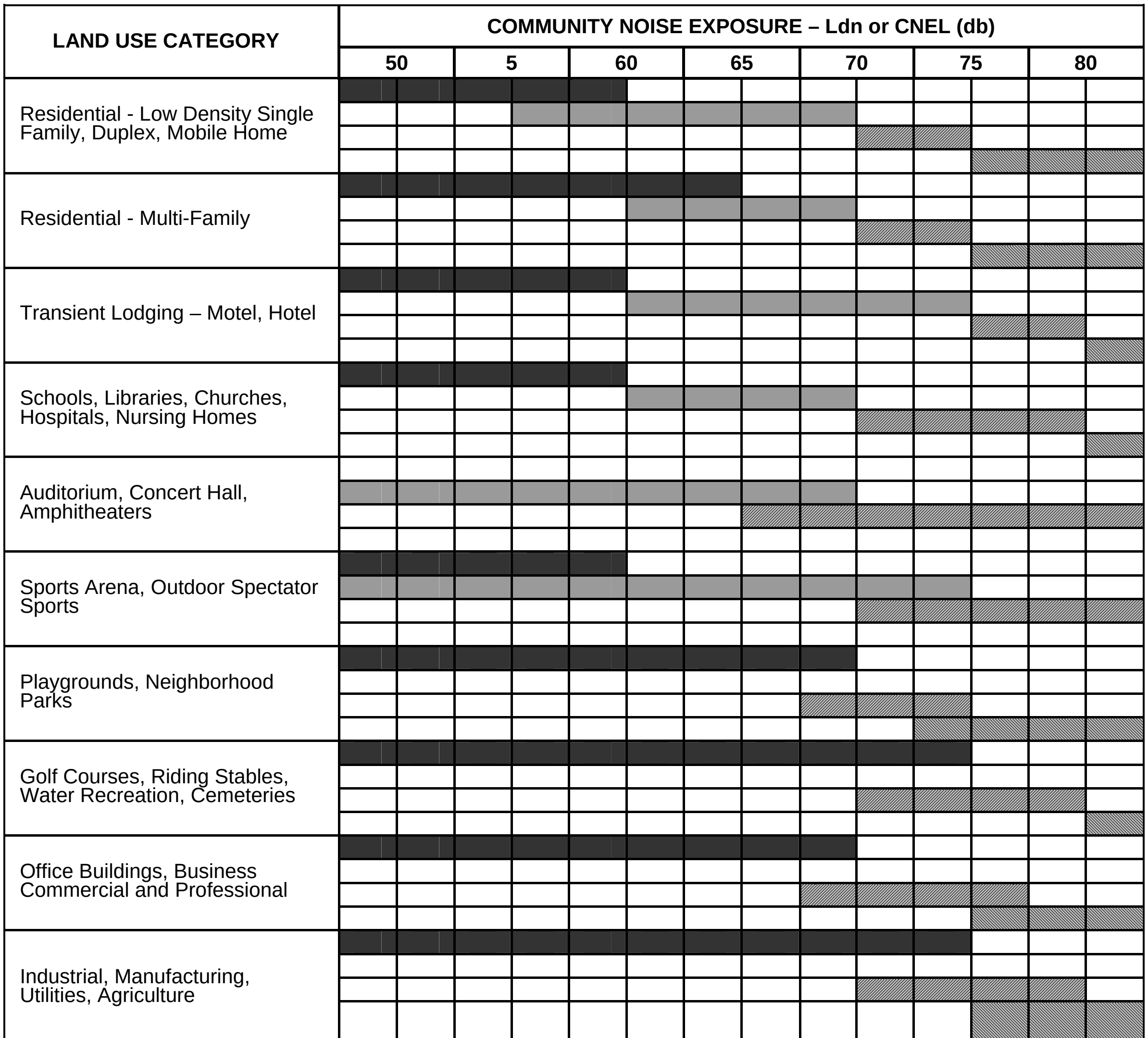
STATE

California Government Code section 65302(f) encourages each local governmental entity to perform noise studies and implement a noise element as part of its General

[2] VdB is the common measure of vibration energy.

Plan. In addition, the California Office of Planning and Research has published guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure. The State land use compatibility guidelines are listed in **Noise Table 2**.

Noise Table 2
Land Use Compatibility for Community Noise Environment



	Normally Acceptable	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
	Conditionally Acceptable	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design.
	Normally Unacceptable	New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirement must be made and needed noise insulation features included in the design.
	Clearly Unacceptable	New construction or development generally should not be undertaken.

Source: State of California General Plan Guidelines, Office of Planning and Research, June 1990.

The California Occupational Safety and Health Administration (Cal/OSHA) has promulgated Occupational Noise Exposure Regulations (Cal. Code Regs., tit. 8, §§ 5095–5099) that set employee noise exposure limits. These standards are equivalent to the federal OSHA standards (see the **Worker Safety and Fire Protection** section of this document, and **Noise Appendix A, Table A4**).

LOCAL

San Bernardino County General Plan Noise Element

The San Bernardino County General Plan Noise Element establishes noise performance standards for stationary sources. These limits are those specified in the San Bernardino County Development Code (below).

San Bernardino County Development Code

Chapter 83.01 of the San Bernardino County Development Code sets noise performance standards for noise from stationary noise sources measured at the boundaries of noise-sensitive land uses. These limits are reproduced here as **Noise Table 3**. The Code stipulates an allowance to these limits if the measured ambient noise level exceeds any of the four noise limit categories, such that “the allowable noise exposure standard shall be increased to reflect the ambient noise level” (COSB 2007b, § 83.01.080[e]).

Noise Table 3
Noise Standards for Stationary Noise Sources

	Noise Level (dBA L_{eq})	
Receiving Land Use Category	**7:00 a.m. to 10:00 p.m.**	**10:00 p.m. to 7:00 a.m.**
Residential	55	45
Professional Services	55	55
Other Commercial	60	60
Industrial	70	70

Source: COSB 2007b, Ch. 83.01, Table 83-2

Construction noise is exempt from these limits between the hours of 7:00 a.m. and 7:00 p.m. except Sundays and federal holidays (COSB 2007b, § 83.01.080[g][3]).

Vibration is limited to that which cannot be felt without the aid of instruments at or beyond the lot line, and that which does not produce a particle velocity greater than or equal to 0.2 inches per second at the lot line (COSB 2007b, § 83.01.090[a]). Construction vibration is exempt from this limit between the hours of 7:00 a.m. and 7:00 p.m. except Sundays and federal holidays (COSB 2007b, § 83.01.090[c][2]).

Note that, since the project will be built on federally owned land, these San Bernardino County LORS do not apply. They are listed here solely as guidelines.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The analysis of proposed project effects must comply with both CEQA and NEPA requirements given the respective power plant licensing and land jurisdictions of the California Energy Commission and U.S. Bureau of Land Management (BLM). CEQA requires that the significance of individual effects be determined by the Lead Agency; however, the use of specific significance criteria is not required by NEPA.

Because this document is intended to meet the requirements of both NEPA and CEQA, the methodology used for determining environmental impacts of the proposed project includes a consideration of guidance provided by both laws.

CEQA identifies criteria that may be used to determine the significance of identified impacts. A significant impact is defined by CEQA as “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project” (State CEQA Guidelines Section 15382).

In comparison, NEPA states that “‘Significantly’ as used in NEPA requires considerations of both context and intensity…” (40 CFR 1508.27). Therefore, thresholds serve as a benchmark for determining if a project action will result in a significant adverse environmental impact when evaluated against the baseline. NEPA requires that an Environmental Impact Statement (EIS) is prepared when the proposed federal action (project) as a whole has the potential to “significantly affect the quality of the human environment.”

Thresholds for determining significance in this section are based on Appendix G of the CEQA Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission staff. In addition, staff’s evaluation of the environmental effects of the proposed project on land uses (i.e., those listed below) includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27.

Effects of the proposed project on noise and vibration (and in compliance with both CEQA and NEPA) have been determined using the thresholds listed below.

C.9.4 PROPOSED PROJECT

C.9.4.1 SETTING AND EXISTING CONDITIONS

The Calico Solar Project (Calico Solar) would be constructed on an 8,230 acre site located in San Bernardino County, approximately 37 miles east of the city of Barstow. The site is on undisturbed public land managed by the BLM (SES 2008a, AFC §§ 3.2, 3.3.1).

The ambient noise regime in the project vicinity consists of train traffic, highway traffic, aircraft traffic, wind and wildlife. The nearest sensitive receptor is a single residence, designated SR1, located approximately 1,200 feet from the project’s southwest border. A second sensitive receptor, a residence designated SR2, is located approximately 7,800 feet east of the project boundaries. (SES 2008a, AFC 5.12.1.1, Figure 5.12-1).

Ambient Noise Monitoring

In order to establish a baseline for comparison of predicted project noise to existing ambient noise, the applicant has presented the results of an ambient noise survey (SES 2008a, AFC § 5.12.1.4, Appendix CC-3, Tables CC-3-1 through CC-3-3; SES 2009i, DR68, Table DR68-1). The survey was conducted from November 2 to November 7, 2008, and monitored existing noise levels at the following locations, shown on **Noise and Vibration Figure 1**:

1. Measuring Location 3 (LT3): Near the residence located approximately 1,200 feet south-west of the project site, to the south of Route 66 and west of Hector Road, designated SR1. This is the sensitive receptor closest to the project site. Long-term (25 hour) monitoring showed elevated ambient noise levels consistent with the receptor's proximity to the nearby rail lines and highway.
2. Measuring Location 4 (LT4): Near an abandoned corral west of the project site. Long-term monitoring (18 hour) showed ambient noise levels consistent with a rural environment.

Ambient noise measurements were not taken at the second sensitive receptor, a residence located approximately 7,800 feet east of the project site and 5300 feet north of the rail line and Interstate 40, designated SR2 in **Noise and Vibration Figure 1**. On the basis of comparable noise conditions such as noise source proximity and exposure, ambient noise at this receptor is likely similar to that at measuring location LT4 (SES 2009i,DR 68). Energy Commission staff has chosen to analyze project noise impacts at SR2 using the ambient noise data from LT4 as a proxy measurement.

Noise Table 4 summarizes the ambient noise measurements:

Noise Table 4
Summary of Measured Ambient Noise Levels

Measurement Location	Measured Noise Levels, dBA		
	L_{eq} – Daytime[1]	L_{eq} – Nighttime[2]	L_{90} – Nighttime[3]
LT3/SR1	65	63	47
LT4/SR2	41	38	35

Source: SES 2008a AFC Appendix CC-3, Tables CC-3-1 through CC-3-3; SES 2009i table DR68-1

[1] Staff calculations of average of 15 daytime hours
[2] Staff calculations of average of 9 nighttime hours
[3] Staff calculations of average of 4 consecutive quietest hours of the nighttime

C.9.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

DIRECT IMPACTS AND MITIGATION

Noise impacts associated with the project can be created by short-term construction activities and by normal long-term operation of the power plant.

Construction Impacts and Mitigation

Construction noise is usually considered a temporary phenomenon. Construction of Calico Solar is expected to occur in two phases over a period of 41 to 48 months. Phase I would be constructed first, on the eastern half of the project site; Phase II would subsequently be constructed on the western half of the project site (SES 2008a, AFC § 5.12.2.1).

Compliance with LORS

Construction of an industrial facility such as a power plant is typically noisier than permissible under usual noise ordinances. In order to allow the construction of new facilities, construction noise during certain hours of the day is commonly exempt from enforcement by local ordinances.

The applicant has predicted the noise impacts of project construction on the nearest sensitive receptors (SES 2008a, AFC § 5.12.2.1, Tables 5.12-4 and 5.12-5). Assembly and installation of solar collectors (Sun Catchers) for the project is expected to be performed in blocks around the site with additional, more substantial structural construction taking place at the Main Services Complex centrally located on the site. The applicant has estimated that the noise resulting from construction of the collector block closest to the receptor south of the project border, SR1, would be no more than 74 dBA at the receptor. Similarly, noise resulting from the construction of the collector blocks closest to location SR2 would be no more than 60 dBA. A maximum construction noise level for all other project construction (such as roads and buildings) is estimated to be no more than 55 dBA L_{eq} at SR1, and 58 dBA L_{eq} at SR2. Overall construction noise would, therefore, be no more than 74 dBA at location SR1 and 62 dBA at location SR2 (SES 2008a, AFC § 5.12.2.1, Tables 5.12-4 and 5.12-5; and staff calculations). A comparison of construction noise estimates to measured ambient conditions is summarized in **Noise Table 5**.

Noise Table 5
Predicted Power Plant Construction Noise Impacts

Receptor	Highest Construction Noise Level[1] (dBA L_{eq})	Measured Existing Ambient[2] (dBA L_{eq})	Cumulative (dBA L_{eq})	Change (dBA)
SR1 – South Residence	74	65 daytime	75 daytime	+10 daytime
		63 nighttime	74 nighttime	+11 nighttime
SR2 – East Residence	62	41 daytime	62 daytime	+21 daytime
		38 nighttime	62 nighttime	+24 nighttime

1 Source: SES 2008a, AFC § 5.12.2.1, Tables 5.12-4 and 5.12-5; and staff calculations
2 Source: SES 2008a, AFC Appendix CC-3, Tables CC-3-1 through CC-3-3; and staff calculations of average of daytime and nighttime hours.

The San Bernardino County Development Code limits noise levels at residential receptors to no more than 55 dBA L_{eq}. The Code exempts construction noise from these limits during the daytime hours of 7:00 a.m. to 7:00 p.m. except Sundays and federal holidays. To ensure that these hours are, in fact, enforced, staff proposes Condition of Certification **NOISE-6**.

Compliance with **NOISE-6** would insure that the noise impacts of Calico Solar Project construction activities would comply with the local noise LORS.

CEQA Impacts

Power Plant Site

To evaluate construction noise impacts, staff compares the projected noise levels to the ambient. Since construction noise typically varies continually with time, it is most appropriately measured by, and compared to, the L_{eq} (energy average) metric.

The applicant estimates that construction of the Calico Solar Project would take place in two phases over a period of 41 to 48 months, which is significantly longer than the 12 to 16 month construction period of a traditional power plant. However, the construction of the Calico Solar Project would be conducted modularly, each module taking approximately 4 months to construct. Thus, maximum construction noise would occur during the construction of the module closest to the receptor for a duration of 4 months and would decrease as construction activity moved on to the next module, further from the receptor. Construction for the Calico Solar Project would therefore still constitute a temporary noise impact.

Aggregate construction noise may be expected to reach levels as high as 62 dBA L_{eq} at the sensitive receptor east of the project, SR2, for a period of approximately 4 months; an increase of 21 dBA during daytime hours (see **Noise Table 5**, above). Such an increase represents a quadrupling of noise level at the receptor and would generally be considered a significant impact. The projected construction noise levels, however, are most likely conservative, calculated from manufacturers' estimated data and engine power sound generation formulae; actual noise levels may be less than predicted. Since noisy construction work will be restricted to daytime hours, staff believes it will be noticeable, but tolerable, at the nearest residences.

The increase of construction noise over nighttime ambient noise levels at SR2 would be approximately 24 dBA. Such an increase represents more than a quadrupling in noise level, and at night, when people are sleeping, would clearly prove annoying. However, the schedule constraints on construction presented by the San Bernardino County Development Code and Condition of Certification **NOISE-6** further enforcing these constraints, would result in less than significant adverse impacts at the most noise-sensitive receptors.

In the event that actual construction noise should annoy nearby residents, staff proposes Conditions of Certification **NOISE-1** and **NOISE-2**, which would establish a Notification Process to make nearby residents aware of the project, and a Noise Complaint Process that requires the applicant to resolve any problems caused by noise from the project.

Linear Facilities

Linear facilities include new electrical transmission lines interconnecting a proposed new onsite substation to the transmission system on the project's eastern boundary. The transmission lines would extend past the project site boundaries only minimally and would not pass any sensitive receptors (SES 2008a, AFC Figure 5.12-1). While construction noise levels for linears would be noticeable, construction on linears proceeds rapidly, so no particular area is exposed to noise for more than a few days.

Pile Driving

The applicant does not explicitly state that pile driving would be necessary for construction of the Calico Solar Project, however staff has analyzed the potential noise impacts of pile driving in case it is found necessary during the construction process. If pile driving is required for construction of the project, the noise from this operation could be expected to reach 104 dBA at a distance of 50 feet. Pile driving noise would thus be projected to reach levels of 76 dBA at SR1 and 60 dBA at SR2 (staff calculation). Added to the existing daytime ambient levels of 65 and 41 dBA L_{eq} at SR1 and SR2, respectively, this would combine to produce an increase of 11 dBA over ambient noise levels at SR1 and 19 dBA over ambient at SR2 (see **Noise Table 6,** below). While this would produce a noticeable impact, staff believes that limiting pile driving to daytime hours, in conjunction with its temporary nature, would result in impacts tolerable to residents. Staff proposes Condition of Certification **NOISE-6** to ensure that pile driving noise, should it occur, would be limited to daytime hours.

Noise Table 6
Pile Driving Noise Impacts

Receptor	Pile Driving Noise Level (dBA L_{eq})	Daytime Ambient Noise Level (dBA L_{eq})	Cumulative Level (dBA)	Change (dBA)
SR1	76	65	76	+11
SR2	60	41	60	+19

1 Source: SES 2008a, AFC Appendix CC-3, Tables CC-3-1 through CC-3-3; SES 2009i, DR 68; and staff calculations

Vibration

The only construction operation likely to produce vibration that could be perceived off site would be pile driving, should it be employed. Vibration attenuates rapidly; it is likely that no vibration would be perceptible at any appreciable distance from the project site. Staff therefore believes there would be no significant impacts from construction vibration.

Worker Effects

The applicant has acknowledged the need to protect construction workers from noise hazards and has recognized those applicable LORS that would protect construction workers (SES 2008a, AFC § 5.12.2.1). To ensure that construction workers are, in fact, adequately protected, staff has proposed Condition of Certification **NOISE-3**, below.

<u>Operation Impacts and Mitigation</u>

The primary noise sources of the Calico Solar Project would consist of the reciprocating Stirling Engines (including generator, cooling fan and air compressor) utilized on each of the Sun Catchers that make up the project, as well as step-up transformers and a new substation (SES 2008a, AFC § 3.4.4.1, 5.12.2.2). Staff compares the projected noise with applicable LORS. In addition, staff evaluates any increase in noise levels at sensitive receptors due to the project in order to identify any significant adverse impacts.

Compliance with LORS

The applicant performed noise modeling to determine the project's noise impacts on sensitive receptors (SES 2008a, AFC § 5.12.2.2, Table 5.12-7; Data Response 68, Table DR68-1).

As seen in **Noise Table 7**, the project's operational noise level at the nearest sensitive receptor would be no more than 57 dBA L_{eq}. While this value exceeds the noise level limits specified in the San Bernardino County Development Code (55 dBA L_{eq} for residential receptors), it follows the stipulated allowable increase in noise level given that the measured ambient level at that receptor (65 dBA L_{eq}) is greater than the stated limit, and is thus in compliance. The project's operational noise at the second sensitive receptor is below the specified LORS limit.

Noise Table 7
Plant Operating Noise LORS Compliance

Receptor	LORS	LORS Limit	Projected Noise Level (CNEL)
SR1	San Bernardino County Development Code	65 dBA L_{eq}, , Existing Daytime Ambient	57 dBA
SR2		55 dBA L_{eq}, LORS Daytime Requirement	52 dBA

Source: San Bernardino County 2007, and AFC Table 5.12-7.

CEQA Impacts

Power plant noise is unique. Essentially, a power plant operates as a steady, continuous, broadband noise source, unlike the intermittent sounds that comprise the majority of the noise environment. As such, power plant noise contributes to, and becomes part of, the background noise level, or the sound heard when most intermittent noises cease. Where power plant noise is audible, it will tend to define the background noise level. For this reason, staff compares the projected power plant noise to the existing ambient background (L_{90}) noise levels at the affected sensitive receptors. If this comparison identifies a significant adverse impact, then feasible mitigation must be incorporated in the project to reduce or remove the impact.

In many cases, a power plant will be intended to operate around the clock for much of the year. As a solar thermal generating facility, the Calico Solar Project would operate only during daytime hours, typically 15 hours per day during the summer (with fewer hours during the fall, winter, and spring), when sufficient solar insolation is available.

Typically, daytime ambient noise consists of both intermittent and constant noises. The noise that stands out during this time is best represented by the average noise level, or L_{eq}. Staff's evaluation of the above noise surveys shows that the daytime noise environment in the Calico Solar Project area consists of both intermittent and constant noises. Thus, staff compares the project's daytime noise levels to the daytime ambient L_{eq} levels at the project's noise-sensitive receptors.

As seen in **Noise Table 8**, power plant noise levels are predicted to be no greater than 57 dBA L_{eq} and 52 dBA L_{eq} at receptors SR1 and SR2, respectively, during daytime operation.

Noise Table 8
Power Plant Noise Impacts at Nearest Sensitive Receptors

Location	Power Plant Noise Level, dBA L_{eq}[1]	Ambient Noise Level, dBA L_{eq}[2]	Cumulative Noise Level, dBA	Change from Ambient Level dBA
SR1	57	65	66	+1
SR2	52	41	52	+11

[1] Source: SES 2008a AFC Table 5.12-7; and staff calculations.
[2] Source: SES 2008a, AFC Appendix CC-3, Tables CC-3-1 through CC-3-3; SES 2009i, DR 68, table DR68-1; and staff calculations of average of fifteen consecutive daytime hours.

When projected plant noise is added to the daytime ambient value (as calculated by staff), the cumulative level is higher than the ambient value at location SR1 by an inaudible amount (see **Noise Table 8**). The cumulative level at location SR2 is considerably higher, more than 10 dBA, than the ambient value and is thus considered a significant impact. No change in ambient noise at any sensitive receptor at night would result from plant operation.

Because project operating noise would only occur during daytime hours, staff considers an increase of 10 dBA or less to be a less than significant impact. In order for the cumulative level to be no more than 10 dBA over ambient at SR2, the project noise alone must not exceed 51 dBA at location SR2. Thus, the applicant's predicted noise level of 52 dBA must be reduced to 51 dBA, at SR2. Staff proposes Condition of Certification **NOISE-4** to ensure that the project does not exceed the noise levels specified above.

Tonal Noises

One possible source of disturbance would be strong tonal noises. Tonal noises are individual sounds (such as pure tones) that, while not louder than permissible levels, stand out in sound quality. The applicant can avoid the creation of annoying tonal (pure-tone) noises by balancing the noise emissions of various power plant features during plant design. To ensure that tonal noises do not cause annoyance, staff proposes Condition of Certification **NOISE-4**, below.

Linear Facilities

Noise effects from the electrical interconnection line typically do not extend beyond the right-of-way easement of the line and would thus be inaudible to any receptors.

Vibration

Vibration from an operating power plant could be transmitted by two chief means; through the ground (groundborne vibration) and through the air (airborne vibration).

The Calico Solar Project would be essentially comprised of a large number of solar dish generators, the operating components of each consisting of a relatively small reciprocating engine, cooling fans and air compressor. All of these pieces of equipment must be carefully balanced in order to operate. Given the distributive layout of the project, Energy Commission staff believes that the ground borne vibration from the Calico Solar Project would be undetectable by any likely receptor.

Airborne vibration (low frequency noise) can rattle windows and objects on shelves and can rattle the walls of lightweight structures. None of the project equipment is likely to produce low frequency noise; this makes it highly unlikely that the Calico Solar Project would cause perceptible airborne vibration effects.

Worker Effects

The applicant has acknowledged the need to protect plant operating and maintenance workers from noise hazards and has committed to comply with applicable LORS (SES 2008a, AFC § 5.12.2.2). To ensure that plant operation and maintenance workers are, in fact, adequately protected, Energy Commission staff has proposed Condition of Certification **NOISE-5**, below.

C.9.4.3 CEQA LEVEL OF SIGNIFICANCE

For the purposes of CEQA compliance, the significance of construction and operating noise impacts of the proposed project at the nearest sensitive receptors has been determined.

Construction Impacts

As discussed in detail in section C10.4.2 above (under the subsection entitled “Construction Impacts and Mitigation”), the noise level increase at the nearest sensitive receptors resulting from construction of the project (presented in **Noise Table 5**) would be noticeable. However, given the temporary nature of construction noise and the fact that noisy construction activity would be restricted to daytime hours (by both the local LORS and Condition of Certification **NOISE-6**), the impacts due to construction noise are considered less than significant.

Operation Impacts

As discussed in detail in section C10.4.2 above (under the subsection entitled “Operation Impacts and Mitigation”), power plant noise levels are predicted to be less than 52 dBA L_{eq} at receptor SR2 and 57 dBA L_{eq} at receptor SR1 during daytime operation. This would result in an increase of 11 dBA over ambient noise at location SR2, which is considered significant. Staff proposes Condition of Certification **Noise-4** to bring project noise impacts down to 51 dBA at SR2, which, given that operation would only occur during daytime hours, is considered less than significant.

C.9.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the boundaries of Phase 2 of the proposed 850 MW project. This alternative and alternative locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

C.9.5.1 SETTING AND EXISTING CONDITIONS

The reduced acreage alternative would consist of approximately one third as many SunCatchers (11,000 machines), producing 32% as much power (275 MW) and occupying 40% as much land as the proposed project. The project boundary for the alternative would be approximately 2,000 feet further away from SR2, the sensitive receptor that would be most impacted by noise from the proposed project.

C.9.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Given the distributive nature of the operational noise produced by the chosen project technology, the 275 MW alternative would most likely correspond to lower operational noise impacts at the noise receptor located east of the project, SR2; a receptor that faces significant, though mitigable, noise impacts from the proposed project. Operational noise impacts at the receptor south of the project would likely be the same as that of the 850 MW project. Certainly, the noise impacts of the 275 MW alternative would not be greater than the noise impacts from the proposed 850 MW project.

C.9.5.3 CEQA LEVEL OF SIGNIFICANCE

The CEQA Level of Significance of the 275 MW alternative would be unchanged from the proposed project.

C.9.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed 850 MW project. This alternative, the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 2**.

C.9.6.1 SETTING AND EXISTING CONDITIONS

Like the proposed project, this alternative would include numerous groups of 60 Sun Catchers, connected by underground electrical cables. When aggregated at the project substation, the power generated would interconnect to SCE's existing Pisgah 230 kV substation which is located in San Bernardino County approximately 35 miles east of Barstow, California. There would be fewer Sun Catcher groups in this alternative, but the system of aggregation and method of power transmission would be the same as for the proposed project.

C.9.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Avoidance of Donated and Acquired Lands Alternative would consist of 28,800 SunCatchers with a net generating capacity of approximately 720 MW occupying the entire proposed project footprint but avoiding use of any lands that were donated to BLM or acquired by BLM through the Land and Water Conservation Fund program. Like the proposed project, this alternative would transmit power to the grid through the SCE

Pisgah Substation and would require infrastructure similar to the entire proposed 850 MW project, including water storage tanks, transmission line, road access, main services complex, and substation. Additionally, like the proposed project, the Avoidance of Donated and Acquired Lands Alternative would require the 65-mile upgrade to the SCE Lugo-Pisgah transmission line.

The Avoidance of Donated and Acquired Lands Alternative would use approximately 85% of the Sun Catchers, provide 85% of the power generating potential, and would affect approximately 86% of the land (7,050 acres) of the proposed 850MW project. This alternative would require fewer Sun Catcher groups to generate 275 MW. Therefore, it would require fewer distribution facilities and a smaller substation to be built within the project site.

The noise impacts of this alternative on the nearest noise sensitive receptors could potentially be lower than the impacts of the proposed project, depending on the specific placement of the Sun Catchers. Given that the number of Sun Catchers would be fewer and would be contained in the same project boundaries, the noise impacts to nearby sensitive receptors would likely not be greater than the impacts of the proposed project.

C.9.6.3 CEQA LEVEL OF SIGNIFICANCE

The level of significance under CEQA for the Avoidance of Donated and Acquired Lands Alternative would be the same as for the proposed project.

C.9.7 NO PROJECT / NO ACTION ALTERNATIVES

There are three No Project / No Action Alternatives evaluated as follows:

No Project / No Action Alternative #1: No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

The results of the No Project / No Action Alternative would be the following:

- The noise impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another renewable energy project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If the proposed project is not approved, renewable projects would likely be developed on other sites in San Bernardino County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and

State/Federal mandates. For example, there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District.

No Project / No Action Alternative #2: No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

The noise impacts of the proposed project would not occur under this No Project Alternative. If another solar project were constructed at the site, noise impacts could potentially occur; however, without project specific data (such as the type of technology that would be used), staff cannot determine what those noise impacts might be.

No Project / No Action Alternative #3: No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. The noise impacts of the proposed project would not occur under this No Project Alternative.

C.9.8 PROJECT-RELATED FUTURE ACTIONS

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the transmissions interconnection (gen-tie) from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE Right of Ways (ROWs).
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.9.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

Noise is the general term given to unwanted sound. Sound is measured in units of decibels (dB), which is a logarithmic measure of sound power. Sound measurements are corrected to provide an approximate measure of normal human hearing. The correction to sound measurement is called the A-weighted decibel (dBA) scale. This scale provides a general correlation to a human's sensing of noise under normal circumstances. Noise control is regulated for two main purposes, the first is to control public nuisance associated with excessive noise in the public environment. The second control is for worker safety associated with chronic noise exposure that may cause permanent damage to an individual's hearing.

The levels of noise in a given environment are dependent on the amount of human activity and the environmental conditions present. The SCE upgrades project area contains a broad range of environmental conditions, ranging from the urban conditions present in Hesperia at the west end of the project area near Lugo Substation, to undeveloped areas, such as the Ordman and Roman mountain areas in the central and eastern sections of the project area. Typical noise levels for these areas may range from 70 dBA in an urban setting to 35 dBA in a rural setting (CSU 2009).

C.9.8.2 ENVIRONMENTAL IMPACTS

Construction of the upgrades and tower removal would require short-term use of heavy-duty equipment such as trenchers, excavators, drill rigs, cranes, and trucks. Although the new ROW has not been finalized, residences would be located nearby to the transmission line ROW near the Hesperia area. In general, construction work within 200 feet of any location would cause noise levels averaging around 65 dBA, with intermittent peaks up to about 88 dBA. This would be a noticeable (more than 5 dBA) temporary increase in the ambient noise levels near the work that would fade into quiet background noise at distances over one-quarter mile. Although construction noise would be required to comply with local ordinances, it may still be disruptive. The 275 MW Early Interconnection upgrades would be located entirely in rural areas (except for work at the southwestern end of the OPGW installation on Eldorado – Lugo 500 kV transmission line), would have a reduced scope of construction activities, and would occur over a shorter duration than the 850 MW Full Build-Out option.

Project construction activities may last up to 24 months for the 850 MW Full Build-Out option, with activities generally progressing along the length of the transmission and telecomm ROW alignments and around the expanded Pisgah Substation. Noise levels during construction in any given area would increase above background levels. The level of increase would be dependent on the background levels present in the area and the level of activity. Noise levels would vary based on the type of activity occurring and the associated equipment in operation to perform a given task.

Normal operation of the transmission line would include routine inspection of the line and possible repair and maintenance activities. These activities would create short-term increases in noise levels, depending on the level of activity. After installation of the new 500 kV line is complete and the line operational, there may be a change in corona noise levels. Corona noise is a function of the line voltage and the condition of the line. The voltage would be increased, but the condition of the line would be improved, so the net change in corona noise may minor.

In areas of the new ROW, the proposed 500 kV transmission line would cause a permanent noise increase due to the corona effect. The precise location of highest possible corona noise cannot be known until after commencing operation. This is because conductor surface defects, damage, and inconsistencies influence corona. Because the approximately 10 miles of new ROW would be in more developed areas with higher ambient noise, it is likely that the resulting overhead transmission line noise would not violate any local standards or cause a substantial (more than 5 dBA) noise increase for any nearby noise-sensitive receptor.

C.9.8.3 MITIGATION

Implementation of mitigation measures similar to the proposed Conditions of Certification from the Calico Solar Project Staff Assessment/EIS are recommended to minimize potential impacts and adhere to all permit conditions. These conditions would require notification of affected residents of impending construction, establishing a noise complaint resolution process, and limiting noisy construction to daytime hours.

Implementation of mitigation that would require all vehicles and equipment to be equipped with exhaust noise abatement devices, such as sound mufflers, and would require landowner notification are also recommended. To minimize disturbance, mitigation should also be implemented that would limit work to daytime hours and institute timing control for all activities that are known to have high noise levels.

In order to reduce impacts from corona noise, especially to areas around the new 500 kV ROW, SCE should be required to respond to third-party complaints of corona noise generated by operation of the transmission line by investigating the complaints and by implementing feasible and appropriate measures (such as repair damaged conductors, insulators, or other hardware). As part of SCE's repair inspection and maintenance program, the transmission line should be patrolled, and damaged insulators or other transmission line materials, which could cause excessive noise, should be repaired or replaced.

C.9.8.4 CONCLUSION

Implementing mitigation measures discussed above and similar to the Conditions of Certification that are proposed in the Staff Assessment/DEIS for construction of the Calico Solar Project would likely avoid potential significant noise impacts from work associated with the SCE upgrades.

C.9.9 CUMULATIVE IMPACT ANALYSIS

Geographic Extent

The geographic scope for considering cumulative noise impacts on sensitive receptors for this project is the region immediately surrounding those receptors identified in the project application.

Existing Cumulative Conditions

Any existing cumulative noise conditions are included in the existing ambient noise survey conducted at the sensitive receptors.

Future Foreseeable Projects

Foreseeable Projects in the Newberry Springs/Ludlow Area

The applicant has identified two additional potential projects in the vicinity of Calico Solar that might propose a potential for cumulative noise impacts. The applicant plans to propose an additional solar project (SES Solar Three) northwest of the Calico Solar project site and a wind power facility has been proposed to the east of the Calico Solar project site. Since the potential solar project would be located on the opposite side of the Calico Solar project site from the identified noise sensitive receptors, a significant cumulative impact from that project would not be expected. Noise data from the proposed wind power facility are not available for a cumulative impacts assessment; further analysis would be necessary as data becomes available (SES 2008a, AFC § 5.12.3).

Foreseeable Renewable Projects in the California and Arizona Desert

Additional projects outside the immediate vicinity of Calico Solar would not pose a potential for cumulative noise impacts.

C.9.10 COMPLIANCE WITH LORS

Compliance with LORS is discussed in section C.9.4.2 above.

C.9.11 NOTEWORTHY PUBLIC BENEFITS

Staff has not identified and noteworthy public benefits to noise and vibration from the proposed Calico Solar Project.

C.9.12 FACILITY CLOSURE

In the future, upon closure of the Calico Solar Project, all operational noise from the project would cease, and no further adverse noise impacts from operation of the Calico Solar Project would be possible. The remaining potential temporary noise source is the dismantling of the structures and equipment and any site restoration work that may be performed. Since this noise would be similar to that caused by the original construction, it can be treated similarly. That is, noisy work could be performed during daytime hours, with machinery and equipment properly equipped with mufflers. Any noise LORS that were in existence at that time would apply. Applicable conditions of certification included in the Energy Commission decision would also apply unless modified.

C.9.13 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

NOISE-1 At least 15 days prior to the start of ground disturbance, the project owner shall notify all residents within 2miles of the site, by mail or other effective means, of the commencement of project construction. At the same time, the project owner shall establish a telephone number for use by the public to report any undesirable noise conditions associated with the construction and operation of the project and include that telephone number in the above notice. If the telephone is not staffed 24 hours per day, the project owner shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This telephone number shall be posted at the project site during construction in a manner visible to passersby. This telephone number shall be maintained until the project has been operational for at least one year.

Verification: Prior to ground disturbance, the project owner shall transmit to the Compliance Project Manager (CPM) a statement, signed by the project owner's project manager, stating that the above notification has been performed and describing the method of that notification, verifying that the telephone number has been established and posted at the site, and giving that telephone number.

NOISE COMPLAINT PROCESS

NOISE-2 Throughout the construction and operation of the project, the project owner shall document, investigate, evaluate, and attempt to resolve all project-related noise complaints. The project owner or authorized agent shall:

- Use the Noise Complaint Resolution Form (below), or a functionally equivalent procedure acceptable to the CPM, to document and respond to each noise complaint;
- Attempt to contact the person(s) making the noise complaint within 24 hours;
- Conduct an investigation to determine the source of noise related to the complaint;
- Take all feasible measures to reduce the noise at its source if the noise is project related; and
- Submit a report documenting the complaint and the actions taken. The report shall include: a complaint summary, including final results of noise reduction efforts, and if obtainable, a signed statement by the complainant stating that the noise problem is resolved to the complainant's satisfaction.

Verification: Within 5 days of receiving a noise complaint, the project owner shall file a copy of the Noise Complaint Resolution Form with the CPM, documenting the resolution of the complaint. If mitigation is required to resolve a complaint, and the complaint is not resolved within a 3-day period, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is implemented.

NOISE-3 The project owner shall submit to the CPM for review and approval a noise control program and a statement, signed by the project owner's project manager, verifying that the noise control program will be implemented throughout construction of the project. The noise control program shall be used to reduce employee exposure to high noise levels during construction and also to comply with applicable OSHA and Cal/OSHA standards.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit to the CPM the noise control program and the project owner's project manager's signed statement. The project owner shall make the program available to Cal/OSHA upon request.

NOISE RESTRICTIONS

NOISE-4 The project design and implementation shall include appropriate noise mitigation measures adequate to ensure that the operation of the project will not cause the noise levels due to plant operation alone to exceed an average of 51 dBA L_{eq} measured at or near monitoring location SR2, and an average of 57 dBA L_{eq} measured at or near monitoring location SR1.

No new pure-tone components shall be caused by the project. No single piece of equipment shall be allowed to stand out as a source of noise that draws legitimate complaints.

A. When the project first achieves a sustained output of 85% or greater of rated capacity, the project owner shall conduct a 25-hour community noise survey at monitoring location SR2, or at a closer location acceptable to the

CPM. This survey shall also include measurement of one-third octave band sound pressure levels to ensure that no new pure-tone noise components have been caused by the project.

During the period of this survey, the project owner shall also conduct a short-term survey of noise at monitoring location SL1 or at a closer location acceptable to the CPM. The short-term noise measurements at this location shall be conducted during morning, early afternoon, and evening hours.

The measurement of power plant noise for the purposes of demonstrating compliance with this condition of certification may alternatively be made at a location, acceptable to the CPM, closer to the plant (e.g., 400 feet from the plant boundary) and this measured level then mathematically extrapolated to determine the plant noise contribution at the affected residence. The character of the plant noise shall be evaluated at the affected receptor locations to determine the presence of pure tones or other dominant sources of plant noise.

B. If the results from the noise survey indicate that the power plant noise at the affected receptor sites exceeds the above specified values, mitigation measures shall be implemented to reduce noise to a level of compliance with these limits.

C. If the results from the noise survey indicate that pure tones are present, mitigation measures shall be implemented to eliminate the pure tones.

Verification: The survey shall take place within 30 days of the project first achieving a sustained output of 85% or greater of rated capacity. Within 15 days after completing the survey, the project owner shall submit a summary report of the survey to the CPM. Included in the survey report will be a description of any additional mitigation measures necessary to achieve compliance with the above listed noise limit, and a schedule, subject to CPM approval, for implementing these measures. When these measures are in place, the project owner shall repeat the noise survey.

Within 15 days of completion of the new survey, the project owner shall submit to the CPM a summary report of the new noise survey, performed as described above and showing compliance with this condition.

NOISE-5 Following the project's first achieving a sustained output of 80% or greater of rated capacity, the project owner shall conduct an occupational noise survey to identify the noise hazardous areas in the facility.

The survey shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations sections 5095–5099 and Title 29, Code of Federal Regulations section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure.

The project owner shall prepare a report of the survey results and, if necessary, identify proposed mitigation measures that will be employed to comply with the applicable California and federal regulations.

Verification: Within 30 days after completing the survey, the project owner shall submit the noise survey report to the CPM. The project owner shall make the report available to OSHA and Cal/OSHA upon request.

CONSTRUCTION TIME RESTRICTIONS

NOISE-6 Heavy equipment operation, including pile driving, and noisy construction work relating to any project features shall be restricted to the times of day delineated below, unless a variance has been issued by San Bernardino County for limited nighttime construction:

Mondays through Saturdays:	7:00 a.m. to 7:00 p.m.
Sundays and Holidays:	No Construction Allowed

Haul trucks and other engine-powered equipment shall be equipped with mufflers that meet all applicable regulations. Haul trucks shall be operated in accordance with posted speed limits. Truck engine exhaust brake use shall be limited to emergencies.

Verification: Prior to ground disturbance, the project owner shall transmit to the CPM a statement acknowledging that the above restrictions will be observed throughout the construction of the project. Prior to ground disturbance, a copy of the variance issued by the county, if one should be issued, shall be submitted to the CPM for review and approval.

C.9.14 CONCLUSIONS

Staff concludes that the Calico Solar Project, if built and operated in conformance with the proposed conditions of certification, would comply with all applicable noise and vibration LORS and would produce no significant adverse noise impacts on people within the project area, directly, indirectly, or cumulatively.

EXHIBIT 1 - NOISE COMPLAINT RESOLUTION FORM

Calico Solar Project
(08-AFC-13)

NOISE COMPLAINT LOG NUMBER ________________________

Complainant's name and address:

Phone number: ________________________

Date complaint received: ________________________
Time complaint received: ________________________

Nature of noise complaint:

Definition of problem after investigation by plant personnel:

Date complainant first contacted: ________________________

Initial noise levels at 3 feet from noise source _________ dBA Date: _____________

Initial noise levels at complainant's property: __________ dBA Date: ____________

Final noise levels at 3 feet from noise source: ________ dBA Date: _____________

Final noise levels at complainant's property: __________ dBA Date: ____________

Description of corrective measures taken:

Complainant's signature: ________________________ Date: ____________

Approximate installed cost of corrective measures: $ ____________
Date installation completed: ____________
Date first letter sent to complainant: ____________ (copy attached)
Date final letter sent to complainant: ____________ (copy attached)

This information is certified to be correct:

Plant Manager's Signature: ________________________

(Attach additional pages and supporting documentation, as required).

C.9.15 REFERENCES

San Bernardino 2007. San Bernardino County General Plan.

San Bernardino County 2007. San Bernardino County Development Code, Title 8, Division 3, Chapter 83.01, Section 80: Noise. Effective April 12, 2007.

SES 2008a – Stirling Energy Systems/R. Liden (tn: 49181). Application for Certification, dated December 1, 2008. Submitted to CEC/Docket Unit on December 1, 2008.

SES 2009i - Stirling Energy Systems/C. Champion (tn: 52466). Applicant's Responses to Energy Commission and Bureau of Land Management's Data Requests Set 1, Part 1, dated July 17, 2009. Submitted to CEC/Docket Unit on July 20, 2009.

NOISE APPENDIX A
FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

To describe noise environments and to assess impacts on noise sensitive area, a frequency weighting measure, which simulates human perception, is customarily used. It has been found that “A-weighting” of sound intensities best reflects the human ear’s reduced sensitivity to low frequencies and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. Decibels are logarithmic units that conveniently compare the wide range of sound intensities to which the human ear is sensitive. **Noise Table A1** provides a description of technical terms related to noise.

Noise environments and consequences of human activities are usually well represented by an equivalent A-weighted sound level over a given time period (L_{eq}), or by average day and night A-weighted sound levels with a nighttime weighting of 10 dBA (L_{dn}). Noise levels are generally considered low when ambient levels are below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. Outdoor day-night sound levels vary over 50 dBA depending on the specific type of land use. Typical L_{dn} values might be 35 dBA for a wilderness area, 50 dBA for a small town or wooded residential area, 65 to 75 dBA for a major metropolis downtown (e.g., San Francisco), and 80 to 85 dBA near a freeway or airport. Although people often accept the higher levels associated with very noisy urban residential and residential-commercial zones, those higher levels nevertheless are considered to be levels of noise adverse to public health.

Various environments can be characterized by noise levels that are generally considered acceptable or unacceptable. Lower levels are expected in rural or suburban areas than would be expected for commercial or industrial zones. Nighttime ambient levels in urban environments are about 7 decibels lower than the corresponding average daytime levels. The day-to-night difference in rural areas away from roads and other human activity can be considerably less. Areas with full-time human occupation that are subject to nighttime noise, which does not decrease relative to daytime levels, are often considered objectionable. Noise levels above 45 dBA at night can result in the onset of sleep interference effects. At 70 dBA, sleep interference effects become considerable (U.S. Environmental Protection Agency, Effects of Noise on People, December 31, 1971).

To help the reader understand the concept of noise in decibels (dBA), **Noise Table A2** illustrates common noises and their associated sound levels, in dBA.

Noise Table A1
Definition of Some Technical Terms Related to Noise

Terms	Definitions
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this testimony are A-weighted.
L_{10}, L_{50}, & L_{90}	The A-weighted noise levels that are exceeded 10%, 50%, and 90% of the time, respectively, during the measurement period. L_{90} is generally taken as the background noise level.
Equivalent Noise Level, L_{eq}	The energy average A-weighted noise level during the noise level measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 4.8 decibels to levels in the evening from 7 p.m. to 10 p.m., and after addition of 10 decibels to sound levels in the night between 10 p.m. and 7 a.m.
Day-Night Level, L_{dn} or DNL	The Average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10 p.m. and 7 a.m.
Ambient Noise Level	The composite of noise from all sources, near and far. The normal or existing level of environmental noise at a given location.
Intrusive Noise	That noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.
Pure Tone	A pure tone is defined by the Model Community Noise Control Ordinance as existing if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the two contiguous bands by 5 decibels (dB) for center frequencies of 500 Hz and above, or by 8 dB for center frequencies between 160 Hz and 400 Hz, or by 15 dB for center frequencies less than or equal to 125 Hz.

Source: Guidelines for the Preparation and Content of Noise Elements of the General Plan, Model Community Noise Control Ordinance, California Department of Health Services 1976, 1977.

Noise Table A2
Typical Environmental and Industry Sound Levels

Noise Source (at distance)	A-Weighted Sound Level in Decibels (dBA)	Noise Environment	Subjective Impression
Civil Defense Siren (100')	140-130		Pain Threshold
Jet Takeoff (200')	120		Very Loud
Very Loud Music	110	Rock Music Concert	
Pile Driver (50')	100		
Ambulance Siren (100')	90	Boiler Room	
Freight Cars (50')	85		
Pneumatic Drill (50')	80	Printing Press Kitchen with Garbage Disposal Running	Loud
Freeway (100')	70		Moderately Loud
Vacuum Cleaner (100')	60	Data Processing Center Department Store/Office	
Light Traffic (100')	50	Private Business Office	
Large Transformer (200')	40		Quiet
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing

Source: Handbook of Noise Measurement, Arnold P.G. Peterson, 1980

Subjective Response to Noise

The adverse effects of noise on people can be classified into three general categories:

- Subjective effects of annoyance, nuisance, dissatisfaction.
- Interference with activities such as speech, sleep, and learning.
- Physiological effects such as anxiety or hearing loss.

The sound levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Workers in industrial plants can experience noise effects in the last category. There is no completely satisfactory way to measure the subjective effects of noise or of the corresponding reactions of annoyance and dissatisfaction, primarily because of the wide variation in individual tolerance of noise.

One way to determine a person's subjective reaction to a new noise is to compare the level of the existing (background) noise, to which one has become accustomed, with the level of the new noise. In general, the more the level or the tonal variations of a new noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

With regard to increases in A-weighted noise levels, knowledge of the following relationships can be helpful in understanding the significance of human exposure to noise.

1. Except under special conditions, a change in sound level of 1 dB cannot be perceived.
2. Outside of the laboratory, a 3-dB change is considered a barely noticeable difference.
3. A change in level of at least 5 dB is required before any noticeable change in community response would be expected.
4. A 10-dB change is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response (Kryter, Karl D., The Effects of Noise on Man, 1970).

Combination of Sound Levels

People perceive both the level and frequency of sound in a non-linear way. A doubling of sound energy (for instance, from two identical automobiles passing simultaneously) creates a 3-dB increase (i.e., the resultant sound level is the sound level from a single passing automobile plus 3 dB). **Noise Table A3** indicates the rules for decibel addition used in community noise prediction.

Noise Table A3
Addition of Decibel Values

When two decibel values differ by:	Add the following amount to the larger value
0 to 1 dB	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0
Figures in this table are accurate to ± 1 dB.	

Source: Architectural Acoustics, M. David Egan, 1988.

Sound and Distance

Doubling the distance from a noise source reduces the sound pressure level by 6 dB.

Increasing the distance from a noise source 10 times reduces the sound pressure level by 20 dB.

Worker Protection

OSHA noise regulations are designed to protect workers against the effects of noise exposure and list permissible noise level exposure as a function of the amount of time to which the worker is exposed, as shown in **Noise Table A4**.

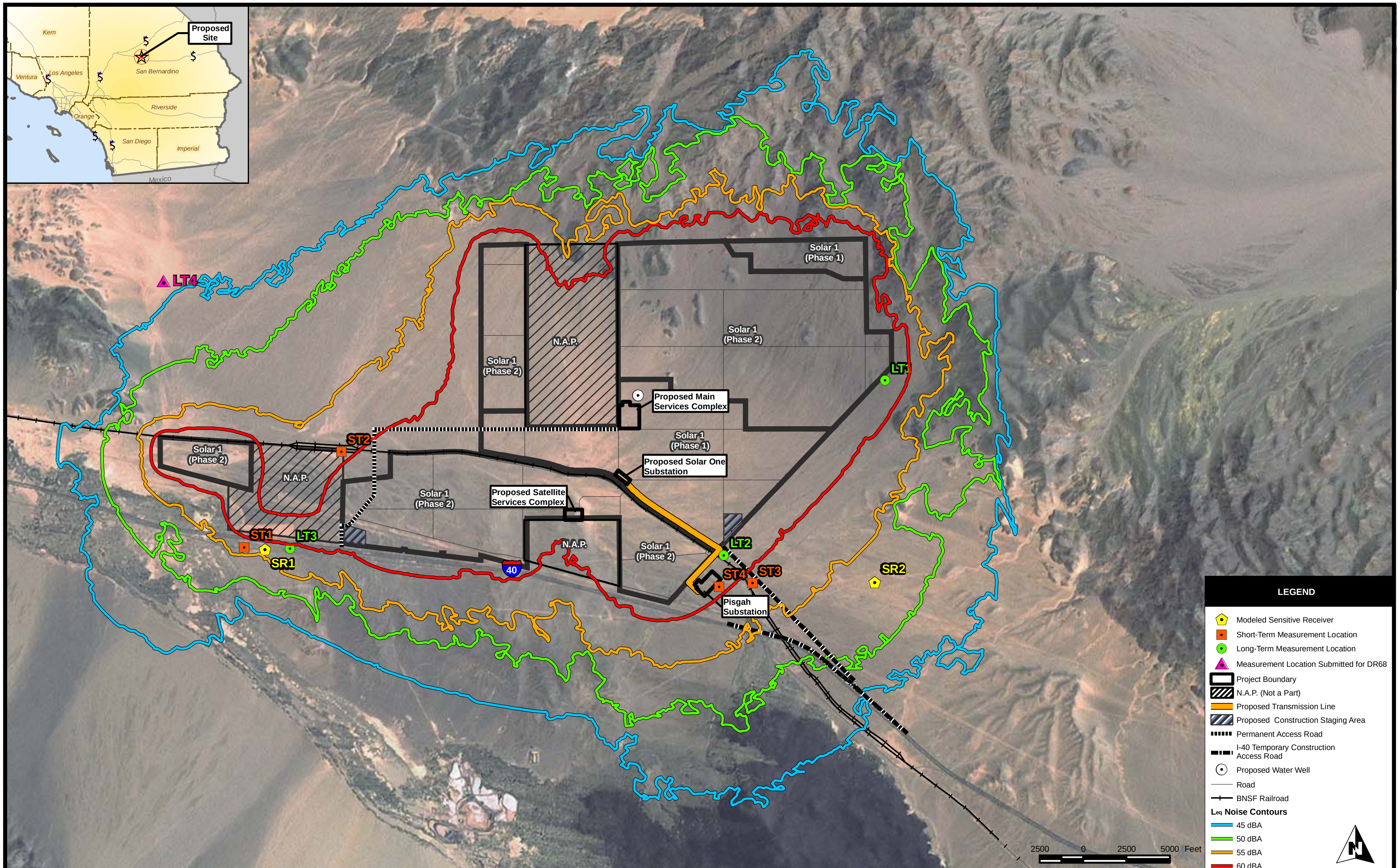
Noise Table A4
OSHA Worker Noise Exposure Standards

Duration of Noise (Hrs/day)	A-Weighted Noise Level (dBA)
8.0	90
6.0	92
4.0	95
3.0	97
2.0	100
1.5	102
1.0	105
0.5	110
0.25	115

Source: 29 CFR § 1910.95.

NOISE AND VIBRATION - FIGURE 1

Calico Solar Project - Sound Measurment Location and L_{eq} Noise Contours



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: AFC Figure 5.12-1

C.10 – SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

Testimony of Kristin Ford

C.10.1 SUMMARY OF CONCLUSIONS

Energy Commission staff (hereafter jointly referred to as “staff”) have reviewed the Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) in accordance with the requirements of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). With respect to CEQA and NEPA, staff concludes that the Calico Solar Project would not under CEQA cause a significant adverse direct or indirect impact or contribute to a cumulative socioeconomic impact on the area’s housing, schools, parks and recreation, police, emergency medical services, or hospitals, because the project’s construction and operation workforce currently resides in the regional or local labor market area. Staff also concludes that the project would not require the construction of new or altered public facilities.

The construction and operation of the proposed project would not result in any disproportionate socioeconomic impacts to low-income or minority populations. Gross public benefits from the project include capital costs, construction and operation payroll, and sales tax from construction and operation spending. No Conditions of Certification are proposed.

Please refer to the **LAND USE, RECREATION, AND WILDERNESS** section of this document for further analysis of recreation impacts.

C.10.2 INTRODUCTION

Staff’s socioeconomics impact analysis evaluates the project-induced changes on community services and/or infrastructure, and related community issues such as environmental justice. Staff discusses the estimated beneficial impacts of the construction and operation of the Calico Solar Project and other related economic impacts.

C.10.3 METHODOLGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The analysis of proposed project effects must comply with both California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) requirements given the respective power plant licensing and land jurisdictions of the California Energy Commission and U.S. Bureau of Land Management (BLM). CEQA requires that the significance of individual effects be determined by the Lead Agency; however, the use of specific significance criteria is not required by NEPA.

Because this document is intended to meet the requirements of both NEPA and CEQA, the methodology used for determining environmental impacts of the proposed project includes a consideration of guidance provided by both laws.

CEQA requires a list of criteria that are used to determine the significance of identified impacts. A significant impact is defined by CEQA as “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project” (State CEQA Guidelines Section 15382).

In comparison, NEPA states that “‘Significantly’ as used in NEPA requires considerations of both context and intensity” (40 CFR 1508.27). Therefore, thresholds serve as a benchmark for determining if a project action would result in a significant adverse environmental impact when evaluated against the baseline. NEPA requires that an Environmental Impact Statement (EIS) is prepared when the proposed federal action (project) as a whole has the potential to “significantly affect the quality of the human environment.”

The socioeconomic resource areas evaluated by staff are based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines. Staff’s assessment of impacts on population, housing, police protection, schools, emergency medical services, and parks and recreation are based on professional judgments, input from local and state agencies, and the industry-accepted two-hour commute range for construction workers.

In addition, staff’s evaluation of the proposed project’s effects on socioeconomic resources includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27.

Effects of the proposed project on socioeconomic resources (and in compliance with both CEQA and NEPA) have been determined using the thresholds listed below.

According to Appendix G of the CEQA guidelines, a project may have a significant effect on population, housing, and public services if the project will:

- Induce substantial population growth in an area, either directly or indirectly;
- Displace substantial numbers of people and/or existing housing, necessitating the construction of replacement housing elsewhere; or
- Adversely impact acceptable levels of service for fire and police protection, schools, parks and recreation, and other public facilities.

A socioeconomic analysis looks at beneficial impacts on local finances from property and sales taxes as well as potential adverse impacts on public services. To determine if a project would have any significant impacts, staff analyzes whether the current status of these community services and capacities can absorb the project- related impacts in each of these areas. A project’s property taxes, sales tax, local school impact fees, or development fees can help local governments augment public services required to meet project needs. If the project’s impacts could appreciably strain or degrade these services, staff considers this to be a significant adverse impact and would propose mitigation.

In this analysis, staff used fixed percentage criteria for evaluating demography for environmental justice. Impacts on housing, schools, medical services, law enforcement, parks and recreation, and cumulative impacts are based on professional judgments or input from local and state agencies. Substantial employment of people coming from regions outside the study area has the potential to create significant adverse socioeconomic impacts. Significance criteria for subject areas such as utilities, fire protection, water use, and wastewater disposal are identified in the **SOIL AND WATER RESOURCES**, **RELIABILITY**, **WORKER SAFETY AND FIRE PROTECTION**, and **WASTE MANAGEMENT** sections of this staff assessment/draft environmental impact statement (SA/DEIS).

Laws, Ordinances, Regulations, and Standards

The following table contains all applicable socioeconomic laws, ordinances, regulations, and standards (LORS).

C.10.4 PROPOSED PROJECT

C.10.4.1 SETTING AND EXISTING CONDITIONS

The project would be located in an undeveloped area of San Bernardino County, north of Interstate 40, approximately 37 miles east of Barstow. The 850 MW project site is currently vacant and located within the Mojave Desert.

The 850 MW project would require approximately 8,230 acres of land to be authorized under a Right of Way (ROW) permit from the Bureau of Land Management (BLM). There would be approximately 2,246 acres of private land within the project boundary (3-5, Calico, AFC). The project site is approximately 17 miles east of Newberry Springs, and 57 miles northeast of Victorville, all of which are located in San Bernardino County. The project site is approximately 115 miles east of Los Angeles, which is located in Los Angeles County.

Socioeconomics Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Emergency Economic Stabilization Act of 2008 (P.L. 110-343) Business Solar Investment Tax Credit (IR Code	Extends the 30% investment tax credit (ITC) for solar energy property for eight years through December 31, 2016. The bill allows the ITC to be used to offset both regular and alternative minimum tax (AMT) and waives the public utility exception of current law (i.e., permits utilities to directly invest in solar facilities and claim the ITC). The five-year accelerated depreciation allowance for solar property is permanent and unaffected by passage of the eight-year extension of the solar ITC.
State	
California Education Code, Section 17620	The governing board of any school district is authorized to levy a fee, charge, dedication, or other requirement for the purpose of funding the construction or reconstruction of school facilities.
California Government Code, Sections 65996-65997	Except for a fee, charge, dedication, or other requirement authorized under Section 17620 of the Education Code, state and local public agencies may not impose fees, charges, or other financial requirements to offset the cost for school facilities.
California Revenue and Taxation Code Section 70-74.7	Property taxes are not assessed on solar facilities. Assembly Bill 1451 extended the current property tax exclusion for new construction of solar energy systems to January 1, 2017.

The applicant expects construction of the Calico Solar Project would take place in two phases and employ and average of 400 workers a month for the approximately four-year construction period. Phase I of the proposed project will consist of up to 20,000 Sun Catchers configured in 333 (1.5 MW) solar groups of 60 SunCatchers per group that will have a net nominal generating capacity of 500 MW. Phase II would expand the proposed project to 34,000 SunCatchers configured in 567 (1.5 MW) solar groups with a total net generating capacity of 850 MW. Monthly construction employment would peak at a maximum of 700 workers in the seventh month, with all other months below 700 workers. Construction for the proposed project would be for a 41-month period (5.10-16, Calico, AFC). At operation, the proposed project would employ approximately 180 full time workers, with maintenance activities occurring 7 days a week, 24 hours a day (5.10-26, Calico, AFC).

In 2008, the population of Barstow/Victorville was 23,952 and 107,408 respectively. San Bernardino County had a total population of 1,710,139 in 2000 and 2,055,766 in 2008 (5.10-3, Calico, AFC).

The unemployment rate for San Bernardino County and the incorporated communities in the vicinity of the proposed project in September 2008 ranged from 8.5% in San Bernardino County and 13% in Adelanto. The State of California unemployment rate was 7.5% in September 2008 (5.10-9, Calico, AFC).

ENVIRONMENTAL JUSTICE/DEMOGRAPHIC SCREENING

Executive Order 12898, “Federal Actions to address environmental justice in Minority Populations and Low-Income Populations,” focuses federal attention on the environment and human health conditions of minority communities and calls on agencies to achieve environmental justice as part of this mission. The order requires the US Environmental Protection Agency (EPA) and all other federal agencies (as well as state agencies receiving federal funds) to develop strategies to address this issue. The agencies are required to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations.

Civil Rights Act of 1964, Public Law 88-352, 78 Stat.241 (Codified as amended in scattered sections of 42 U.S.C.) Title VI of the Civil Rights Act prohibits discrimination on the basis of race, color, or national programs in all programs or activities receiving federal financial assistance.

California law defines environmental justice as “the fair treatment of people of all races, cultures and income with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies” (Government Code Section 65040.12 and Public Resources Code Section 72000).

All Departments, Boards, Commissions, Conservancies and Special Programs of the Resources Agency must consider environmental justice in their decision-making process if their actions have an impact on the environment, environmental laws, or policies. Such actions that require environmental justice consideration may include:

- Adopting regulations;
- Enforcing environmental laws or regulations;
- Making discretionary decisions of taking actions that affect the environment;
- Providing funding for activities affecting the environment; and
- Interacting with the public on environmental issues.

In considering environmental justice in energy siting cases, staff uses a demographic screening analysis to determine whether a low-income and/or minority population exists within the potentially affected area of the proposed site. The potentially affected area consists of a 6-mile radius of the site and is consistent with air quality modeling of the range of a project's air quality impacts. The demographic screening is based on information contained in two documents: *Environmental Justice: Guidance Under the National Environmental Policy Act* (Council on Environmental Quality, December, 1997) and *Guidance for Incorporating Environmental Justice Concerns in EPA's Compliance Analyses* (U.S. Environmental Protection Agency, April, 1998). The screening process relies on Year 2000 U.S. Census data to determine the presence of minority and below-poverty-level populations.

In addition to the demographic screening analysis, staff follows the steps recommended by the U.S. EPA's guidance documents which are outreach and involvement, and if warranted, a detailed examination of the distribution of impacts on segments of the population.

When **Socioeconomics Figure 1** shows a minority population present within the 6-mile radius, staff follows each of the above steps for the following 11 sections in the SA/DEIS: Air Quality, Hazardous Materials, Land Use, Noise, Public Health, Socioeconomics, Soils and Water, Traffic and Transportation, Transmission Line Safety/Nuisance, Visual Resources, and Waste Management. When a minority population is present, over the course of the analysis for each of the 11 areas, staff considered potential impacts and mitigation measures, significance, and whether there would be a significant impact on an environmental justice population.

Minority Populations

According to *Environmental Justice: Guidance Under the National Environmental Policy Act*, minority individuals are defined as members of the following groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.

A minority population, for the purposes of environmental justice, is identified when the minority population of the potentially affected area is greater than 50% or meaningfully greater than the percentage of the minority population in the general population or other appropriate unit of geographical analysis.

The total population within the 6-mile radius of the proposed site is 1043 persons and the total minority population is 20 persons, or about 25% of the total population (see **Socioeconomics Figure 1**).

Below-Poverty-Level Populations

Staff also identified the below-poverty-level population based on Year 2000 U.S. Census block group data within a 6-mile radius of the project site. The below-poverty-level population within a 6-mile radius of the Calico Solar Project consists of 191 people or about 18.31% of the total population in that area. Staff expects to have Census 2010 data by early 2011.

C.10.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The socioeconomic resource areas evaluated by staff are based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines and shown in **Socioeconomics Table 2**. Staff's assessment of impacts on population, housing, emergency medical services, police protection, schools, emergency medical services, and parks and recreation, are based on professional judgments, input from local and state agencies, and the industry-accepted two-hour commute range for construction workers. Criteria for subject areas such as utilities, fire protection, water supply, and wastewater disposal are analyzed in the **RELIABILITY**, **WORKER SAFETY AND FIRE PROTECTION**, and **WATER RESOURCES** sections of this document.

DIRECT/INDIRECT/INDUCED IMPACTS

Induce Substantial Population Growth

For the purpose of this analysis, staff defines "induce substantial population growth" as workers permanently moving into the project area because of project construction and operation, thereby encouraging construction of new homes or extension of roads or other infrastructure. To determine whether the project would induce population growth, staff analyzes the availability of the local workforce and the population within the region. Staff defines "local workforce" as the Riverside–San Bernardino–Ontario and the Los Angeles Metropolitan Statistical Areas MSA.

Staff used the San Bernardino and Riverside County labor market area (and two-hour commute of project site) for its evaluation of construction worker availability. Project construction would take place in two phases and employ an average of 700 workers a month for approximately four-year construction period. Month construction employment would peak at a maximum of 400 workers in month seven of the proposed schedule, with a total of 41 construction months (5.10-16, Calico, AFC). After construction, the project would employ approximately 180 employees.

Socioeconomics Table 2 shows that the total labor by skill in the Riverside–San Bernardino–Ontario and Los Angeles County MSAs is more than adequate to provide construction labor for the Calico Solar Project.

Socioeconomics Table 2
Total Labor by Skill in San Bernardino and Los Angeles Counties
Annual Average for 2016

Trade	San Bernardino County MSA	Los Angeles County MSA	Peak Number of Workers for Project Construction by Craft
Carpenters	32,390	30,050	40
Concrete Crews	4,690	4,530	42
Electricians	7,600	13,700	106
Ironworkers	1,090	770	38
Laborers	32,080	34,810	136
Miscellaneous Crews[1]	4,960	8,610	10
Operators	5,460	4,780	104
Plumbers	5,330	12,900	26
SES Technicians	N/A	N/A	32
SunCatcher Assemblers	990[1]	1,350[1,3]	64
SunCatcher Electricians	7,600[3]	13,700[3]	16[3]
SunCatcher Ironworkers	1,090[3]	770[3]	32[3]
SunCatcher Laborers	32,080[3]	34,810[3]	16[3]
SunCatcher Material Handlers	990[1,3]	1,350[1,3]	16[3]
SunCatcher Operators	5,460[3]	4,780[3]	8[3]
SunCatcher Teamsters	N/A	N/A	12[3]
SunCatcher Technicians	1,150[3]	5,130[3]	32[3]
Teamsters	N/A	N/A	58[3]
Technicians[2]	1,150	5,130	6[3]

Notes:
1 - Other Construction and Related Workers
2 - Electrical and Electronic Engineering Technicians
3 - The applicant has indicated that local resources, hires and contractors would be used to the best extent practical. However, some positions would potentially need to be more specialized that may come from internal staff or outside the area.
Source: EDD Labor Market Information; Occupational Employment Projections 2006-2016., Calico Solar AFC, 5.10-17, Table 5.10-10

Because the majority of the construction workforce currently resides within San Bernardino and Riverside Counties, construction, and operation of the project would have little impact with respect to inducing substantial population growth. For operations, the workforce is modest (180 workers) and most would reside within one hour commute of the proposed project site (5.10-26, Calico, AFC). Staff concludes that inducement of substantial population growth either directly or indirectly by the Calico Solar Project, under CEQA would not be significant or adverse.

Housing Supply

There are approximately 1,000 housing units available in the Barstow (2008) vicinity including single-family homes apartments and mobile homes available for rent. Additionally, there are approximately 1,050 housing units available for rent in Victorville (2008).

There are 49 motels with a total of approximately 4,000 rooms located in Barstow. A total of 321 hotels and approximately 21,500 hotel rooms were identified within a two-hour drive of the project site (Table 5.10-4, Calico, AFC). Based on the average annual motel and hotel occupancy rate in San Bernardino and Riverside Counties in 2008, on average, approximately 500 unoccupied motel and hotel rooms are available for rent in Barstow, with an additional 400 unoccupied motel and hotel rooms available elsewhere with a one hour drive of the site (primarily Victorville) (5.10-23, Calico, AFC).

Because of the large labor force within commuting distance of the project, staff expects the majority of construction and operations workers would commute to the project daily from their existing residences, and those that might in-migrate with their families could settle in the Barstow area with no expected adverse impacts on the local infrastructure or community services. The project would have 180 full-time employees; the majority of whom are expected to already reside in the area; the applicant expects 20 operational jobs recruited from outside the immediate project area.

The project would be located primarily on BLM-administered land in a relatively remote and largely uninhabited area and construction and operation of the project is not expected to adversely impact existing housing supply.

Displace Existing Housing and Substantial Numbers of People

The approximately 8,230-acre proposed site is located in an undeveloped area of San Bernardino County. The project site would be located approximately 37 miles east of Barstow, California and north of Interstate 40 (I-40). The proposed project is located primarily on Bureau of Land Management (BLM). The area is open, undeveloped land within the Mojave Desert (5.9-1, Calico, AFC).

The lands located within the project boundary are designated multi-use class M (moderate) by the BLM, and are zoned Resource Conservation by San Bernardino County. The Resource Conservation covers all the county lands within one mile of the proposed project. Land uses immediately adjacent to the proposed project site include transportation use, open space, and resource conservation. Newberry Springs, located 17 miles from the project site consists of single-family homes, mobile homes, recreational vehicle parts and commercial lots. One rural residence is located approximately 2 miles east and southwest (5.9-3, Calico, AFC).

Because of the large labor force within commuting distance of the project, staff expects the majority of construction workers would commute to the project daily from their existing residences. No new housing construction would be required. The project would have 180 new full-time employees; the applicant expects all 180 employees would be hired within commuting distance of the project. Given the labor forces in San Bernardino County and surrounding counties within commuting distance of the project, staff does not expect employees would relocated to the immediate project area.

Housing in San Bernardino County was at an 11.6% (2008) vacancy rate. The geographic area of Adelanto, Apple Valley, Barstow, Hesperia and Victorville was at 15.1%, 8.4%, 17.1%, 6.5%, and 7.7%, respectively (Table 5.10-3, Calico, AFC). Operation of the Calico Solar Project would require 180 new employees. The applicant estimates that operation of the project would result in 20 workers permanently relocating to the project area. The potential increase of 20 workers would have negligible effects on existing housing. Staff concludes that the proposed project would not displace any people or necessitate construction of replacement housing elsewhere

Result in Substantial Physical Impacts to Government Facilities

Emergency Medical Services

Emergency services would be coordinated with the nearby fire department of Newberry Springs, California, and a hospital in Barstow, California. The San Bernardino County Fire Department indicated in the AFC, (5.10-31) that additional resources may be required to enable the Fire Department to provide adequate fire protection and emergency response services during construction and operation of the project. The applicant states in the AFC (5.10-36) they would work with the local fire protection and emergency response service providers to address the need for additional resources during the construction and operation phases of the project.

The city of Barstow and the county of San Bernardino, Hazardous Materials Units would respond to any hazardous material calls from the project site as part of the county-wide San Bernardino County Intra-agency Hazardous Materials Response Team. The Hazardous Materials team consists of approximately 150 members and is a Level A, which is capable of handling chemical, biological, radiological and nuclear responses. Response times from the City of Barstow Hazardous Materials unit would be approximately 35 minutes. The closest County Hazardous Materials unit is located at Station 322 in Adelanto, and the response time to the project site would be approximately 90 minutes (5.10-14, Calico, AFC).

An off-site medical clinic would be contracted to set up nonemergency physician referrals. First aid kits and fire extinguishers would be provided around the site and in offices, and would be regularly inspected and maintained by qualified personnel. Safety personnel trained in first aid would be part of the construction staff. An Emergency Medical Technician or other highly trained medical professional would be assigned to the site to provide advanced injury care. In addition, all foremen and supervisors would be given first aid training (5.17-14, Calico, AFC).

The Barstow Community Hospital is the closest hospital to the project site. The hospital has an emergency room onsite; however, does not have a trauma level emergency room. An ambulance would take approximately 20 to 30 minutes from project site to the Barstow Community Hospital. Loma Linda University Medical Center would treat all major life threatening injuries. A helicopter flight from the project site to Loma Linda University Medical Center would take approximately 20 to 30 minutes. The medical center is a full service hospital with a level 1 trauma center and is capable of treating almost any injury (5.10-14, Calico, AFC).

The applicant states in the **WORKER SAFETY AND FIRE PROTECTION** section of the SA/DEIS that several programs would be required for construction and operation workers and would address health and safety, injury and illness prevention, personal protection equipment, fire protection and prevention, and hazardous materials handling and storage. As stated in the **WORKER SAFETY AND FIRE PROTECTION** section of this document, the applicant (or construction contractor) would ensure compliance with the all federal, state, and local health standards that pertain to worker health and safety and first-aid trained safety personnel would comprise part of the construction staff.

As previously discussed above, the applicant states in the AFC that the San Bernardino Fire Department may need additional resources to provide adequate fire protection and emergency response services during construction and operation of the project. However, the applicant's proposed safety procedures and employee training would minimize potential unsafe work conditions and the need for outside emergency medical response. Staff concludes that the emergency medical services provided by the local fire department and hospitals, in addition with the trained medical professional's located onsite, would be adequate during construction and operation of the proposed 850 MW project.

Law Enforcement

As stated in the AFC and verified by staff (http://www.sbcounty.gov/sheriff), the project falls under the jurisdiction of the San Bernardino County Sheriff's Department. The closest sheriff's office is located in Barstow. The office employs approximately 60 individuals; 35 deputies, two detectives, one "active detective" (detective in training), five sergeants, one school resource officer, a lieutenant, a captain and administrative staff. Response time to the project site would take approximately 20 minutes (5.10-13, Calico, AFC). The applicant states in the AFC (5.10-31), that San Bernardino County Sheriff's Department resources would not likely be impacted by operation of the project. In addition, the applicant states the department is well staffed and local/regional facilities are capable of handling any injuries that might occur at the project site.

The California Highway Patrol (CHP) (http://www.chp.ca.gov) is the primary law enforcement agency for state highways and roads. Services include law enforcement, traffic control, accident investigation and the management of hazardous material spill incidents. The nearest CHP office is located approximately 37 miles from the project site in Barstow, California.

The applicant states in the **PROJECT DESCRIPTION AND LOCATION** section of the AFC that onsite security measures would be installed as part of the project. Controlled access gates would be maintained at the entrances to the site. The Hector Road access would also serve as the main entry and exit gate during project operations. Twenty-four-hour site security monitoring would be provided in the control room via closed-circuit television and intercom system.

Perimeter security fencing and access gates would be provided for the project site, including fencing and gates around the main buildings, the electrical substation, and the construction laydown areas. Security monitoring cameras and active detection systems would be provided for project buildings, support areas, and the entire site perimeter. Regular site security vehicular patrols would be conducted to provide additional site security. Site access would be provided to off-site emergency response teams that respond in the event of an “after-hours emergency.” Entry into the project site by fire department or emergency units would be handled on a manual override basis by 24-hour security officers stationed at both entrances (3-24, Calico, AFC).

Unlike residential or commercial developments, power plants do not attract large numbers of people and thus require little in the way of law enforcement. Because of this factor and the proposed onsite security measures, staff concludes that the existing law enforcement resources would be adequate to provide services to the Calico Solar Project during construction and operation.

Education

There are two school districts located within the vicinity of the project site; Barstow Unified School District and the Silver Valley Unified School District. The project site is located within the Silver Valley Unified School District boundary. Silver Valley District serves the smaller communities located east of Barstow, including Yermo and Newberry Springs. The closest school to the project site is Newberry Springs Elementary, approximately 14 miles west of the project site. The closest high school is located in Yermo, approximately 33 miles west of the project site. Staff has provided information for the Barstow Unified School District in the event that construction workers or operations employees and their families who may choose to relocate to the vicinity would likely reside in the Barstow area.

The Barstow Unified School District has 13 schools; 9 elementary schools, one junior high school, one high school, one continuation school and one community day school. Student enrollment in the Barstow Unified School District has declined with approximately 5% fewer students enrolled in the 2007/08 school year (5.10-12, Calico, AFC) than two years before. Barstow Unified would be able to accommodate up to approximately 150 new students without requiring additional resources (5.10-12, Calico, AFC).

The Silver Valley Unified School District has 8 schools; 4 elementary schools, one middle school, one high school, one alternative school, and a continuation school. Enrollment has increased in recent years with approximately 2% more students enrolled in the 2007/08 school year (5.10-12, Calico, AFC). The Silver Valley Unified School District is not currently at capacity and could accommodate approximately 300 new students without additional resources (5.10-12, Calico, AFC).

During construction, staff expects the labor force would commute daily from the region and that the enrollment in local school districts would not increase. The applicant estimates that operation of the project would result in 20 workers of 180 required for project operation would permanently relocating to the project area from outside of the project area. The potential increase of 20 workers would have negligible effects to schools from the construction of the project. . However, in the unlikely scenario in which all 180 operation workers are newly relocated to the Silver Valley Unified School

District, an average family size of 3.15 persons per household (San Bernardino County) would result in the addition of about 207 school children to the schools in the district. Barstow and Silver Valley School Districts could accommodate approximately 150 new students and 300 new students, respectively. Potential new students would not impact existing school resources and the project would not require the construction of new or physically altered school facilities. Staff concludes that construction and operation of the proposed project would not cause a significant adverse impact on school facilities.

Like all school districts in the state, the Silver Valley Unified School District is entitled to collect school impact fees for new construction within their district under the California Education Code Section 17620. These fees are based on the project's square feet of habitable space. Because the main services complex of the Calico Solar Project (considered "habitable space") would be constructed entirely on BLM land, no private land would be affected and therefore, the provisions of Education Code Section 17620 would not apply to this project.

In addition, the Silver Valley Unified School District indicated that the proposed project would be exempt from the school impact fees because it would be developed on federal lands. (5.10-13, Calico Solar, AFC).

Increase the Use of Existing Recreation Facilities

The San Bernardino County Regional Parks (http://www.sbcounty.gov/parks) maintains a variety of regional parks, outdoor recreation and special activities. The regional parks amenities include picnicking, fishing, hiking, horseback riding, bird watching, overnight camping, horseshoes, swimming, water skiing, passive recreation and a ghost town.

Given the large labor force in the San Bernardino and Riverside Counties residing within two hours commuting time of the project, staff does not expect employees to relocate to the immediate project area. Staff concludes that there are a number and variety of parks within the regional project area and does not expect the construction or operation workforce to have a significant adverse impact on parks or necessitate construction of new parks in the area.

C.10.4.3 CEQA LEVEL OF SIGNIFICANCE

As discussed in the subject headings above, under CEQA, project-related socioeconomic impacts would be less than significant for population, employment, housing, schools, parks and recreation, emergency medical services, and law enforcement.

C.10.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the central portion of the proposed 850 MW project. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

Setting and Existing Conditions

The setting for the Reduced Acreage Alternative would eliminate approximately 67% of the proposed 850 MW project area. Potential impacts related to socioeconomic resources would be reduced. The Reduced Acreage Alternative would transmit the power generated without requiring an upgrade to 65 miles of the existing 200 kV SCE Pisgah-Lugo transmission line. The Reduced Acreage Alternative would affect 33% of the land of the proposed 850 MW project.

Assessment of Impacts and Discussion of Mitigation

The alternative would eliminate approximately 67% of the proposed project area, would not require an upgraded transmission line, and would consist of less SunCatchers. The Reduced Acreage Alternative would require less construction with the above mentioned infrastructure and operation of the solar facility. The alternative would create a smaller fiscal impact than the proposed project, with less need of housing, school, parks and recreation, law enforcement and emergency medical services. The alternative would have a smaller impact than the proposed project on substantial population growth, impact housing supply, displace existing housing or substantial numbers of people or result in substantial physical impacts to government facilities. In addition, the alternative would have a smaller impact than the proposed project with smaller project cost, payroll, and local construction materials/supplies.

CEQA Level of Significance

Similar to the proposed project, the Reduced Acreage Alternative would not a cause adverse significant impact from construction or operation. The benefits of the project to the local economy would be reduced because of the smaller acreage which would cause less construction time, and less socioeconomic resources. Similar to the proposed 850 MW project, the Reduced Acreage Alternative would not require Socioeconomic conditions of certification.

C.10.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed 850 MW project. This alternative, the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 2**.

Setting and Existing Conditions

The setting of the Avoidance of Donated and Acquired Lands Alternative would eliminate about 15% of the 850 MW project area. The alternative would contain approximately 28,800 SunCatchers with a net generating capacity of approximately 720 MW occupying approximately 7,050 acres of land, and would affect 85% of the land of the proposed 850 MW project. The proposed project would avoid approximately 1,200 acres of donated and acquired lands.

Assessment of Impacts and Discussion of Mitigation

The Avoidance of Donated and Acquired Lands Alternative would affect 85% of the 850 MW project area. Although 15% would be not be used, this alternative would require the upgraded transmission line. The Avoidance of Donated and Acquired Lands Alternative would have fewer SunCatchers that the proposed 850 MW project, less land acreage used, and LWCF lands would not be used. Less construction and operation would need to occur, which would require less housing, school, parks and recreation, law enforcement and medical services. Reduced construction would result in smaller fiscal effects from construction and operation sales tax. Total project costs, payroll costs, and local construction materials/supplies would have a smaller non-fiscal effect. The Avoidance of Donated and Acquired Lands Alternative would not impact socioeconomic resources.

CEQA Level of Significance

Similar to the proposed project, the Avoidance of Donated and Acquired Lands Alternative would not cause an adverse significant impact from construction or operation. The benefits of the project to the local economy would be reduced because of the smaller acreage, the construction and operation staff would be decreased, and there would be less impacts to socioeconomic resources. Similar to the proposed project, the Avoidance of Donated and Acquired Lands Alternative would not require Socioeconomic Conditions of Certification.

C.10.7 NO PROJECT / NO ACTION ALTERNATIVE

There are three No Project/No Action Alternatives evaluated in this section, as follows:

NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed the Calico Solar Project would not be approved by the CEC and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, no impacts related to socioeconomics or environmental justice would occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed the Calico Solar Project would not be approved by the CEC and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with a different solar technology. As a result, construction and operation of the solar technology would likely result in impacts to socioeconomics or environmental justice. Different solar technologies require varying numbers of personnel for construction and operation; however, all solar technologies in this area would require such personnel. As such, this No Project/No Action Alternative could result impacts to socioeconomics or environmental justice similar to under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed the Calico Solar Project would not be approved by the CEC and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended. There would be no socioeconomic or environmental justice impacts.

C.10.8 PROJECT-RELATED FUTURE ACTIONS – SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios:

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.

- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

Environmental Setting

The environmental setting incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

The potential social and economic impacts associated with the SCE upgrades include effects to population, housing, public services (fire protection, emergency medical response services, law enforcement, and schools), utilities, and government tax revenue, as well as economic benefits that would arise from the project's investment and payroll. The potential affected area would be San Bernardino County, specifically the northeast portion of the county near the Cities of Barstow and Hesperia.

This preliminary analysis of socioeconomic effects for the SCE Lugo-Pisgah No. 2 line uses baseline socioeconomic data compiled for the Calico Solar AFC. Both projects have the same affected area (San Bernardino County) for socioeconomic impacts and would be constructed on similar schedules. Therefore the population, housing, employment, income, and fiscal revenue data used in the Calico Solar Project AFC would be relevant to this analysis with the addition of the southwestern parts of the transmission line, near Lugo Substation, particularly for the City of Hesperia. The forecasted growth rate for the affected area is approximately 40,000 people per year. There are estimated to be about 5,000 housing units and more than 3,400 hotel rooms or other temporary housing available in the surrounding communities (36, Calico, Appendix EE Section 2.11.2.1).

Environmental Impacts

Because few, if any, workers are expected to relocate to the area, no new housing would be needed for the project, no housing would be displaced, and no new competition for existing housing would likely occur. Construction employees would likely already live within commuting distance to the project area in San Bernardino County. Should construction or operation workers choose to relocate to the Cities of Barstow, Riverside, San Bernardino, or Ontario, there is sufficient housing in these areas to not adversely affect the housing market. Temporary accommodations may also be needed during construction, but with numerous hotels and motels in the area, impacts are expected to be less than significant, and mitigation measures are not required.

The addition of project-related children to schools that are at or over capacity may increase costs in terms of supplies, equipment, and/or teachers but the impact would be minimal. Even so, this worst-case scenario is unlikely to occur since any non-local construction workers would not likely relocate family members for the relatively short duration of construction and very few if any new permanent employees would be hired by SCE for operation of the project.

Likewise impacts to law enforcement and public utilities would be minimal. Water and wastewater discharge is discussed in the **Soil and Water Resources** section of this Staff Assessment/EIS and solid waste removal is discussed in the **Waste Management** section of this Staff Assessment/EIS. Because of staff's socioeconomic analysis of the proposed project, and the on-site security and safety procedures for construction and operation as described in the **Worker Safety and Fire Protection** section of this SA/EIS, staff concludes that the emergency medical services resources would be adequate to meet the needs of the proposed upgrades project during construction and operation.

The construction or operation workforces are not expected to have a significant adverse impact on parks and recreation because of the number and variety of parks within the regional project area. In addition, construction workers are unlikely to bring their families to a work site, and therefore, impact existing park services would be less than significant.

Environmental Justice. EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires each federal agency to make the achievement of environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low income populations. Guidelines provided by the Council on Environmental Quality (CEQ) (1997) and USEPA (1998) indicate that a minority community may be defined as one where the minority population comprises more than 50% of the total population or comprises a meaningfully greater share than the share in the general population. In 2006, the percentage of San Bernardino County's population reporting non-White race was about 20%, about the same as the state of California. The percentage of San Bernardino County's population reporting Hispanic or Latino ethnicity was 46% compared to about 36% for the state in 2006. In 2007, approximately 11.8% of San Bernardino County's population was living below poverty level compared to 12.4% statewide (37, Calico, Appendix EE Section 2.11.2.1). Therefore, staff concludes that the SCE proposed upgrades would not disproportionately or adversely impact minority or low income populations in the affected area.

<u>Mitigation</u>

Compliance with LORS discussed in the **Soil and Water Resources**, **Worker Safety and Fire Protection**, **Waste Management**, and **Reliability** sections of this Staff Assessment/EIS would ensure that impacts from SCE upgrades would be less than significant. No additional mitigation is recommended.

C.10.9 CUMULATIVE IMPACTS AND MITIGATION

A project may result in significant adverse cumulative impacts when its effects are cumulatively considerable; that is, when the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects [*Public Resources Code* Section 21083; *California Code of Regulations*, Title 14, Sections 15064(h); 15065 (c); 15130; and 15355]. Mitigation requires taking feasible measures to avoid or substantially reduce the impacts.

In a socioeconomic analysis, cumulative impacts could occur when more than one project in the same area has an overlapping construction schedule, thus creating a demand for workers that cannot be met locally. An increased demand for labor could result in an influx of non-local workers and their dependents, resulting in a strain on housing, schools, parks and recreation, law enforcement, and medical services.

As shown in **Socioeconomics Table 3,** the total construction labor force by MSA for the region is more than sufficient to accommodate the labor needs for construction of power generation facilities and other large industrial projects. Because of the robust local and regional construction labor force, staff does not expect an influx of non-local workers and their dependents to the project area. Staff does not expect any significant and adverse impacts on housing, schools, parks and recreation, law enforcement, and emergency medical services. Staff does not expect construction or operation of the Calico Solar Project to contribute to any significant adverse cumulative socioeconomic impacts.

Socioeconomics Table 3
Occupational Employment Projections by MSA

Construction and Extraction Occupations for Selected MSAs	Average Annual Employment 2006	Average Annual Employment 2016
San Bernardino County MSA	137,160	155,250
Los Angeles County MSA	174,940	187,580
Orange County MSA	110,580	121,460
TOTALS	**422,680**	**464,290**

Source: EDD 2009 Projections of Employment by Industry and Occupation

C.10.10 NOTEWORTHY PUBLIC BENEFITS

Noteworthy public benefits include the direct, indirect, and induced impacts of a proposed power plant. For example, the dollars spent on or resulting from the construction and operation of the Calico Solar Project would have a ripple effect on the local economy. This ripple effect is measured by an input-output economic model. The model relies on a series of multipliers to provide estimates of the number of times each dollar of input or direct spending cycles through the economy in terms of indirect and induced output, or additional spending, personal income, and employment. The typical input-output model used by economists and the one used for this analysis by the applicant is the IMPLAN model. IMPLAN multipliers indicate the ratio of direct impacts to indirect and induced impacts. Staff reviewed the results of the IMPLAN model and found them to be reasonable considering data provided by the applicant as well as data obtained by staff from governmental agencies, trade associations, and public interest research groups. The proposed project site would be owned and operated by Stirling Energy Systems and would employ workers and purchase supplies and services for the life of the project. Employees would use salaries and wages to purchase goods and services from other businesses. Those businesses make their own purchases and hire employees, who also spend their salaries and wages throughout the local and regional economy. This effect of indirect (jobs, sales, and income generated) and induced (employees' spending for local goods and services) spending continues with subsequent rounds of additional spending, which is gradually diminished through savings, taxes, and expenditures made outside the area.

For purposes of this analysis, direct impacts were said to exist if the project resulted in permanent jobs and wages; indirect impacts, if jobs, wages, and sales resulted from project construction; induced impacts, from the spending of wages and salaries on food, housing, and other consumer goods, which in turn creates jobs. Indirect and induced economic impacts from construction would take place over a four-year period (41 months).

All indirect and induced operation impacts would result from annual operations and maintenance expenditures. All construction and operation impacts would take place within San Bernardino County. The economic benefits of the proposed project, as required by the Energy Commission regulations and resulting from the IMPLAN model are shown below in **Socioeconomics Table 4.**

Socioeconomics Table 4
Calico Solar Economic Benefits (2008 dollars)

Fiscal Benefits	
Estimated annual property taxes	$220,000 (on property components)
State and local sales taxes: Construction	$700,000
State and local sales taxes: Operation	$650,000
School Impact Fee	N/A
Non-Fiscal Benefits	
Total capital costs	$1 billion
Construction payroll	$159 million
Annual Operations and Maintenance	
Construction materials and supplies	$9.1 million
Operations and maintenance supplies	$8.4 million
Direct, Indirect, and Induced Benefits	
Estimated Direct	
Construction	393 jobs
Operation	180 full-time positions
Estimated Indirect	
Construction Jobs	99
Construction Income	$10.3 million
Operation Jobs	N/A
Operation Income	$2.2 million
Estimated Induced	
Construction Jobs	145
Construction Income	$10.8 million
Operation Jobs	N/A
Operation Income	$2.6 million

Source: Calico Solar AFC.

C.10.11 COMPLIANCE WITH LORS

Staff has considered the Federal and State laws, ordinances, regulations and standards as identified in **Socioeconomics Figure 1** and has found no potential significant adverse impacts regarding the Emergency Economic Stabilization Act of 2008, California Education Code 17620, California Government Code Section 65996-65997 and the California Revenue and Taxation Code Section 70-74.7.

Staff concludes that construction and operation of the Calico Solar Project would be in compliance with all applicable LORS regarding long-term and short-term project impacts in the area of **Socioeconomics and Environmental Justice.**

C.10.12 FACILITY CLOSURE AND DECOMMISSIONING

According to Section 3.12 of the applicant's project description, the solar generating facility is expected to have a lifespan of 40 years. At any point during this time, temporary or permanent closure of the solar facility could occur. Temporary closure would be a result of necessary maintenance, hazardous weather conditions, or damage due to a natural disaster. Permanent closure would be a result of damage that is beyond repair, adverse economic conditions, or other significant reasons.

Both temporary and permanent closures would require the applicant to submit to the Energy Commission a contingency plan or a decommissioning plan. A decommissioning plan would be implemented to ensure compliance with applicable socioeconomic LORS, removal of equipment and shutdown procedures, site restoration, potential decommissioning alternatives, and the costs and source of funds associated with decommissioning activities.

Upon closure of the facility or decommissioning, it is likely that the applicant would be required to restore lands affected by the project to their pre-project state. Given the fact that the proposed project site is located on undeveloped land with current evidence of high levels of disturbance (due to OHV use), staff anticipates that project decommissioning would have impacts similar in nature to proposed project construction activities. Therefore, given the temporary nature of decommissioning activities and the eventual return of the lands to their current state, staff concludes the effects of decommissioning on socioeconomic resources would not be adverse.

C.10.13 PROPOSED CONDITONS OF CERTIFICATION/MITIGATION MEASURES

The proposed project does not require any socioeconomic conditions of certification or mitigation measures.

C.10.14 CONCLUSIONS

Staff concludes that construction, operation, and demolition of the proposed Calico Solar Project would not cause, under CEQA, a significant direct, indirect, or cumulative adverse socioeconomic impact on the study area's housing, schools, parks and recreation, law enforcement, and emergency medical services. Socioeconomic impacts of the Calico Solar Project would not combine with impacts of any past, present, or reasonably foreseeable local projects to result in cumulatively considerable local impacts. Hence, there are no socioeconomic environmental justice issues related to this project. The Calico Solar Project, as proposed, is consistent with applicable Socioeconomic LORS.

Estimated gross public benefits from the Calico Solar Project include increases in sales, employment, and income in San Bernardino County and the surrounding region during construction and operation. There would be an estimated average of 180 direct project-related construction jobs for the 41 months of construction. The Calico Solar Project would have an estimated total capital cost of $1 billion and a construction payroll of $159 million annually. Total sales and use taxes during construction are estimated to be approximately $700,000; during operation the local sales tax is estimated to be $650,000 annually. An estimated $9.1 million would be spent locally for materials and equipment during construction, and an additional $8.4 million would be spent annually for the project's local operation and maintenance budget.

C.10.15 REFERENCES

California Department of Education, Data and Statistics, Student Demographics, School Year: 2006-07. http://www.cde.ca.gov/ds/

California Highway Patrol, http://www.chp.ca.gov

San Bernardino County Regional Parks. http://www.sbcounty.gov/parks

San Bernardino County Sheriff's Department. http://www.sbcounty.gov/sheriff

SES 2008a – Stirling Energy Systems/R. Liden (tn 49181). Application for Certification, dated December 1, 2008. Submitted to CEC/Docket Unit on December 1, 2008.

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State of California, Employment Development Department (EDD) 2009. Labor Market Information, Occupational Employment Projections 2006-2016 San Bernardino, Los Angeles and Orange County Metropolitan Statistical Areas (MSAs).

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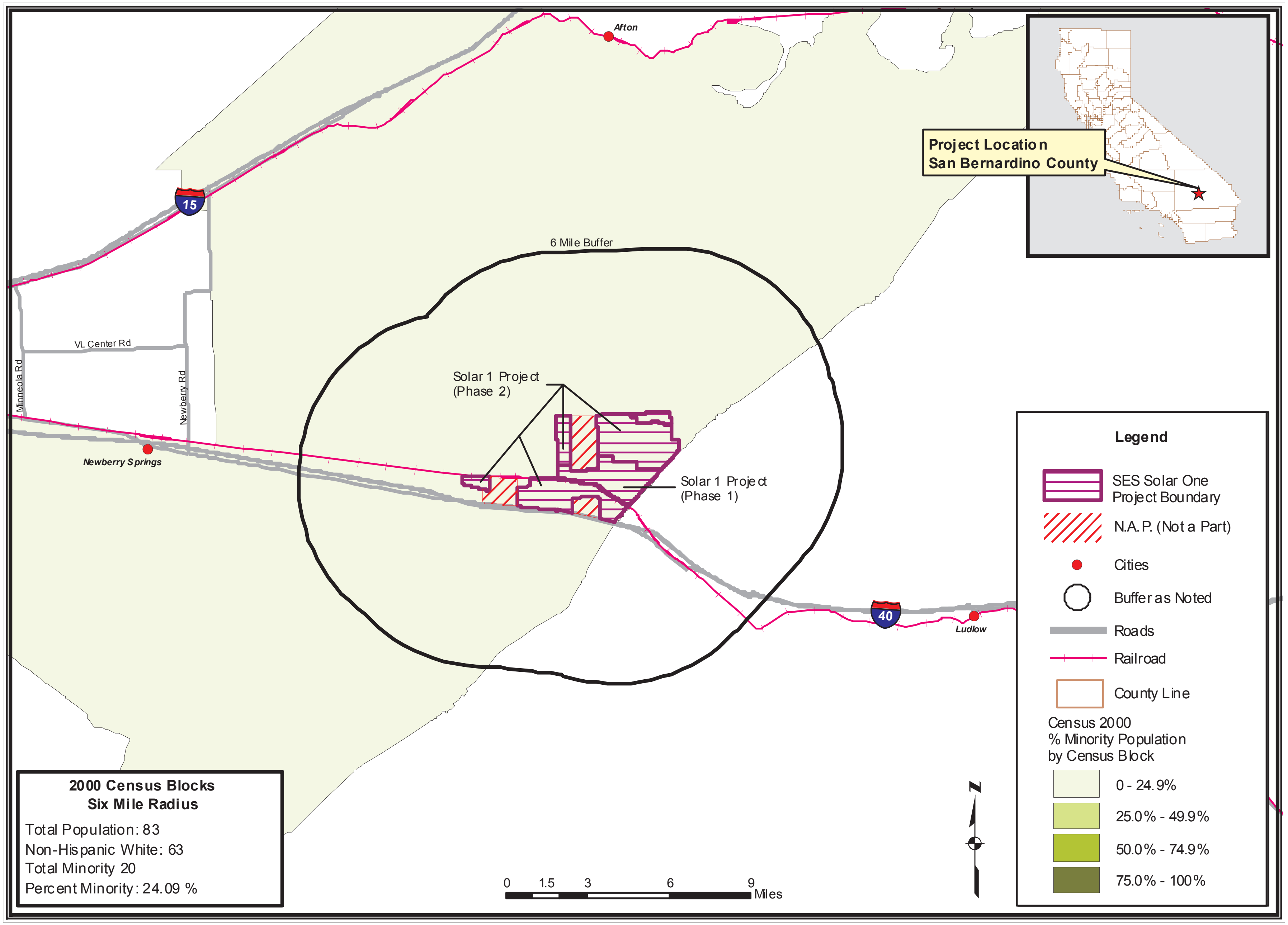
SOCIOECONOMICS - FIGURE 1

Calico Solar Project - Census 2000 Minority Population by Census Block - Six Mile Buffer



CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: ESRI and Tele Atlas Data California Energy Commission Statewide Power Plant Maps 2009 and URS - Census 2000 PL 94-171 Data

C.11 – TRAFFIC AND TRANSPORTATION

Testimony of Marie McLean

C.11.1 SUMMARY OF CONCLUSIONS

As currently proposed, the Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) has the potential to impact Burlington Northern Santa Fe (BNSF) and AMTRAK train operations because of the proximity of SunCatcher mirrors to the BNSF tracks traversing the project site. In addition, the mirrors have the potential to impact motorists on I-40 and Route 66. Staff is currently investigating appropriate mitigation.

However, in all other areas, with implementation of recommended conditions of certification, the Calico Solar Project would be consistent with applicable federal, state, and local laws, ordinances, regulations, and standards. As a result, in those areas the project would not have a significant adverse impact under the California Environmental Quality Act (CEQA) on the local and regional roadway network.

With implementation of recommended conditions of certifications, local roadway and highway demand resulting from daily movement of workers would not increase beyond significance thresholds established by San Bernardino County and the state of California.

Currently, open Bureau of Land Management (BLM) routes transverse the project area. Those routes would be closed if any of the action alternatives or California Desert Conservation Area (CDCA) Plan amendments are approved.

C.11.2 INTRODUCTION

In the Traffic and Transportation analysis, staff focuses on:

1. Whether construction and operation of the Calico Solar Project would result in traffic and transportation impacts under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) and
2. If the project would be in compliance with applicable laws, ordinances, regulations, and standards (LORS).

In its analysis, staff identifies potential impacts related to the construction and operation of the Calico Solar Project on the surrounding transportation systems and roadways and, when applicable, proposes mitigation measures.

C.11.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Significance criteria are based on three items:

1. California Environmental Quality Act (CEQA) Guidelines
2. CEQA Environmental Checklist

3. Performance standards and thresholds established by interested agencies

A project may have a significant effect if it would:

1. Cause a substantial increase in traffic in relation to the existing traffic load or capacity of the street system.
2. Exceed an established level of service standard applicable for the designated roads or highways.
3. Alter existing patterns of circulation or the movement of people or goods or both.
4. Alter waterborne, rail, or air traffic.
5. Increase traffic hazards to motor vehicles, bicyclists, or pedestrians.
6. Result in inadequate emergency access or parking capacity or both.
7. Conflict with existing policies, plans, or programs.

Level of Service

When evaluating the project-related impacts on the local transportation system, staff bases its analysis on level of service (LOS) determinations. *Level of service* is a generally accepted measure used by traffic engineers, planners, and decision-makers to describe and quantify the congestion level on a particular roadway or intersection in terms *speed*, *travel time,* and *delay.*

The *Highway Capacity Manual 2000,* published by the Transportation Research Board, Committee on Highway Capacity and Quality of Service, includes six levels of service for roadways or intersections ranging from LOS A—the best operating conditions—to LOS F—the worst.

San Bernardino County and the State of California use the LOS criteria to assess the performance of its street and highway system and the capacity of roadway segments. The county's as well as the state's threshold standards policy requires that LOS C or better be maintained on roadway segments under their jurisdiction.

In addition, operations of intersections were evaluated using methodology contained in the *Highway Capacity Manual 2000*. This methodology is used to assess delays at an unsignalized intersection for movements operating under traffic control—a stop sign, for example. For an intersection at which the only stop-sign is placed at a side street, delay will be reported for movements controlled by the stop sign. The delay is then assigned a corresponding letter grade to represent the overall condition of the intersection or level of service. These grades range from LOS A, free-flow, to LOS F, poor progression.

The level-of-service standards for the Calico Solar Project as required by San Bernardino County and the State of California are as follows:

1. LOS C or better on roads and conventional highways located in San Bernardino County's Desert Region, the location of the Calico Solar Project.
2. LOS C or better on Interstate 40, the primary access road to the project site.

A significant impact would exist if the Calico Solar Project were to cause intersection operations to exceed the accepted LOS standards on a state, county, or federal roadway.

Laws, Ordinances, Regulations, and Standards

Staff uses LORS as significance criteria to determine if the proposed Calico Solar Project would have a significant adverse impact on the environment. The federal, state, and local regulations applicable to the proposed CSP are listed in **Traffic and Transportation Table 1,** which follows.

Traffic And Transportation Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
Code of Federal Regulations (CFR), Title 14, Aeronautics and Space; Part 77, Objects Affecting Navigable Airspace (14 CFR 77)	Includes standards for determining physical obstructions to navigable airspace; information about requirements for notices, hearings, and requirements for aeronautical studies to determine the effect of physical obstructions to the safe and efficient use of airspace.
*Code of Federal Regulations (*CFR*)*, Title 49, Subtitle B, Sections 171-177; Sections 350-399; Appendices A-G Other Regulations Relating to Transportation	Includes procedures and regulations pertaining to interstate and intrastate transport (including hazardous materials program procedures) and as well as safety measures for motor carriers and motor vehicles operating on public highways.
State	
California Vehicle Code (CVC), Division 2, Chapter 2.5, Div. 6; Chap. 7, Div. 13; Chap. 5, Div. 14.1; Chap. 1 and 2, Div. 14.8, Div. 15	Pertain to licensing, size, weight, and load of vehicles operated on highways; safe operation of vehicles; and transporting hazardous materials.
California Streets and Highway Code, Section 117; Section 660-695; Section 700-711; Section 1450; 1460 et seq.; and 1480 et. Seq.	Pertain to regulating rights-of-way encroachments and granting permits for encroachment on state highways and freeways and on county roads.
California Health and Safety Code; Section 25160 et seq.	Pertain to operators of vehicles transporting hazardous materials
Local	
San Bernardino General Plan, Circulation and Infrastructure Element, Desert Region	Pertains to public policies and strategies for the transportation system in San Bernardino County, including those pertaining to transportation routes, terminals, and facilities; construction of extensions of existing streets; and levels of services (LOS).
San Bernardino Traffic Code, Section 52.0125	Pertains to requirements for oversize and overweight vehicles.

C.11.4 PROPOSED PROJECT

C.11.4.1 SETTING AND EXISTING CONDITIONS

The project site is located in San Bernardino County on approximately 8,230 acres of land owned by the United States government and managed by the US Department of Interior, Bureau of Land Management. Access to the site is off Hector Road, north of Interstate 40, 17 miles east of Newberry Springs and 115 miles east of Los Angeles in the Mojave Desert. The project consists of 29 contiguous parcels; and the Burlington Northern Santa Fe (BSNF) railroad bisects the site from west to east.

In the project area, I-40 is a primary east/west regional arterial beginning at the Interstate-15 interchange in the city of Barstow and heading east towards Arizona and eventually ending at the concurrence of U.S. Route 117 and North Carolina Highway 132 in Wilmington, North Carolina.

In the project area, I-40 is classified as a freeway with two lanes in each direction. Access to the site from I-40 is the Hector Road interchange. See **Traffic and Transportation Figure 1**, Local Transportation Network.

The proposed project would utilize SunCatchers— a 40-foot tall, 25-kilowatt-electrical (kWe) solar dish developed by Stirling Energy Systems. The SunCatcher system consists of a unique radial solar concentrator dish structure that supports an array of curved glass mirror facets.

Those mirrors are designed to automatically track the sun, collect and focus or concentrate its solar energy onto a patented power conversion unit (PCU). The PCU is coupled with and powered by a completely reengineered SES Stirling engine that generates power grid-quality electricity.

Originally, Stirling Energy Systems planned to construct its project in two phases: a 500-MW facility on 5,838 acres (Phase 1) and an additional 350 megawatt facility on the remaining 2,392 acres (Phase II). However, the applicant subsequently revised the project to align the output of Phase I with the capacity of the Southern California Edison (SCE) transmission system prior to the completion of a 500 kV upgrade to the Lugo-Pisgah Transmission line. Consequently, today Phase I would be limited to 275 MW, with the remaining 575 MW to be constructed as part of Phase II.

The project would consist of four laydown areas, two laydown areas for each phase of the project. The first phase would consist of a 26-acre laydown site located on the southeast corner of phase-one site. The second laydown area, which consists 14 acres, will be located next to the main services complex.

The second phase of construction would utilize a 26-acre laydown area located north of Interstate 40 (I-40). Other features and facilities associated with the proposed project—the majority of which are located on the proposed project site or construction laydown area)—include:

- Approximately 34,000 SunCatchers and associated equipment and infrastructure within a fenced boundary

- An onsite, 14.4-acre main services complex located in the north eastern portion of the Phase I section of the project site for administration and maintenance activities. The complex would include buildings, parking and access roads (SES 2008f page 3-62 and Figure 3-4)
- An onsite, 10-acre satellite services complex located in the eastern portion of the Phase II section of the project site for maintenance activities and SunCatcher mirror washing. The complex would include buildings, parking and access roads (SES 2008f page 3-62 and Figure 3-4
- An onsite, 2.8-acre 850-MW Calico Solar Project substation located in the southern portion of the Phase I section of the site (SES 2008f page 3-62 and Figure3-4)

To ensure adequate parking and staging areas for the project, staff recommends Condition of Certification **TRANS-1.**

Local Highways and Roads

The following roads are located in the vicinity of the project, Interstate 40, Route 66, and Hector Road. Information about each road follows. See **Traffic and Transportation Figure 2**.

Interstate 40 (I-40)

Interstate 40, an east-west interstate freeway, is located south of the Calico Solar Project site. I-40 begins at the Interstate-15 interchange in the city of Barstow, San Bernardino County, and heads east towards Arizona. Interstate 40 ends at the concurrence of U.S. Route 117 and North Carolina Highway 132 in Wilmington, North Carolina.

Interstate 40 is the major access road to and from the Calico Solar Project. A four-lane highway, two lanes in each direction, I-40 has 6feet of shoulder on both sides and a wide center median. It is posted at 70 miles per hour (mph) in the vicinity of the site. The existing average daily traffic (ADT) near the vicinity of the Calico Solar Project site is 15,600 vehicles per day; 43% is truck traffic.

Temporary and permanent access to the project site will be through the Hector Road exit off I-40. The roadway segment north of the interchange is currently unpaved. The northbound and southbound approach at the double-track BNSF at-grade railroad crossing is newly improved with asphalt surface aprons.

Hector Road is currently gated and locked on both the northbound and southbound approaches. Access is controlled and determined by BNSF. See information about Hector Road in this section for additional information on access to the project site.

National Trails Highway (Route 66)

Route 66 is located south of the Calico Solar Project site and runs parallel to I-40. Route 66, a 2,448-mile roadway once known as the Main Street of America, runs west to east from Santa Monica, California, to Chicago, Illinois, wending its way through Arizona, New Mexico, Texas, Oklahoma, Kansas, and Missouri before ending in Chicago.

Hector Road

Hector Road, a local road running north-south, is the primary access to the Calico Solar Project site. It begins at Route 66 just south of the I-40 interchange and continues north to the project site. Hector Road ends just south of the BNSF railroad tracks and west of a gated crossing. The existing average daily traffic (ADT) on Hector Road near the vicinity of the project site is 31 vehicles per day.[1]

Hector Road within the I-40 interchange is paved and controlled by Caltrans. Hector Road north of the Caltrans right-of-way extends for about 750 feet as a 24-foot paved roadway controlled by San Bernardino County. From the end of this San Bernardino County-controlled segment to the gated BNSF gated crossing, the road, controlled by BLM, extends for about 24 feet. This BLM-controlled road terminates at the BNSF right-of-way.

The Hector Road interchange will be used for both temporary and permanent access to the project site. Information about temporary and permanent access to the site follows.

Temporary Access Road

According to the applicant, temporary access for construction of the project will be provided from an existing road off Interstate 40 (I-40) and follow for approximately one mile the same alignment as the existing unimproved road leading from the Hector Road interchange to the existing gated railroad crossing. See **Traffic and Transportation Figure 1**.

The temporary road will be located along the north side of the BNSF right-of-way from the existing crossing and extend 1.75 miles east where it will be incorporated as part of the permanent road.

This temporary access road will be used by workers and visitors as well as for delivery of hazardous materials and other supplies. In addition, it will be used for access by fire trucks and ambulances. According to the applicant, this temporary access road will be used until October 2011, the date of expected completion of a bridge across the BNSF tracks.

According to the applicant, both the temporary and permanent access roads are to have two 12-foot travel lanes with 3-foot shoulders and exceed the minimum design requirements of the American Association of State Highway and Transportation Officials (AASHTO).

Staff is proposing Condition of Certification **TRANS-2** to ensure that the temporary access road conforms to the requirements of the California State Fire Marshall as contained in *California Code of Regulations*, Title 19, Section 3.05(a) and that the crossing meets all state and federal safety requirements, including required safety training and flagpersons necessary to control traffic.

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[1] Staff notes interveners' comments concerning the gating of Hector Road, specifically that the gating prevents public and private property owners from accessing their property.

Permanent Access Road

The permanent access road roughly follows the layout of the temporary access road. However, while the temporary access road is designed so that those using the road must cross the BNSF tracks, the permanent access road will be designed so that those using the road will not cross the tracks but instead go over them on a bridge to be constructed as part of the permanent road. According to the applicant, the construction of the bridge will be completed by October 2011.

After crossing the bridge, the road would continue north for approximately one-fourth mile, then west for one and one-half miles to the Main Services Complex, where it would end. See **Traffic and Transportation Figure 1**.

This access road would be used by workers, suppliers, and emergency vehicles such as fire trucks and ambulances. Construction of this road requires the approval of the BNSF railroad and must meet all safety requirements for railroad crossings as required by the California Public Utilities Commission (PUC) and the Federal Railroad Administration (FRA).

Consequently, staff is recommending Condition of Certification **TRANS-3**, designed to ensure that prior to construction, the project owner concurrently:

1. Obtains written approval from BSNF to construct the proposed railroad crossing according to agreed-upon specifications and that after construction, the crossing meets with BNSF, PUC, and FRA approval
2. Coordinates with the Rail Crossings Engineering Section, California Public Utilities Commission, Los Angeles, as well as the Federal Railroad Administration to ensure that all state and federal requirements pertaining to railroad crossings will be met during and after construction.

Bureau of Land Management Routes

Several Bureau of Land Management (BLM) routes transverse the proposed project area.

<u>Public Transportation</u>

Public transportation consists of rail services, bicycle and pedestrian facilities, and airports. Information about those forms of public transportation follows.

Rail Service

The Burlington Northern Santa Fe Railway (BNSF) provides long-haul freight service throughout the United States over a 32,000-mile route. Near the project site, BNSF operates a double-track railroad line through the project site from east to west. See **Traffic and Transportation Figure 1** for the BNSF route intersecting the project site. AMTRAK's Southwest Chief route from Los Angeles to Chicago travels on the BNSF rail line through the middle of the project site, The Southwest Chief passenger train travels through the site only at night in both directions.

Staff has determined that the intersection of the BNSF rail line through the project site could pose a safety hazard for construction workers and others visiting or making deliveries to the construction site. State and federal regulations require that a flagperson be present at all times wherever workers, delivery persons, or visitors cross and unattended or open track. Consequently, staff has recommended Condition of Certification **TRANS-4** to require measures to be in place to help ensure the safety of workers and other visitors to the site. Those safety measures include coordination with BSNF concerning and AMTRAK, among other things.

Bicycle and Pedestrian Facilities

Neither bicycle nor pedestrian facilities are located in the project vicinity. Instead, bicycle and pedestrian circulation is limited to shoulders of rural highway and county roads and is not allowed on freeways such as I-40.

Airports

Three airport facilities are located in the general vicinity of the Calico Solar Project:

1. Barstow-Dagget Municipal Airport, located approximately 19 miles west of the project site
2. Twentynine Palms Airport, owned and operated by San Bernardino County, located approximately 32 miles southeast of the project site.
3. Bicycle Lake Army Airfield, a private-use facility, located approximately 34 miles northwest of the project site

Federal Aviation Administration (FAA) Regulation Part 77 contains specific requirements pertaining to objects affecting navigable airspace. However, that FAA regulation does not apply to the Calico Solar Project because the project is not located within 20,000 feet or less of a public use or military airport and will not contain an object 200 feet above ground level.

C.11.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The direct and indirect impacts of the proposed CSP on the transportation system are examined in this section. The assessment of transportation-related impacts is based on evaluations and technical analyses designed to compare the pre-CSP conditions to the post-CSP conditions, including the following:

1. Study intersection/road segment locations
2. Direct/indirect impacts and mitigation
3. Construction period impacts and mitigation
4. Operations impact and mitigation
5. Emergency services vehicle access
6. Water, rail, and air traffic
7. Impact of glare on motorists
8. Parking capacity

9. Transportation of hazardous materials
10. Laws, ordinances, regulations, and standards (LORS)
11. Conflict with policies, plans, or programs

Studied Intersection and Road Segment Locations

The following locations on the surrounding roadway network were reviewed:

1. Interstate 40, West of Hector Road
2. Interstate 40 West-Bound Ramp at Hector Road Intersection
3. Interstate 40, East of Hector Road
4. Interstate 40 East-Bound Ramp, at Hector Road Intersection
5. Hector Road, North of I-40, Westbound ramps, east of project site
6. Hector Road, South of I-40 10, Eastbound ramps, Mesa Drive
7. National Trails Highway, West of Hector Road
8. National Trails Highway, East of Hector Road
9. Hector Road and National Trails Highway Intersection

Direct/Indirect Impacts and Mitigation

Determinations of the direct and indirect impacts of the CSP are based on the relevant laws, ordinances, regulations, and standards (LORS) pertaining to this project. See the LORS section of this document. To address direct and indirect impacts and mitigation, two project scenarios have been evaluated:

1. Construction phase and mitigation
2. Operations phase and mitigation

Most traffic would occur during the construction phases. Consequently, the construction impacts have been examined in detail and mitigation proposed when necessary. That examination follows. The analysis of the operations phase follows the analysis of the construction phases. Mitigation has been proposed, when necessary.

Construction Period Impacts and Mitigation

Potential traffic impacts associated with the construction of CSP were evaluated for both construction workforce traffic and construction truck traffic.

Construction Workforce

Construction of the CSP would be completed over an approximately 48-month period beginning in 2010 and ending in 2014. The construction work force will peak during month 16 at approximately 731 workers per day in month seven (2011) and average approximately 400 workers over the course of construction.

Construction of the transmission line is expected to require a limited crew with fewer than 25 workers during peak periods. However, the transmission line construction schedule will not coincide with the peak of plant site construction employment.

During the 4-year construction period, the project is expected to employ an average of 400 workers per month. However, during the peak construction month, 731 workers will be on-site daily. To evaluate the worst-case scenario, the traffic analysis assumed no workers would carpool and all workers would arrive during the morning peak period (7 AM to 9 AM) and depart during the evening peak period (4 PM to 6 PM).

Peak Construction for Workers

During peak construction, the daily round trips for workers would total 1,462 trips, 731 inbound in morning and 731 outbound in evening.

Parking for workers will be provided in the14-acre construction laydown area adjacent to 14.4-acre main services complex as well as the 26-acre laydown and staging areas on the south and east entrances to the site. In addition, employees may be moved to and from the site from surrounding areas and/or the laydown parking areas, in shuttles or other mass conveyance vehicles or both.

Consequently, staff has proposed Condition of Certification **TRANS-5**, preparation of a traffic control plan to ensure, among other things, adequate off-site parking for construction workers as well as elimination of congestion on I-40 at the temporary interchange at Hector Road off I-40.

The construction workforce, to be drawn from the surrounding local and regional area, including San Bernardino County and Riverside County, is expected to commute to the site. Approximately 20% of the workers are expected to travel east on I-40; approximately 80%, west on I-40.

The following roads and intersections will be used to travel to and from the project site. **See Traffic and Transportation Figure 1**.

1. Interstate 40, West of Hector Road
2. Interstate 40, East of Hector Road
3. Hector Road, North of I-40
4. Hector Road, South of I-40
5. National Trails Highway (Route 66), West of Hector Road
6. National Trails Highway (Route 66), East of Hector Road

The temporary intersection at Hector Road off I-40, which will be controlled by a stop sign, has the potential to result in congestion on I-40 as workers travel to and from the construction site. Consequently, staff has recommended Condition of Certification **TRANS-5**. With implementation of this condition, all roads and intersections during peak-hour construction are projected to operate at least LOS C or better during peak-hour construction. For example:

- Before project construction levels of service (LOS) for Interstate 40 east and west, Hector Road, and National Trails Highway operates at acceptable levels of service ranging from LOS B for I-40 and LOS A for Hector Road and National Trails Highway.
- During project construction peak hours the levels of service for roads and the intersection of I-40 via Hector Road will operate at LOS C or better with implementation of Condition of Certification **TRANS-5**. With implementation of Condition of Certification **TRANS-5**, during construction, Hector Road is projected to operate at the acceptable level of LOS B or C.
- All intersections used by construction traffic operate at LOS A before construction begins.
- During construction at peak hours, all intersections are projects to operate at acceptable levels of at least LOS C, including Hector Road, North of I-40 with implementation of Condition of Certification **TRANS-5**.

See **Traffic and Transportation Table 1**, 2011 Peak Hour Roadway Traffic Volumes, Design Capacities, and Levels of Service Without Project; **Traffic, and Transportation Table 2,** 2011 Peak Roadway Traffic Volumes With Project; **Traffic and Transportation Table 3**, 2011 Peak Hour Intersection Volumes With Project; and **Traffic and Transportation Table 4**, 2011 Peak Hour Intersection Volumes Without Project, which follow.

These tables reflect the levels of service as reported by the applicant. However, during peak traffic times staff (1) considered that the intersection used by workers to get to the project site was signed; and (2) assumed the worst possible conditions—that no workers would carpool and all workers would arrive during the morning peak period (7 AM to 9 AM) and depart during the evening peak period (4 PM to 6 PM).

Consequently, the number of workers driving to the site through that signed intersection could significantly impact traffic on I-40 at during morning arrival and evening departure times. Consequently, staff imposed Condition of Certification **TRANS-5**, to ensure that levels of service remained at least a LOS C.

Traffic and Transportation Table 1
2011 Peak Hour Roadway Traffic Volumes
Design Capacities, and Levels of Service Without Project

2011 Existing Conditions without Calico			Morning Peak Hour		Evening Peak Hour	
Roadway Segment	**Traffic Volumes**	**LOS**	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**	**LOS**
I-40 – West of Hector Road	15,660[1]	B[4]	8.8	A	8.8	A
I-40 – East of Hector Road	16,850[1]	B[4]	8.8	A	8.8	A
Hector Road – North of I-40	10/10[2]	A/A[5]	---	---	8.5	---
Hector Road – South of I-40	10/15[5]	A/A[5]	---		---	---
National Trails Highway – West of Hector Road	10/10[2]	A/A[5]	8.5	A	8.5	A
National Trails Highway – East of Hector Road	10/15[2]	A/A[5]	8.5	A	8.5	A
BLM Access Road – North of I-40	N/A	N/A	---	---	---	---

Notes and Sources: 2007 Traffic Volumes (Caltrans, 2008a); [2]AM/PM Volumes (Higher Volumes between Northbound and Southbound Direction), Source: National Data Services, 2008a; 2007 Truck Volumes (Caltrans, 2008b); 4 ADT LOS; 5 Peak Hour LOS; 6 Peak Hour LOS is based on Table 5.11-3, San Bernardino CMP, 2003 Update. Information not listed was not available; ADT = Average Daily Traffic; LOS = Level of Service. Source: URS Corporation.

Traffic and Transportation Table 2
2011 Peak Hour Roadway Traffic Volumes
Design Capacities, and Levels of Service With Project

2011 Existing Conditions with Calico			Morning Peak Hour		Evening Peak Hour	
Roadway Segment	**Traffic Volumes**	**LOS**	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh**	**LOS**
I-40 – West of Hector Road	17,000[1]	B[4]	15.5	C	13.1	B
I-40 – East of Hector Road	17,250[1]	B[4]	16.5	C	11.0	B
Hector Road – North of I-40	705/775[2]	B/C[5]	---	---	---	---
Hector Road – South of I-40	10/15[2]	A/A[5]	---	---	---	---
National Trails Highway – West of Hector Road	10/10[2]	A/A[5]	8.5	A	8.5	A
National Trails Highway – East of Hector Road	10/15[2]	A/A[5]	8.5	A	8.5	A
BLM Access Road – North of I-40	81/12[2]	A/A[5]	---	---	---	---

Notes and Sources: 2007 Traffic Volumes (Caltrans, 2008a); [2]AM/PM Volumes (Higher Volumes between Northbound and Southbound Direction), Source: National Data Services, 2008a; 2007 Truck Volumes (Caltrans, 2008b); 4 ADT LOS; 5 Peak Hour LOS; 6 Peak Hour LOS is based on Table 5.11-3, San Bernardino CMP, 2003 Update. Information not listed was not available; ADT = Average Daily Traffic; LOS = Level of Service. Source: URS Corporation 2008.

Traffic and Transportation Table 3
2011 Peak Hour Intersection
Levels of Service Without Project

Intersection	AM Average Delay (sec/veh)	LOS	PM Average Delay (sec/veh)	LOS
I-40 – Westbound Ramp/Hector Road	8.8	A	8.8	A
I-40 – Eastbound Ramp Hector Road	8.8	A	8.8	A
Hector Road/National Trails Highway	---	---	8.5	---

Source: URS Corporation.

Traffic and Transportation Table 4
2011 Peak Hour Intersection
Levels of Service During Construction

Intersection	AM Average Delay (sec/veh)	LOS	PM Average Delay (sec/veh)	LOS
I-40 – Westbound Ramp/Hector Road	15.5	C	13.1	B
I-40 – Eastbound Ramp Hector Road	16.5	C	11.0	B
Hector Road/National Trails Highway	8.5	A	8.5	A

Source: URS Corporation.

Construction Truck Deliveries

During construction the passenger car equivalent (PCE) of approximately 41 trucks are expected to arrive at and leave from the construction site each morning and evening, resulting in a total of 274 trips during the 48-month construction period. Most deliveries will occur between 7 AM and 5 PM on weekdays.

Because these trucks will use the temporary intersection off I-40 to Hector Road, which is controlled by a stop sign, staff is recommending for inclusion in Condition of Certification **TRANS-5** a requirement for ensuring that the arrival and departure time of these trucks does not occur in peak traffic periods, thereby contributing to a decrease in the LOS on I-40 to unacceptable levels.

To transport this equipment, the applicant must obtain special permits from Caltrans to move oversized or overweight materials. In addition, the applicant must ensure proper routes are followed; proper time is scheduled for the delivery; and proper escorts, including advanced warning and trailing vehicles as well as law enforcement control are available, if necessary.

Consequently, staff is recommending Condition of Certification **TRANS-6** to ensure the project owner will comply with vehicle size and weight limitations imposed by Caltrans and other relevant jurisdictions; Condition of Certification **TRANS-7** to ensure the applicant complies with Caltrans' and other relevant jurisdictions' limitations on encroachments into public rights of way; and **TRANS-8** to ensure that the project owner will restore all public roads, easements, and rights-of-way that have been damaged due to project-related construction activities. Repairs shall be of the kind to restore the roads, easements, and rights-of-way to their original or near-original condition.

Emergency Services Vehicle Access

The applicant is proposing to build a temporary access road to the project site. Staff has recommended Condition of Certification **TRANS-2** to require the applicant to conform to California State Fire Marshal requirements for adequate access for emergency vehicles.

With implementation of recommended Condition of Certification **TRANS-2**, staff's opinion is that the regional access to the site is adequate. Emergency vehicles, whether from local or surrounding cities, can access the site directly from I-40.

Transportation and Storage of Hazardous Materials

Approximately ten types of hazardous materials, including hydrogen gas, will be used at the site during construction. See **Hazardous Materials Handling** in this document. Those materials will be delivered to the site and disposed of by trucks via I-40 at regularly scheduled intervals. In addition, the CSP site would include chemical storage tanks.

To ensure that the transporting of hazardous materials will comply with all applicable federal and state regulations pertaining to the transportation of these materials, staff is recommending Condition of Certification **TRANS-9**. See **Traffic and Transportation Table 8** for information about these regulations.

Operation Impacts and Mitigation

Due to the nature and location of the CSP a relatively minor amount of traffic would be generated from the site during operations. Assuming the worst-case scenario, approximately 164 workers would drive alone and arrive at the site each day at 8-hour intervals. Assuming the worse-case scenario with truck traffic, an average of 12 round-trip truck trips daily would arrive throughout the day to the project site.

This increase in traffic, based on worst-case scenarios, would be minor and not contribute to increases in LOS on surrounding roads. Hence, no mitigation is required.

Operation of the CSP will result in a small amount of vehicular traffic. Operational workforce is estimated to be 164 workers. The arrival and departure time of those workers will be staggered in three 8-hour shifts to over operations on a 24-hour, 7-day-a-week basis. Consequently, peak weekday traffic will be less than 60 vehicles even if every employee were to commute in his or her own vehicle.

Consequently, the surrounding roadways and intersections are projected to operate well below LOS capacity when CSP is operational in 2016. Projections have taken into account continued local and regional growth.

Truck travel as well as other non-employee site visits will be very small and will typically occur during non-peak periods. Consequently, cumulative operational impacts will not be significant and not require mitigation.

Emergency Services Vehicle Access

Regional access to the site will be directly from I-40 via a permanent access road to be built by the applicant. Staff recommends Condition of Certification **TRANS-3** to ensure that the access road conforms with local, county, and State Fire Marshal codes, including those that pertain to requirements for emergency vehicle access such as fire trucks and ambulances. Implementation of Condition of Certification **TRANS-3** would ensure that access for emergency vehicles is adequate.

Parking

Parking for workers would be providing onsite on the grounds of a 10-acre satellite services complex located in the eastern portion of the Phase II section of the project site. When operational, the project would employ up to 164 workers, who would work in three 8-hour shifts. Consequently, parking for workers is adequate.

Water and Rail Obstructions

The proposed CSP is not located adjacent to a navigable body of water; therefore, the CSP is not expected to alter water-related transportation. However, BNSF operates a double-track railroad line through the project site. Staff is proposing Condition of Certification **TRANS-4** to address safety concerns associated with workers and other aspects of project construction.

Impact of Glare

The proposed Calico Solar Project would utilize SunCatchers— a 40-foot tall, 25-kilowatt-electrical (kWe) solar dish developed by Stirling Energy Systems. The SunCatcher system consists of a unique radial solar concentrator dish structure that supports an array of curved glass mirror facets. Those mirrors are designed to automatically track the sun and collect and focus or concentrate its solar energy onto a patented power conversion unit (PCU).

The SunCatcher mirrors have the potential to move off-axis during cloud cover, and staff is concerned that the energy of the reappearing sun redirected from the mirrors nearest the rail line may pose a visual hazard to motorists on I-40; construction and operational workers; visitors; and crews and passengers on trains traversing the project site on BNSF tracks

Consequently, staff has determined that the impacts of the SunCatchers may present a hazard to motorists; workers; visitors; and train crews and passengers and is in the process of obtaining additional information to determine the impact of the SunCatcher mirrors.

Transportation of Hazardous Materials

Approximately ten types of hazardous materials will be used at the site during operations. See **Hazardous Materials Handling** in this document. Those materials will be delivered to the site and disposed of by trucks via Interstate 40 at regularly scheduled intervals.

Consequently, staff is recommending Condition of Certification **TRANS-9** to ensure that the transporting of hazardous materials will comply with all applicable federal and state regulations pertaining to the transportation of these materials. See **Traffic and Transportation Table 3** for information about these regulations.

Cumulative Impacts

According to *California Environmental Quality Act (CEQA) Guidelines*, a project may result in significant adverse cumulative impacts when its effects are "cumulatively considerable."

Cumulatively considerable means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, or the effects of probable future projects (Title 14, California Code of Regulations, section 15130).

Cumulative traffic and transportation impacts could occur when more than one project has an overlapping construction schedule resulting in a demand on highways that, if met, would result in an unacceptable level of service (LOS). An unacceptable level of service would result in traffic delays, significantly reduced traffic flows, and backup of traffic at signed intersections.

Operational cumulative traffic and transportation impacts could occur when the operation of multiple projects significantly impacts the highways, resulting in unacceptable levels of service (LOS) on highways.

Cumulative impacts of the Calico Solar Project were analyzed in the context of other known projects in the area. The analysis was based on the construction schedule indicated in the Executive Summary of the *Application for Certification* prepared by the applicant and submitted to the California Energy Commission on December 2, 2008. In that Executive Summary the applicant indicated that construction would begin in Fall 2010; be completed in Fall 2012; and the plant would be in full-scale operation in Winter 2012. The year 2012 traffic estimate is based on a 2% per year general growth rate.

In the general vicinity of the Calico Solar Project, the following projects were proposed, approved, or already exist:

1. Abengoa Solar Project, 250 MW solar thermal, Proposed. Application for Certification being reviewed by California Energy Commission.
2. SES Solar Three, 914 MW solar thermal, Proposed.
3. SES Solar Six, 1,631 MW solar thermal, Proposed.
4. Southern California Edison Pisgah Substation Expansion and Pisgah-Lugo Upgrade, Proposed.

5. CACTUS, originally a solar plant, now converted into an observatory, Existing.
6. Two small mines within 14 miles of project, Existing.

Staff analyzed the traffic-related impacts of those existing or proposed projects when combined with the traffic-related activities of the Calico Solar Project.[2] See **Cumulative Impacts Figure 3.**

Except for the Abengoa Mojave Project, the existing or proposed projects although relatively close to the Calico Solar Project on I-40 will not significantly impact traffic due to number of workers; construction schedules, and existing capacity of I-40.

However, the Abengoa Mojave Project Application for Certification (AFC) is currently being reviewed by the California Energy Commission. This project has the potential to result in cumulative impacts on local highways. Abengoa Mojave's 24-month construction period –third third quarter 2010 to third quarter 2012—overlaps with the construction schedule of the Calico Solar Project. In fact, the Calico Solar Project has essentially the same construction schedule—late 2010 to late 2012.

However, impacts will be mitigated to less than significant through the following actions:

1. For the Abengoa Mojave project, staff assumed that workers would be traveling from the west. Total daily peak construction traffic, including workforce and busses, would be 2,092 vehicle trips, 52 bus trips, and 134 truck trips. To reduce traffic impacts staff recommended Condition of Certification **TRANS-1**, which required the applicant to provide a park-and-ride lot west of the site near SR-58. Consequently, traffic would likely travel on US Route 395 to SR 58 to get to the Park-and-Ride lot. See **Cumulative Impacts Figure 3.**

   However, staff also assumed that some if not all workers would be staying in hotels and motels in the Barstow area. Consequently, staff will include this assumption in its final staff analysis. In addition, staff will recommend a condition of certification that would require workers to walk to central locations in Barstow to be picked up and transported to the project site, thereby eliminating the need for a park-and-ride location for those staying in motels and hotels.

2. For the Calico Solar Project, staff assumed that the workers would also be traveling from the west. During peak construction month, the applicant estimated 731 vehicles, one for each worker, traveling to and from the site and 41 truck deliveries. Those workers would likely travel to the site on I-15 to Barstow and then to I-40 to the project site. See **Cumulative Impacts Figure 3**. For those workers, staff is recommending Condition of Certification **TRANS-10** to require a park-and-ride lot in or near Barstow.

3. However, for the Calico Solar Project, staff assumes that most if not all workers will stay in Barstow and commute to the project site. To reduce traffic on I-40, staff is recommending Condition of Certification **TRANS-11**, requiring bus transportation from Barstow to the project site. That condition of certification would require that

[2] Other projects were proposed but not considered, including Broadwell BrightSource, three wind projects, and the Twentynine Palms Expansion because of existing concerns with the projects; location; or length of EIS review period ..

workers walk to central locations in Barstow to be picked up and transported to the project site, thereby eliminating the need for a park-and-ride location for those staying in hotels and motels.

In addition, during regular operations projects listed in this section generate a negligible amount of traffic. Consequently, the cumulative impacts of these projects are less than significant.

Conflict with Policies, Plans, or Programs

With implementation of recommended conditions of certification, the Calico Solar Project would not conflict with any formal policies, plans, or programs related to transportation aspects of the project.

C.11.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the central portion of the proposed 850 MW project. It was developed because it could be constructed without the necessity of a new 500 kV transmission line, and would avoid several other environmental impacts. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

C.11.5.1 SETTING AND EXISTING CONDITIONS

The general setting and existing conditions would remain as described in C.11.4.1 although the land requirements would be proportionately reduced to reflect the smaller project size. Locations of laydown areas may also vary.

C.11.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The implementation of this alternative would reduce the number of workers needed for the construction and operation of this project. However, that reduction would not have a significant impact for the following reasons: It does not change the project's setting and the change in the number of workers is not significant . That is, traffic would still need to be mitigated because of the intersection at which workers would need to exit to the project. That intersection is signed and without mitigation, LOS would decrease to unacceptable levels.

C.11.5.3 CEQA LEVEL OF SIGNIFICANCE

Similar to the proposed project, staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant impacts would occur as a result of waste management associated with the Reduced Acreage Alternative.

The implementation of this alternative would not significantly affect the number of workers needed for the construction and operation of this project because it does not change the setting of the project or the necessity of the workers to travel on I-40. Workers required for this project is relatively small and even each worker traveling alone in one vehicle would not exceed acceptable levels of service on I-40. However, staff has proposed mitigation to encourage car-pooling or other methods of reducing traffic impacts.

C.11.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed 850 MW project. This alternative, the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 2**.

C.11.6.1 SETTING AND EXISTING CONDITIONS

The general setting and existing conditions would remain as described in C.15.4.1 although the land requirements would be proportionately reduced to reflect the smaller project size. Locations of laydown areas may also vary.

C.11.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

With suitable mitigation, the 720 MW solar facility located with the boundaries of the proposed 850 MW project would not significantly affect the level of service (LOS) on I-40. Based on the LOS for I-40 in the location of the Calico Solar Project, the additional number of vehicles could be absorbed and not cause a significant impact on the road. However, to get to the project site, workers have to travel through an intersection that is controlled by a stop sign.

Consequently, traffic could easily get backed up from both east and west directions and result in a decrease in a LOS to a significant level. However, suitable mitigation exists to ensure that the LOS is kept acceptable levels. That mitigation consists of park-and-ride locations and staggered work hours. However, because of the location of the Calico Solar Project; the expected direction of travel of workers—west; and the location of the project site from workers' homes, workers would likely stay in motels in the local area and be transported to the project site on buses provided by the applicant.

Consequently, the impact of workers on the local roadway would be insignificant.

Presently, open BLM routes that traverse the Avoidance of Donated and Acquired Lands Alternative area would be closed if the proposed project is approved, limiting transportation through the area. Fewer routes would be impacted, compared with the proposed action.

C.11.6.3 CEQA LEVEL OF SIGNIFICANCE

Similar to the proposed project, staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant impacts would occur as a result of traffic and transportation associated with the 720 MW Alternative.

C.11.7 NO PROJECT/NO ACTION ALTERNATIVE

There are three No Project / No Action Alternatives evaluated as follows:

C.11.7.1 NO PROJECT / NO ACTION ALTERNATIVE #1

No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

If the proposed project is not approved, renewable projects would likely be developed on other sites in San Bernardino County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District.

The impacts of traffic and transportation of developing renewable projects being developed on other sites in San Bernardino County, the Mojave Desert, or adjacent states would be not significant because of the various mitigation measures available for transporting workers to those sites. These mitigation measures include:

1. Busing workers to the sites from central locations
2. Staying in local hotels and motels near the site and being bused to the site
3. Staggering work hours over a 24-hour period
4. Providing park-and-ride locations

C.11.7.2 NO PROJECT / NO ACTION ALTERNATIVE #2

No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. As a result, impacts on traffic and transportation would essentially be the same and the same mitigation would be proposed to ensure a significant impact on the roadways would not occur.

That mitigation would include park-and-ride locations; staying in motels and being bused to work; and staggering work hours.

C.11.7.3 NO PROJECT / NO ACTION ALTERNATIVE #3

No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result the negative impacts on the local transportation system would be nonexistent due to the construction and operation of a solar project. Roads would continue to operate at a relatively high level of service.

C.11.8 PROJECT-RELATED FUTURE ACTIONS - TRANSPORTATION AND TRAFFIC

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios

- The 275 MW Early Interconnection Option would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The 850 MW Full Build-Out Option would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at

a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.11.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

The proposed transmission line route would generally follow a southwest line from north of the Town of Newberry Springs, crossing I-40 east of Daggett, crossing State Highway 247 and terminating south of Hesperia at the SCE Lugo Substation. The major access routes for project workers would likely be I-40, I-15, and State Highway 247, as well as secondary routes such State Route 18 (SR 18).

The section of I-40 within the project area would be from Barstow southeast to Needles. This segment of I-40 is a fully improved freeway through Barstow at the junction with I-15. I-15 extends northeasterly from the Victorville area through Barstow and Las Vegas. It is fully improved to freeway status in the Victorville area with grade-separated interchanges at Bear Valley Road, Palmdale Road, Hook Boulevard, Mojave Drive, "D" Street, and Stockton Wells Road. State Highway 274 is classified as a minor arterial and is a two-lane highway connecting Barstow and Lucerne Valley near SR 18. SR 18 is a two-way, two-lane roadway.

The roadway operating characteristics for these routes have been defined in several recent transportation planning documents, including the Victor Valley Area Transportation Study (SANBAG 2008). LOS defines roadway operating conditions as follows:

- **LOS A**: Free flow, with no restrictions on maneuvering or operating speeds. Minimal or no delay.
- **LOS B**: Stable flow, with some restrictions on maneuvering or operating speeds. Nominal delays
- **LOS C**: Stable flow, with more restrictions on speed and maneuverability. Some delays.
- **LOS D**: Approaching unstable flow. Restricted speed and maneuverability. Delays encountered at intersections.
- **LOS E**: Unstable flow, with some stoppages. Constitutes maximum capacity by definition. Extensive delays at some locations.
- **LOS F**: Forced flow, with many stoppages. Low operating speeds, extensive queuing and very extensive delays.

The Victor Valley Area Transportation Study identifies current Level of Service (LOS) for I-15 as LOS C or better, and SR 18 in the Victor Valley Area as LOS D, E or F. Bear

Valley Road at the I-15 interchange (between Highway 395 and Cottonwood Road) is also operating at a LOS F (SANBAG 2008). The intersection of U.S. 395 and SR 18 in Victorville has been improved and is controlled with traffic signals. Widening SR 18 has been proposed as part of the High Desert Corridor project improving highway access between Victorville and Palmdale to the west. **TRAFFIC AND TRANSPORTATION Table 5** lists the 2008 traffic volumes on SR 18 between Highway 247 and Highway 395 in the Apple Valley, Victorville and Hesperia areas.

Traffic And Transportation Table 5
2008 Traffic Volumes on State Route 18 between Highway 247 and Highway 395

Postmile[1]	State Route 18 Description	Back Peak Hour	Back Peak Month	Back AADT[2]	Ahead Peak Hour	Ahead Peak Month	Ahead AADT[2]
73.783	Lucerne Valley, Jct. Rte. 247	520	5,600	5,400	920	10,000	9,600
84.325	Bear Valley Cutoff	910	11,000	10,400	470	5,700	5,400
88.871	Apple Valley, Yucca Loma-Navajo Road	1,100	13,500	12,800	1,750	21,800	20,700
90.936	Apple Valley Inn Road	2,250	27,000	26,500	2,850	34,500	33,500
94.390	Apple Valley Road	2,850	34,500	33,500	4,050	48,500	47,500
95.220	Victorville, Stoddard Wells Road	4,050	48,500	47,500	3,800	45,500	44,500
95.790	Victorville, Seventh Street	3,100	37,500	36,500	2,700	32,500	31,500
96.571	Victorville, North Jct Rte 15, Barstow Freeway Jct. Rte. 15	2,350	28,000	27,500	4,050	46,500	43,500
97.001	Victorville, Amargosa Road	4,050	46,500	43,500	2,950	33,500	31,500
100.956	Jct. Rte. 395	1,750	20,000	18,700	950	11,100	8,600

Source: Caltrans 2008.
[1] Postmile: Each profile breakpoint is identified by the milepost value corresponding to that point on the highway. The milepost values increase from the beginning of a route within a county to the next county line. The milepost values start over again at each county line. Milepost values usually increase from south to north or west to east depending upon the general direction the route follows within the state. The milepost at a given location will remain the same year after year.
[2] Annual Average Daily Traffic (AADT) is the total volume for the year divided by 365 days. Back AADT, Peak Month, and Peak Hour usually represents traffic South or West of the count location. Ahead AADT, Peak Month, and Peak Hour usually represent traffic North or East of the count location.

C.11.8.2 ENVIRONMENTAL IMPACTS

The construction activity requiring the largest workforce would likely be the installation of the conductors and optical ground wire (OPGW). In addition, at some stages of the project, especially during the full build-out construction, multiple locations would be under construction simultaneously.

Consequently, several independent construction teams may be working throughout the project area. As a result, the overall peak number of workers may be greater. The area’s roadways would also be used for transportation of equipment and access to the temporary staging areas and the transmission and telecommunication corridors. Finally, the movement of heavy machinery or the possible need to use rail lines, such as the BNSF railroad tracks that bisect the project area, to deliver equipment or materials to the project site could also affect the surrounding transportation system.

The proposed SCE upgrades are unlikely to adversely affect traffic circulation or parking conditions along any of the expected access routes. Both options would be required to comply with updated requirements in transportation plans for San Bernardino County and the cities of Victorville and Hesperia. All of the transportation plans for these communities are being changed and improvements implemented as part of the Southern California Association of Governments' Regional Transportation Improvement Plan and San Bernardino County's updated Regional Transportation Plan.

The upgrades associated with the 275 MW Early Interconnection option would occur primarily in rural areas with low traffic volumes; however, the 850 MW Full Build-Out option could affect the LOS for transportation facilities under the jurisdiction of Caltrans and the local communities. Based on this preliminary analysis of LOS of highway segments that would be likely to be used to access the project site by workers, the major potential impact is increased traffic on SR 18 east of U.S. 395 by workers accessing the Lugo Substation and the southwestern portion of the proposed transmission line route. This roadway segment is currently at an LOS D, E or F and is likely to drop below target operations levels in the next few years if roadway improvements are not implemented. It is assumed that some workers would carpool, and not all workers would be commuting from the project site on I-40, I-15, State Highway 247 and SR 18. Regardless, at the beginning and end of the work day, additional construction personnel would travel on SR 18 east of U.S. 395. Although the exact number of construction workers is unknown, construction of the 850 MW Full-Build Out option would temporarily exacerbate existing congestion on SR 18 east of U.S. 395 in Hesperia and may result in potentially significant temporary impacts to traffic flow.

In addition, large vehicles delivering materials and oversized vehicles used in the construction process may affect traffic flow on one or more of the roadways, resulting in a safety hazard. These potential impacts can be avoided through mitigation, which is discussed below. In addition, there is potential for unexpected damage to roads by vehicles and equipment (overhead line trucks, crew trucks, concrete trucks, etc.) that would be entering and leaving roads within the project area.

Helicopters may be used to support construction during stringing activities, in areas where access is limited (e.g., no suitable access road, limited pad area to facilitate onsite structure assembly area), where there are environmental constraints to accessing the project area with standard construction vehicles and equipment, and periodically for maintenance during operation.

Project activities potentially facilitated by helicopters may include delivery of construction laborers, equipment and materials to structure sites, structure placement, hardware installation, and wire stringing operations. The operations area of the helicopters would be limited to helicopter staging areas near construction locations that are considered safe for landing. Final siting of staging areas for the SCE project would be conducted with the input of the helicopter contractor, affected private landowners and land management agencies.

Permits and Impact Fees. Some of the potential permits and impact fees that may be applicable to the project construction and transport of equipment or materials include:

- City of Victorville Oversize Load Permit
- Apply at least 2 working days prior to oversize load on city roadways Caltrans Oversize Load Permit
- Apply at least 7 working days prior to oversize load on state highways Lucerne Valley Local Area Transportation Facilities Impact Fee
- Assessed on commercial projects and truck trips on Lucerne Valley roadways

C.11.8.3 MITIGATION

Because SR 18 east of U.S. 395 in Hesperia is already highly congested, and project-related construction traffic would exacerbate congestion, project impacts on SR 18 east of U.S. 395 in Hesperia are considered potentially significant. To limit SCE's project's contribution to existing congestion on SR 18 east of U.S. 395 in Hesperia, implementation of mitigation similar to Conditions of Certification in this Staff Assessment/EIS, which would require development and approval of a traffic control plan, would be recommended. The traffic control plan should include methods to substantially reduce the project's impact on SR 18 traffic or interference with road widening construction, such as staggering the departure of construction workers from the project area and/or establishing a carpool/vanpool incentive program. With proper implementation of the traffic control plan, the project's direct impact during construction can be reduced to a less than significant level.

Temporary guard structures should be constructed across roads and other potentially inhabited areas to protect those areas in the unlikely event that a conductor breaks and the line falls to the ground. This safety precaution would reduce the potential for construction materials falling on any intersecting roadways during the tensioning/cable pulling process. The following possible locations would be where guard structures may be installed to facilitate construction crossings: existing distribution lines, dirt roads, and other roadway and rail crossings, such as the AT&SF Railroad. The types of guard structures that would be required for crossings and the number of crossings necessary should be field verified upon completion of final design. Installation of guard structures would also help to ensure that access for emergency service providers is maintained to the maximum extent feasible.

All access and spur road improvements and construction, whether on or off of the ROW, would comply with applicable permits and approvals, and SCE has preliminarily stated that any damage to existing roads as a result of construction would be repaired once construction is complete.

The use of helicopters for the erection of LSTs would be in accordance with SCE specifications and would be similar to methods detailed in IEEE 951-1966, Guide to the Assembly and Erection of Metal Transmission Structures, Section 9, Helicopter

Methods of Construction. The upgrades, including all helicopter construction activities, would also be required to comply with all appropriate regulations of the Federal Aviation Administration (FAA), such as restrictions on helicopter flights within 1,500 feet of residential dwellings. To offset potential impacts from helicopter use, helicopter use should be included in the Traffic Management Plan, which should be developed as part of the mitigation similar to Condition of Certifications in this Staff Assessment/EIS.

C.11.8.4 CONCLUSION

The intersection of a new access road with an existing public road would be constructed in accordance with the requirements of the agency having authority over the existing public road. Any activity that would need to occur outside of the existing transmission line ROW would require landowner notification and permission for access. Movement of heavy machinery on local roads would occur intermittently, but infrequently over the construction period. Since the majority of the upgrade activities for both options would take place in undeveloped areas on BLM land, impacts to traffic level of service for most roadways in the project vicinity would be less than significant. However, because SR 18 east of U.S. 395 in Hesperia is already highly congested and project-related construction traffic would exacerbate congestion, project impacts to traffic flow on SR 18 east of U.S. 395 in Hesperia are considered potentially significant.

To limit SCE's project's contribution to existing congestion on SR 18, implementation of mitigation similar to Conditions of Certification in this Staff Assessment/EIS is recommended. Based on the temporary nature of the construction activities and the minor staffing and equipment expected to be required compared to the traffic volumes on I-40, I-15, State Highway 247 and SR 18, coupled with implementation of mitigation measures similar to Conditions of Certification concerning peak hour traffic would likely ensure that any potential impacts of SCE's upgrades to traffic and transportation would be less than significant.

C.11.9 CUMULATIVE IMPACT ANALYSIS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

There is the potential for substantial future development in the San Bernardino Valley area and throughout the southern California desert region. Analysis of cumulative impacts is based on data provided in the following maps and tables (see **CUMULATIVE SCENARIO**):

- Cumulative Impacts Figure 1, Regional Renewable Applications;
- Cumulative Impacts Figure 2, Renewable Applications in the Barstow & Needles District Areas;

- Cumulative Impacts Figure 3, Newberry Springs/Ludow Area - Existing and Future/Foreseeable Projects;
- Cumulative Impacts Table 1, Renewable Energy Projects in the California Desert District
- Cumulative Impacts Table 2, Existing Projects in the Newberry Springs/Ludow Area; and
- Cumulative Impacts Table 3, Future Foreseeable Projects in the Newberry Springs/Ludlow Area.

The analysis in this section first defines the geographic area over which cumulative impacts related to traffic and transportation could occur. The cumulative impact analysis itself describes the potential for cumulative impacts to occur as a result of implementation of the Calico Solar Project along with the listed local and regional projects.

Geographic Extent

Cumulative impacts can occur within San Bernardino County if implementation of the Calico Solar Project could combine with those of other local or regional projects. Cumulative impacts could also occur as a result of development of some of the many proposed solar and wind development projects that have been or are expected to be under consideration by the BLM and the Energy Commission in the near future. Many of these projects are located within the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona.

The geographic extent for the analysis of the cumulative impacts associated with the Calico Solar Project includes San Bernardino County. This geographic scope is appropriate because the roads to be most affected by the project are roads that are located in San Bernardino County, particularly I-40.

Potential Environmental Impacts

Local Impacts

Eleven projects either exist or are projected to be constructed during the same period as the Calico Solar Project. See Cumulative Impacts Figure 3 and the Cumulative Impacts section of this document.

These projects include the following:

1. Abengoa Solar Project, 250 MW solar thermal, Proposed. Application for Certification being reviewed by California Energy Commission.
2. SES Solar Three, 914 MW solar thermal, Proposed.
3. SES Solar Six, 1,631 MW solar thermal, Proposed.
4. Southern California Edison Pisgah Substation Expansion and Pisgah-Lugo Upgrade, Proposed.

5. CACTUS, originally a solar plant, now converted into an observatory, Existing.
6. Two small mines within 14 miles of project, Existing.

According to *California Environmental Quality Act (CEQA) Guidelines*, a project may result in significant adverse cumulative impacts when its effects are "cumulatively considerable."

Cumulatively considerable means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, or the effects of probable future projects (Title 14, California Code of Regulations, section 15130).

Cumulative traffic and transportation impacts could occur when more than one project has an overlapping construction schedule resulting in a demand on highways that, if met, would result in an unacceptable level of service (LOS). An unacceptable level of service would result in traffic delays, significantly reduced traffic flows, and backup of traffic at signed intersections.

Operational cumulative traffic and transportation impacts could occur when the operation of multiple projects significantly impacts the highways, resulting in unacceptable levels of service (LOS) on highways.

Cumulative impacts of the Calico Solar Project were analyzed in the context of other known projects in the area. The analysis was based on the construction schedule indicated in the Executive Summary of the *Application for Certification* prepared by the applicant and submitted to the California Energy Commission on December 2, 2008. In that Executive Summary the applicant indicated that construction would begin in Fall 2010; be completed in Fall 2012; and the plant would be in full-scale operation in Winter 2012. The year 2012 traffic estimate is based on a 2% per year general growth rate.

In the general vicinity of the Calico Solar Project, the following projects were proposed, approved, or already exist:

1. Abengoa Solar Project, 250 MW solar thermal, Proposed. Application for Certification being reviewed by California Energy Commission.
2. SES Solar Three, 914 MW solar thermal, Proposed.
3. SES Solar Six, 1,631 MW solar thermal, Proposed.
4. Southern California Edison Pisgah Substation Expansion and Pisgah-Lugo Upgrade, Proposed.
5. CACTUS, originally a solar plant, now converted into an observatory, Existing.
6. Two small mines within 14 miles of project, Existing.

Staff analyzed the traffic-related impacts of those existing or proposed projects when combined with the traffic-related activities of the Calico Solar Project.[3] See **Cumulative Impacts Figure 3.**

Except for the Abengoa Mojave Project, the existing or proposed projects, although relatively close to the Calico Solar Project on I-40, will not significantly impact traffic due to number of workers; construction schedules, and existing capacity of I-40.

However, the Abengoa Mojave Project, whose Application for Certification (AFC) is currently being reviewed by the California Energy Commission, has the potential to result in cumulative impacts on local highways.

Abengoa Mojave's 24-month construction period –third third quarter 2010 to third quarter 2012—overlaps with the construction schedule of the Calico Solar Project. In fact, the Calico Solar Project has essentially the same construction schedule—late 2010 to late 2012.

However, impacts will be mitigated to less than significant through the following actions:

1. For the Abengoa Mojave project, staff assumed that workers would be traveling from the west. Total daily peak construction traffic, including workforce and busses, would be 2,092 vehicle trips, 52 bus trips, and 134 truck trips. To reduce traffic impacts staff recommended Condition of Certification **TRANS-1**, which required the applicant to provide a park-and-ride lot west of the site near SR-58. Consequently, traffic would likely travel on US Route 395 to SR 58 to get to the Park-and-Ride lot. See **Cumulative Impacts** Figure 3.

   However, staff also assumed that some if not all workers would be staying in hotels and motels in the Barstow area. Consequently, staff will include this assumption in its final staff analysis. In addition, staff will recommend a condition of certification to require workers to walk to central locations in Barstow to be picked up and transported to the project site, thereby eliminating the need for a park-and-ride location for those staying in motels and hotels.

2. For Abengoa Solar workers traveling to the project site, staff assumed they would be driving north on US Route 395 to get to the project site because that route is closest to the park-and-ride lot proposed as Condition of Certification **TRANS-1** in the Abengoa Mojave preliminary staff assessment.

   For the Calico Solar Project, staff assumed that the workers would also be traveling from the west and driving north on I-15 and then driving west on 1-40 to the project site. During peak construction month, the applicant estimated 731 vehicles, one for each worker, traveling to and from the site and 41 truck deliveries. Those workers would likely travel to the site on I-15 to Barstow and then to I-40 to the project site. See **Cumulative Impacts Figure 3**. For those workers, staff is recommending Condition of Certification **TRANS-10** to require a park-and-ride lot in or near Barstow.

[3]Other projects were proposed but not considered, including Broadwell BrightSource, three wind projects, and the Twentynine Palms Expansion because of existing concerns with the projects; location; or length of EIS review period ..

3. However, for the Calico Solar Project, staff assumes that most if not all workers will stay in Barstow and commute to the project site. To reduce traffic on I-40, staff is recommending Condition of Certification **TRANS-11**, requiring bus transportation from Barstow to the project site. That condition of certification would require that workers walk to central locations in Barstow to be picked up and transported to the project site, thereby eliminating the need for a park-and-ride location for those staying in hotels and motels.

During regular operations facilities listed in this section generate a negligible amount of traffic. Consequently, the cumulative impacts of these projects are less than significant.

Regional Impacts

Projects located along I-40 and included in **Cumulative Impacts Figure 1**, **2**, and **3** and **Cumulative Tables 1B, 2,** and **3**, may have the potential to result in increased congestion on that highway. These projects include solar and wind projects in the California Desert District and Renewable energy projects. Not all projects will be built. However, the construction of one of these projects, Abengoa, is in the process of being reviewed by the California Energy Commission. And if built as proposed, it has the potential to affect traffic on local roads and highways.

As indicated in the Local Impacts section, above, for both the Abengoa Mojave Project, staff has proposed Condition of certification **TRANS-1** in the Abengoa Mojave preliminary staff assessment and in the Calico Solar Project, Condition of Certification **TRANS-10** and Condition of Certification **TRANS-11** to mitigate any impacts.

In addition, staff:

1. Notes that with the proposed park-and-ride location nearer to the Abengoa Solar site, workers to the site will likely travel on US Route 395, thus not compounding any traffic volumes on I-15, the route likely to be used by workers to the Calico Solar Project site.
2. Assumes that most workers for both the Abengoa Mojave Project as well as the Calico Solar Project will reside in motels in Barstow and the surrounding area rather than drive an average of 100 miles each way to the project site every day. Staff will revise its final staff assessment of Abengoa Solar to include the assumption that most workers will reside in motels in Barstow or the local area, which will dramatically reduce traffic on both US Route 395 and I-15.

<u>Cumulative Impacts Conclusion</u>

In this analysis, staff considered the cumulative impacts of all future/foreseeable and existing projects as indicated in **Cumulative Impacts Figure 3** would not result in a significant cumulative impact for the following reasons:

1. The number of workers needed for existing projects is minimal.
2. The mitigation measures proposed for both Abengoa Mojave and the Calico Solar Project as well as the likelihood that most workers for both the Abengoa Mojave and the Calico Solar Project will stay in local motels during the weekend and be bused to

the worksites will result in acceptable levels of level of service (LOS) on roads and highways to be of acceptable levels.

3. Even all existing and proposed projects used the same roadways, which is not the case, the conditions of certification imposed on Abengoa Mojave and the Calico Solar Project, which include park-and-ride programs; use of different highways to get to and from the job site; as well as the likelihood that workers will reside in local hotels and motels during the construction period would help to ensure that affected roadways operated at acceptable LOS.

C.11.10 COMPLIANCE WITH LORS

The proposed Calico Solar Project is intending to comply with all federal, state, and local LORS. Development and operation of the Calico Solar Project, as planned, would not conflict with the LORS as described in this section. **Traffic and Transportation Table 6** summarizes the SES Solar Two's conformance with all applicable LORS.

Traffic and Transportation Table 6
Calico Solar Compliance with Adopted Traffic and Transportation LORS

Applicable Law	Description
Federal	
Code of Federal Regulations (CFR), Title 14, Aeronautics and Space; Part 77, Objects Affecting Navigable Airspace (14 CFR 77)	This regulation includes standards for determining physical obstructions to navigable airspace; information about requirements for notices, hearings, and requirements for aeronautical studies to determine the effect of physical obstructions to the safe and efficient use of airspace. *Not applicable.*
*Code of Federal Regulations (*CFR*)*, Title 49, Subtitle B, Sections 171-177; Sections 350-399; Appendices A-G Other Regulations Relating to Transportation	49 CFR Subtitle B includes procedures and regulations pertaining to interstate and intrastate transport (including hazardous materials program procedures) and as well as safety measures for motor carriers and motor vehicles operating on public highways. *Consistent:* Applicant has indicated its intention to adhere to all applicable regulations. This adherence is made part of the licensing process as a Condition of Certification; **TRANS-5**; **TRANS-6**; **TRANS-7**; **TRANS-8**; and **TRANS-9**.

Applicable Law	Description
State	
California Vehicle Code (CVC), Division 2, Chapter 2.5, Div. 6; Chap. 7, Div. 13; Chap. 5, Div. 14.1; Chap. 1 and 2, Div. 14.8, Div. 15	These code sections pertain to licensing, size, weight, and load of vehicles operated on highways; safe operation of vehicles; and transporting hazardous materials. *Consistent:* Adhering to these regulations is made part of the licensing process as a Condition of Certification. See **TRANS-6** and **TRANS-9**.
California Streets and Highway Code, Section 117; Section 660-695; Section 700-711; Section 1450; 1460 et seq.; and 1480 et. Seq.	Pertain to regulating rights-of-way encroachments and granting permits for encroachment on state highways and freeways and on county roads. *Consistent:* Adhering to these regulations is made part of the licensing process as Condition of Certifications. See **TRANS-7.**
California Health and Safety Code; Section 25160 et seq.	Pertain to operators of vehicles transporting hazardous materials. *Consistent:* Adhering to these regulations is made part of the licensing process as a Condition of Certification. See **TRANS-9**.
California Public Resources Code, Section 21096	Requires lead agencies performing a CEQA analysis on a project situated within airport land use compatibility plan boundaries to use the Airport Land Use Planning Handbook (ALUPH) published by Caltrans Aeronautics as a technical resource to assist in the analysis. *Consistent:* Energy Commission staff adhered to this regulation when preparing this document.
Local	
San Bernardino General Plan, Circulation and Infrastructure Element, Desert Region	Pertains to public policies and strategies for the transportation system in San Bernardino County, including those pertaining to transportation routes, terminals, and facilities; construction of extensions of existing streets; and levels of services (LOS). *Consistent:* See **TRANS-5; TRANS-6**; **TRANS-7**; **TRANS-8** and **TRANS-9.**
San Bernardino Traffic Code, Section 52.0125	Pertains to requirements for oversize and overweight vehicles. *Consistent:* See Condition of Certification **TRANS-6**.

C.11.11 NOTEWORTHY PUBLIC BENEFITS

The proposed project would result in traffic and transportation impacts related to project construction. These impacts are found to be cumulatively significant. Consequently, staff has recommended conditions of certification to reduce the impact to less than significant. BLM's evaluation for compliance with NEPA assumes that these Conditions of Certification are part of the proposed action.

While the development of the proposed project is intended to address the requirements of federal and state mandates to develop renewable energy, it would not yield any noteworthy public benefits related to traffic and transportation.

C.11.12 FACILITY CLOSURE

Staff has considered facility closure and decommissioning impacts to Traffic and Transportation under individual headings in Assessment of Impacts and Discussion of Mitigation above. Impacts would be mitigated by implementing the required conditions of certification.

C.11.13 PROPOSED CONDITIONS OF CERTIFICATION

TRANS-1– Parking and Staging. During construction of the Calico Solar Project and all related facilities, the project owner shall develop and implement a parking and staging plan for all phases of project construction. This parking and staging plan shall be designed to enforce a policy that all project-related parking occurs on-site or in designated off-site parking areas and that staging occurs on-site in a specifically-defined area.

Verification: At least 60 days prior to start of site mobilization, the project owner shall submit the plan to the County of San Bernardino and BLM Operations Manager for review and comment and to the CPM for review and approval.

TRANS-2 – Temporary Access Road. The applicant proposes to construct a temporary access road to the site. This access road shall be an all-weather road designed to allow for fire-truck access during all weather and soil conditions. The road shall be constructed of materials, including culverts and paving, so that it will be safe for use in crossing washes located on the site. In that regard, the road shall be constructed to requirements as outlined in the *California Code of Regulations* Title 19, section 3.05(a). This road will be used by workers, visitors, vendors, and emergency vehicles.

In addition, because this road, which will be gated, crosses the BNSF railroad tracks, certain safety precautions must be put in place, including a flagperson on site to control all traffic coming and going through the gates during construction hours.

Consequently, the applicant shall prepare a safety plan for ensuring that all state and federal safety requirements for railroad crossings are followed, including those required by the Public Utilities Commission as well as the

Federal Railroad Administration. That plan shall be coordinated with those state and federal agencies.

Verification: At least 60 days prior to start of site mobilization, the project owner shall submit the safety plan to the BLM Operations Manager for review and comment, and to the CPM for review and approval.

TRANS-3 – Permission to Construct Permanent Road to Site. The applicant proposes to construct a permanent road to the site. This road is located on private land but will be used by workers and members of the public to access this site. This road also consists of a bridge designed to transverse the BSNF railroad crossing.

This road will be used by workers, delivery persons, and emergency vehicles. Consequently, the applicant shall construct the road according to California State Fire Marshall specifications as outlined in *California Code of Regulations*, Title 19, Section 2.05(a).

In addition, because this road will consist of a bridge transversing BNSF tracks and is located on federal land, the applicant shall before beginning construction of the bridge:

1. Obtain written agreement from BNSF for constructing the bridge. The bridge shall be constructed to all state and federal requirements as required by the California Public Utilities Commission (PUC) and the Federal Railroad Administration (IFRA).
2. File a formal application for the alternation of a railroad crossing with the Public Utilities Commission.
3. Contact the Federal Railroad Administration, which has authority over all railroad crossings, public and private, to ensure compliance with all federal requirements.

After the agreement is obtained from the PUC and BNSF and construction is completed, the applicant shall obtain all necessary and required inspections and approvals from BNSF as well as the PUC and FRA.

Verification: At least 60 days prior to the start of site mobilization, the project owner shall provide the CPM a copy of all documents pertaining to approvals from the PUC, BSNF, and San Bernardino County. Within 30 days after the completion of the road and railroad crossing improvements, the project owner shall provide the CPM with a copy of written approvals from BSNF, PUC, and San Bernardino County as to the adequacy and safety of the road and bridge.

TRANS-4 – Train Safety Plan. A BNSF railroad line transverses the project site. This line is also used by AMTRAK. This railroad line is a potential hazard to workers who will be working in the area as well as visitors and persons making deliveries to the site. Consequently, the applicant shall put into place measures designed to ensure the safety of workers and other visitors to the site.

These safety measures shall include:

1. A railroad safety plan that includes as a minimum provisions for the following:

    a. Permanent fencing with gates

    b. Flagpersons when workers or visitors must cross tracks

    c. Warning devices necessary to warn workers and visitors of approaching trains

    d. Adequate signage

2. Coordination with or approval of or both from California Public Utilities Commission (PUC); Federal Railroad Administration (FRA); BNSF; and AMTRAK to ensure that all required safety measures are in place. These measures should be reviewed monthly and updated as necessary.

3. Coordination with AMTRAK and BSNF to determine schedules and posting of schedules in locations suitable to be seen by workers and visitors.

In addition, these safety procedures shall be coordinated with BNSF and AMTRAK; reviewed monthly; and updated as necessary.

Verification: At least 60 days prior to the start of site mobilization, the project owner must provide to the CPM for approval a copy of the safety plan. That plan shall clearly indicate the approval of or coordination with or both of the Public Utilities Commission; Federal Railroad Administration; BSNF; and AMTRAK of the safety plan.

TRANS**-5 – Traffic Control Plan.** The Calico Solar Project owner shall, in coordination with San Bernardino County, develop and implement a construction traffic control plan prior to earth moving activities. The plan should include provisions for worker on-site parking and the scheduling of delivery of heavy equipment and building materials. In addition, the plan should be coordinated with San Bernardino County to mitigate any potential adverse traffic impacts from other proposed construction projects that may occur during the construction phase of the Calico Solar Project, and adequate access for emergency vehicles to the Calico Solar Project site.

Specifically, the overall traffic control plan shall include the following adequate provisions for:

- Delivery of heavy equipment and building material deliveries, as well as the movement of hazardous materials to the site, including the adjacent lay-down area

- On-site worker parking
- Coordination with the San Bernardino County to mitigate any potential adverse traffic impacts from other proposed construction projects that may occur during the construction phase of the project
- Access for emergency vehicles at the project site

The construction traffic control plan shall also include the following for activities of substantial stature:

- Signing, lighting, and traffic control device placement
- Temporary travel lane closures and potential need for flaggers.

Verification: At least 60 days prior to start of site mobilization, the project owner shall provide to San Bernardino County for review and comment and the Compliance Project Manager (CPM) for review and approval a copy of the construction traffic control plan.

TRANS-6 – Limitations on Vehicle Size and Weight. The project owner shall comply with limitations imposed by Caltrans District 8 office and other relevant jurisdictions including County of San Bernardino on vehicle sizes and weights. In addition, the project owner or its contractor shall obtain necessary transportation permits from Caltrans and all relevant jurisdictions for use of roadways.

Verification: At least 30 calendar days prior to the start of construction, the project owner shall provide copies of permits obtained from either the County of San Bernardino and the Caltrans District 8 office to BLM's authorized officer and the CPM. In the Monthly Compliance Reports (MCRs), the project owner shall submit copies of any permits received during that reporting period. In addition, the project owner shall retain copies of these permits and supporting documentation in its compliance file for at least 6 months after the start of commercial operation.

TRANS-7 – Encroachment into Public Rights of Way. The project owner or its contractor shall comply with Caltrans and other relevant jurisdictions limitations for encroachment into public rights-of-way and shall obtain necessary encroachment permits from Caltrans and all relevant jurisdictions.

Verification: In the monthly compliance reports (MCRs), the project owner shall submit copies of permits received during the reporting period. In addition, the project owner shall retain copies of these permits and supporting documentation in its compliance file for at least 6 months after the start of commercial operation.

TRANS-8 – Restoration of All Public Roads, Easements, and Rights-of-Way. The project owner shall restore all public roads, easements, and rights-of-way that have been damaged due to project-related construction activities to original or near-original condition in a timely manner, as directed by BLM's Authorized

Officer and CPM. Repairs and restoration of access roads may be required at any time during the construction phase of the project to assure safe ingress and egress.

Verification: At least 30 days prior to the start of mobilization, the project owner shall photograph or videotape all affected public roads, easements, and right-of-way segments and/or intersections and shall provide BLM's Authorized Officer, the CPM, the affected local jurisdictions and Caltrans (if applicable) with a copy of these images. The project owner shall rebuild, repair and maintain all public roads, easements, rights-of-way in a usable condition throughout the construction phase of the project.

Prior to the start of site mobilization, the project owner shall consult with the County of San Bernardino and Caltrans District 8 and notify them of the proposed schedule for project construction. The purpose of this notification is to request that San Bernardino County and Caltrans consider postponement of public right-of-way repair or improvement activities in areas affected by project construction until construction is completed and to coordinate with the project owner regarding any concurrent construction-related activities that are planned or in progress and cannot be postponed.

Within 60 calendar days after completion of construction, the project owner shall meet with BLM's Authorized Officer and the CPM, the County of San Bernardino and Caltrans District 8 to identify sections of public right-of-way to be repaired. At that time, the project owner shall establish a schedule to complete the repairs and to receive approval for the action(s). Following completion of any public right-of-way repairs, the project owner shall provide a letter signed by the County of Riverside and Caltrans District 8 stating their satisfaction with the repairs to BLM's Authorized Officer and the CPM.

TRANS-9 – Permits/Licenses to Transport Hazardous Materials. The project owner shall ensure that permits and/or licenses are secured from the California Highway Patrol and Caltrans for the transport of hazardous materials.

Verification: The project owner shall include in its Monthly Compliance Reports, copies of all permits/licenses acquired by the project owner and/or subcontractors concerning the transport of hazardous substances.

TRANS-10 – Park-and-Ride Site. Prior to mobilization activities, the applicant shall find or construct a suitable 200-space park-and-ride lot to the west of the project site near Barstow and I-15. This lot will be used by workers from the west who will ordinarily drive directly to the site on I-40. This park-and-ride site shall be used to reduce cumulative impacts from the Abengoa Mojave project; decrease vehicle miles traveled; and improve air quality by resulting in less automobile emissions.

Verification: At least 90 days prior to start of site mobilization, the applicant shall propose a new park-and –ride lot to the County of San Bernardino for review and comment. At least 30 days prior to site mobilization, the applicant shall notify the County of San Bernardino and the CPM that the park-and-ride lot is ready for use and ready for inspection by the County of San Bernardino.

TRANS-11 – Bus Transportation to Project Site. For workers who stay during the week in local motels in and around Barstow, the applicant shall provide bus service to the project site from those local motels. A route shall be devised to ensure all workers are picked up at central points within walking distance of their motels. This bus transportation shall be coordinated with the Condition of Certification **TRANS-10** to reduce traffic on local roadways.

Verification: At least 90 days prior to start of site mobilization, the applicant shall propose to the County of San Bernardino a bus route for transporting workers for local motels to the project site. This bus transportation plan shall be coordinated with the Condition of Certification **TRANS-10** to minimize the number of bus trips. At least 30 days prior to site mobilization, the applicant shall notify the county of San Bernardino and the CPM that the bus transportation to site has been finalized and ready for implementation.

C.11.14 CONCLUSIONS

1. With the exception of a determination of the impacts of SunCatcher Mirrors on workers and train crews, implementation of proposed conditions of certification, the Calico Solar Project would comply with all applicable LORS related to traffic and transportation. It would result in less than significant impacts to the traffic and transportation system.
2. With implementation of proposed conditions of certification, the Calico Solar Project as proposed would cause no significant direct or cumulative traffic and transportation impacts, and therefore, no environmental justice issues.
3. Presently open BLM routes that traverse the project area would be closed if any of the action alternatives of amendments to the DCDA Plan as required are approved, limiting transportation through the area.
4. Staff is proposing Condition of Certification TRANS-1, which requires the applicant to develop an on-site parking and staging area to ensure that all worker and visitor parking occurs on-site and that all staging occurs in specifically defined areas.
5. Staff is proposing Condition of Certification TRANS-2, which requires that the applicant construct the temporary access road to specifications required by the California State Fire Marshal and develop a safety plan in coordination with BNSF; the Rail Crossings Engineering Section, California Public Utilities Commission, Los Angeles, and the Federal Railroad Administration to ensure all safety procedures are followed to ensure safe crossing of the BNSF tracks by workers, visitors, and delivery persons. These provisions shall provide for a flagperson as well as adequate postings and warnings.
6. Staff is proposing Condition of Certification TRANS-3, which requires the applicant to coordinate the construction of the permanent access to the site with BNSF. The

construction of this road requires the approval of and shall be coordinated with BNSF railroad and shall meet all safety requirements for railroad crossings as required by the Rail Crossings Engineering Section, California Public Utilities Commission, Los Angeles, and the Federal Railroad Administration to ensure that all state and federal requirements pertaining to railroad crossings are met.:

7. Staff is proposing Condition of Certification, TRANS-4, which requires the applicant, in coordination with BNSF, prepare and implement a workers' safety plan for workers near the railroad line owned and operated by BNSF and traversing the project site. The plan must be coordinated with BNSF and require a flagperson, adequate posting, and all necessary provisions to ensure workers' safety.
8. Staff is proposing Condition of Certification TRANS-5 which would require a construction traffic control plan to be developed and implemented prior to earth moving activities.
9. Staff is proposing Condition of Certification TRANS-6 to ensure the applicant complies with all size and weight limitations proposed by San Bernardino County.
10. Staff is proposing Condition of Certification TRANS-7 to ensure applicant complies with Caltrans requirements for encroachment on rights-of-way.
11. Staff is proposing Condition of Certification TRANS-8 to ensure that the applicant restores to its original or better condition all public roads that may be damaged during the construction of the project.
12. Staff is proposing Condition of Certification TRANS-9 to ensure applicant complies with all relevant state, county, and local regulations on the transportation, handling, and disposal of hazardous materials.
13. Staff is proposing Condition of Certification TRANS-10 to require the applicant to provide a park-and-ride lot for workers who travel daily to the project site.
14. To minimize traffic on local roadways and help ensure adequate LOS, staff is proposing Condition of Certification TRANS-11 to require bus service to transport workers staying in hotels and motels in Barstow to the project site.

C.11.15 REFERENCES

Bureau of Land Management California. Renewable Energy. <http://www.blm.gov/ca/st/en/prog/energy/solar.html> Accessed November 2009.

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DOT 2010A – California Department of Transportation/D. Kopulsky (tn 55376). Department of Transportation's Comments on Proposed Project, dated February 9, 2010. Submitted to CEC/Docket Unit on February 12, 2010.

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Jackson 2009b – Intervener/P. Jackson (tn 52929). Letter from Patrick Jackson Regarding Hector Road, dated August 23, 2009. Submitted to CEC/Docket Unit on August 24, 2009.

Jackson 2009c – Intervener/P. Jackson (tn 53144). Letter to J. Stobaugh and R. Rotte of the Bureau of Land Management Regarding Hector Road, dated September 5, 2009. Submitted to CEC/Docket Unit on September 8, 2009.

Jackson 2009d – Intervener/P. Jackson (tn 53851). Letter to J. Stobaugh and R. Botte of the Bureau of Land Management Regarding Hector Road, dated October 25, 2009. Submitted to CEC/Docket Unit on October 26, 2009.

Jackson 2009e – Intervener/P. Jackson (tn 53849). Patrick Jackson's Status Report #1, dated October 25, 2009. Submitted to CEC/Docket Unit on October 26, 2009.

Jackson 2009f – Intervener/P. Jackson (tn 54518) Patrick Jackson's Status Report #2, dated December 19, 2009. Submitted to CEC/Docket Unit on December 21, 2009.

Jackson 2010a – Intervener/P. Jackson (tn 54906). Patrick Jackson's Status Report #3, dated January 14, 2020. Submitted to CEC/Docket Unit on January 15, 2010.

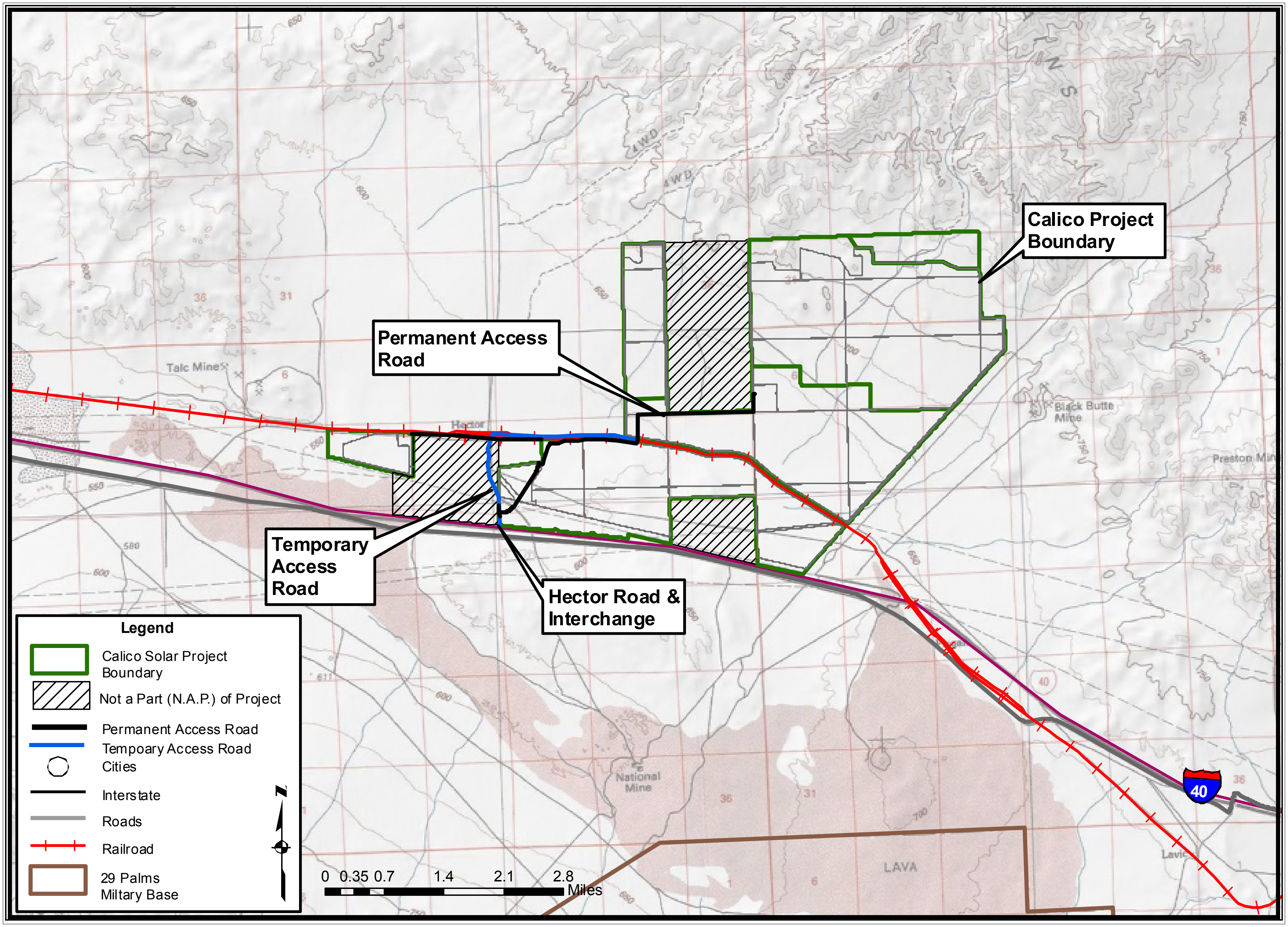
Jackson 2010b – Intervener/P. Jackson (tn 55399). Patrick Jackson's Status Report #4, dated February 13, 2010. Submitted to CEC/Docket Unit on February 16, 2010.

Jackson 2010c – Intervenor/P. Jackson (tn 55876). Patrick Jackson Status Report #5, dated March 13, 2010. Submitted to CEC/Docket Unit on March 15, 2010.

West-wide Energy Corridor Programmatic EIS Information Center. <http://corridoreis.anl.gov/> Accessed November 2009.

TRAFFIC AND TRANSPORTATION - FIGURE 1

Calico Solar Project - Local Transportation Network

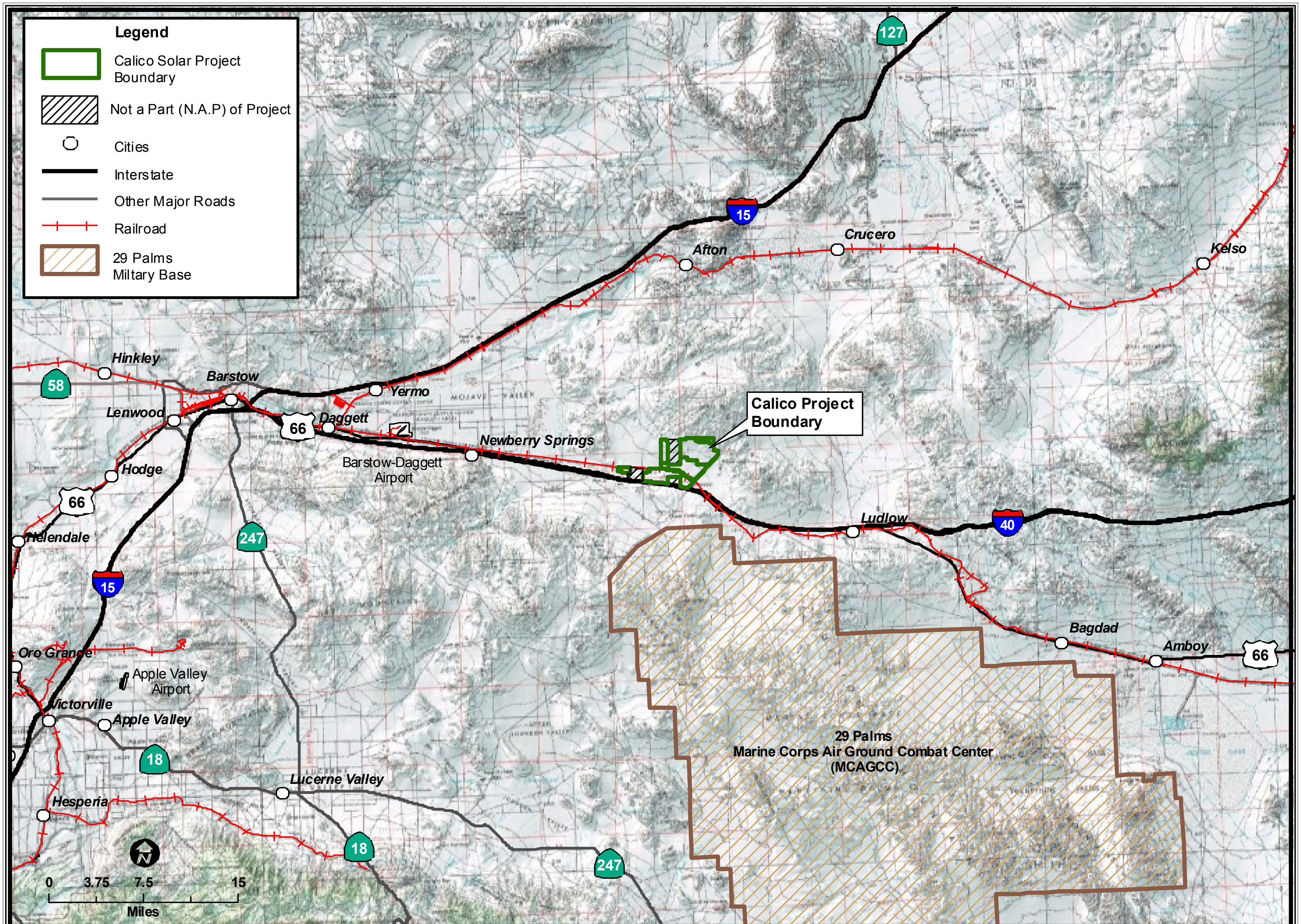


U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission - Tele Atlas Data - San Bernardino County

TRAFFIC AND TRANSPORTATION - FIGURE 2

Calico Solar Project - Regional Transportation Network



U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: California Energy Commission - Tele Atlas Data - San Bernardino County

C.12 – TRANSMISSION LINE SAFETY AND NUISANCE

Testimony of Obed Odoemelam, Ph.D.

C.12.1 SUMMARY OF CONCLUSIONS

The applicant, Calico Solar, LLC, proposes to transmit the power from the two phases of the proposed Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) to Southern California Edison’s existing Pisgah Substation from which it would be delivered to the California Independent Operator-controlled power grid. Since the line would be operated within the Southern California Edison service area, it would be constructed, operated, and maintained according to Southern California Edison’s guidelines for line safety and field management which conform to applicable laws, ordinances, regulations and standards. Also, the route would traverse undisturbed desert land with no nearby residents thereby eliminating the potential for residential electric and magnetic field exposures. With the four proposed conditions of certification, any safety and nuisance impacts from construction and operation of the proposed line would be less than significant, meaning that no adverse environmental impacts would occur as defined under the California Environmental Quality Act (CEQA) or the National Environmental Policy Act (NEPA).

C.12.2 INTRODUCTION

The purpose of this staff assessment is to assess the proposed Calico Solar Project’s transmission line design and operational plan to determine whether its related field and non-field impacts would constitute a significant environmental hazard in the areas around the proposed route. All related health and safety laws, ordinances, regulations, and standards (LORS) are currently aimed at minimizing such hazards. Staff’s analysis focuses on the following issues taking into account both the physical presence of the line and the physical interactions of its electric and magnetic fields:

- aviation safety;
- interference with radio-frequency communication;
- audible noise;
- fire hazards;
- hazardous shocks;
- nuisance shocks; and
- electric and magnetic field (EMF) exposure.

The federal, state, and local laws and policies in the next section apply to the control of the field and nonfield impacts of electric power lines. Staff’s analysis examines the project’s compliance with these requirements.

C.12.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The potential magnitude of the line impacts of concern in this staff analysis depends on compliance with the listed design-related LORS and industry practices. These LORS and practices have been established to maintain impacts below levels of potential significance. Thus, if staff determines that the project would comply with applicable LORS, we would conclude that any transmission line-related safety and nuisance impacts would be less than significant. The nature of these individual impacts is discussed below together with the potential for compliance with the LORS that apply.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

TRANSMISSION LINE SAFETY AND NUISANCE (TLSN) TABLE 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Aviation Safety	
Federal	
Title 14, Part 77 of the Code of Federal Regulations (CFR),"Objects Affecting the Navigable Air Space"	Describes the criteria used to determine the need for a Federal Aviation Administration (FAA) "Notice of Proposed Construction or Alteration" in cases of potential obstruction hazards.
FAA Advisory Circular No. 70/7460-1G, "Proposed Construction and/or Alteration of Objects that May Affect the Navigation Space"	Addresses the need to file the "Notice of Proposed Construction or Alteration" (Form 7640) with the FAA in cases of potential for an obstruction hazard.
FAA Advisory Circular 70/460-1G, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting objects that may pose a navigation hazard as established using the criteria in Title 14, Part 77 of the CFR.
Interference with Radio Frequency Communication	
Federal	
Title 47, CFR, section 15.2524, Federal Communications Commission (FCC)	Prohibits operation of devices that can interfere with radio-frequency communication.
State	
California Public Utilities Commission (CPUC) General Order 52 (GO-52)	Governs the construction and operation of power and communications lines to prevent or mitigate interference.
Audible Noise	
Local	
San Bernardino County General Plan, Noise Element	References the county's Ordinance Code for noise limits.
San Bernardino County Noise Ordinance	Establishes performance standards for planned residential or other noise-sensitive land uses.

Applicable LORS	Description
Hazardous and Nuisance Shocks	
State	
CPUC GO-95, “Rules for Overhead Electric Line Construction”	Governs clearance requirements to prevent hazardous shocks, grounding techniques to minimize nuisance shocks, and maintenance and inspection requirements.
Title 8, California Code of Regulations (CCR) section 2700 et seq. “High Voltage Safety Orders”	Specifies requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment.
National Electrical Safety Code	Specifies grounding procedures to limit nuisance shocks. Also specifies minimum conductor ground clearances.
Industry Standards	
Institute of Electrical and Electronics Engineers (IEEE) 1119, “IEEE Guide for Fence Safety Clearances in Electric-Supply Stations”	Specifies the guidelines for grounding-related practices within the right-of-way and substations.
Electric and Magnetic Fields	
State	
GO-131-D, CPUC ”Rules for Planning and Construction of Electric Generation Line and Substation Facilities in California”	Specifies application and noticing requirements for new line construction including EMF reduction.
CPUC Decision 93-11-013	Specifies CPUC requirements for reducing power frequency electric and magnetic fields.
Industry Standards	
American National Standards Institute (ANSI/IEEE) 644-1944 Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines	Specifies standard procedures for measuring electric and magnetic fields from an operating electric line.
Fire Hazards	
State	
14 CCR sections 1250-1258, “Fire Prevention Standards for Electric Utilities”	Provides specific exemptions from electric pole and tower firebreak and conductor clearance standards and specifies when and where standards apply.

C.12.4 PROPOSED PROJECT

C.12.4.1 SETTING AND EXISTING CONDITIONS

As discussed by the applicant, Calico Solar, LLC, the proposed Calico Solar Project would be developed in two phases. Phase 1 would have a generating capacity of 275 megawatts (MW) while Phase 2 would have a capacity of 575 MW. The total area required for the two phases would be approximately 8,320 acres of federal land in San Bernardino Country currently managed by the Bureau of Land Management (BLM). Phase 1 of the project would require approximately 2,320 acres while Phase 2 would require 5,910 acres. The project site is approximately 37 miles east of Barstow, 17 miles east of Newberry Springs and 57 miles northeast of Victorville. Each phase of the proposed facility would consist of a solar field and related electric power generating equipment from which the generated power would be transmitted to the Southern California Edison's Pisgah Substation (near the southeastern corner of the site) for delivery to the California Independent Operator (CAISO)-operated power grid. The tie-in line for Phase 1 would be an overhead 2-mile long, single-circuit, 230-kV line extending from the project's on-site substation to SCE's Pisgah Substation (SES 2008a pp.1-3, and 3-30 through 3-33).

The proposed project and related transmission line are in an uninhabited open desert area traversed by several underground and overhead transmission lines. The route of the proposed line would extend over generally uninhabited desert land were the nearest residence is approximately 9,000 feet east of the Pisgah Substation (SES 2008a 5.12-6), meaning that there would not be the type of residential field exposure that has been of health concern in recent years.

C.12.4.2 PROJECT DESCRIPTION

The proposed tie-in line system for the two project phases would consist of the following individual segments:

- A new, single-circuit 230-kV overhead transmission line extending 2 miles from the on-site project switchyard to SCE's Pisgah Substation; and
- The project's on-site 230-kV switchyard from which the conductors would extend to the SCE Pisgah Substation.

The on-site segment of the proposed project line would be located within its own unshared right-of-way as it extends from the on-site substation, crossing over three SCE transmission lines of 230 kV and 500 kV as it extends to the connection point within the Pisgah Substation. The proposed routing scheme was chosen to minimize the length of the required line and to locate the line within existing line corridors to the extent possible. To accommodate the power from Phase 1 and later Phase 2, SCE has proposed expanding and upgrading the 230–kV Pisgah Substation to 500 kV, looping the Eldorado-Lugo 500-kV line into the Pisgah Substation and upgrading 65 miles of the existing Lugo-Pisgah No 2 230 line to 500 kV. Modifications within SCE's El Dorado and Lugo Substations would also be necessary. These project-related line modifications would be under CPUC and BLM jurisdiction and would thus be made according to CPUC guidelines ensuring compliance with existing health and safety LORS (SES 2008a pp. 3-27 through 3-36).

The conductors for the proposed project Phase I line would be aluminum steel-reinforced cables supported on steel towers or steel poles as typical of similar SCE lines. The applicant provided the details of the proposed H-Frame or Lattice-Tower support structures as related to line safety, maintainability, and field reduction efficiency. These support structures would be spaced between 650 feet and 850 feet apart (SES 2008a, page 3-28, and Figures 3.4-39).

C.12.4.3 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Direct Impacts and Mitigation Methods

Aviation Safety

Any potential hazard to area aircraft would relate to the potential for collision in the navigable airspace. The requirements in the LORS listed on **TLSN Table 1** establish the standards for assessing the potential for obstruction hazards within the navigable space and establish the criteria for determining when to notify the FAA about such hazards. These regulations require FAA notification in cases of structures over 200 feet from the ground, or if the structure is less than 200 feet in height but would be located within the restricted airspace in the approaches to public or military airports. For airports with runways longer than 3,200 feet, the restricted space is defined by the FAA as an area extending 20,000 feet from the runway. For airports with runways of 3,200 feet or less, the restricted airspace would be an area that extends 10,000 feet from this runway. For heliports, the restricted space is an area that extends 5,000 feet.

The closest area airports are too far from the proposed project and related facilities pose a collision hazard to utilizing aircraft according to FAA criteria. Furthermore, the maximum height of 110 feet for the proposed line support structures (SES 2008a p. 3-31 and Figure 3.4-39) would be much less than the 200-foot height that triggers the concern over aviation hazard according to FAA requirements.

Interference with Radio-Frequency Communication

Transmission line-related radio-frequency interference is one of the indirect effects of line operation and is produced by the physical interactions of line electric fields. Such interference is due to the radio noise produced by the action of the electric fields on the surface of the energized conductor. The process involved is known as *corona discharge*, but is referred to as *spark gap electric discharge* when it occurs within gaps between the conductor and insulators or metal fittings. When generated, such noise manifests itself as perceivable interference with radio or television signal reception or interference with other forms of radio communication. Since the level of interference depends on factors such as line voltage, distance from the line to the receiving device, orientation of the antenna, signal level, line configuration and weather conditions, maximum interference levels are not specified as design criteria for modern transmission lines. The level of any such interference usually depends on the magnitude of the electric fields involved and the distance from the line. The potential for such impacts is therefore minimized by reducing the line electric fields and locating the line away from inhabited areas.

The proposed project lines would be built and maintained in keeping with standard SCE practices that minimize surface irregularities and discontinuities. Moreover, the potential for such corona-related interference is usually of concern for lines of 345 kV and above, and not for 230-kV lines such as the proposed lines. The line’s proposed low-corona designs are used for all SCE lines of similar voltage rating to reduce surface-field strengths and the related potential for corona effects. Since the proposed lines would traverse uninhabited open space, staff does not expect any corona-related radio-frequency interference or related complaints and does not recommend any related condition of certification.

Audible Noise

The noise-reducing designs related to electric field intensity are not specifically mandated by federal or state regulations in terms of specific noise limits. As with radio noise, such noise is limited instead through design, construction, or maintenance practices established from industry research and experience as effective without significant impacts on line safety, efficiency, maintainability, and reliability. Audible noise usually results from the action of the electric field at the surface of the line conductor and could be perceived as a characteristic crackling, frying, or hissing sound or hum, especially in wet weather. Since the noise level depends on the strength of the line electric field, the potential for perception can be assessed from estimates of the field strengths expected during operation. Such noise is usually generated during rainfall, but mainly from overhead lines of 345 kV or higher. It is, therefore, not generally expected at significant levels from lines of less than 345 kV as proposed for the Calico Solar Project. Research by the Electric Power Research Institute (EPRI 1982) has validated this by showing the fair-weather audible noise from modern transmission lines to be generally indistinguishable from background noise at the edge of a right-of-way of 100 feet or more. Since the low-corona designs are also aimed at minimizing field strengths, staff does not expect the proposed line operation to add significantly to current background noise levels in the project area. For an assessment of the noise from the proposed line and related facilities, please refer to staff's analysis in the **NOISE AND VIBRATION** section.

Fire Hazards

The fire hazards addressed through the related LORS in **TLSN Table 1** are those that could be caused by sparks from conductors of overhead lines, or that could result from direct contact between the line and nearby trees and other combustible objects.

Standard fire prevention and suppression measures for similar SCE lines would be implemented for the proposed project lines (SES 2008a, p. 3-29). The applicant's intention to ensure compliance with the clearance-related aspects of GO-95 would be an important part of this mitigation approach. Condition of Certification **TLSN-3** is recommended to ensure compliance with important aspects of the fire prevention measures.

Hazardous Shocks

Hazardous shocks are those that could result from direct or indirect contact between an individual and the energized line, whether overhead or underground. Such shocks are capable of serious physiological harm or death and remain a driving force in the design and operation of transmission and other high-voltage lines.

No design-specific federal regulations have been established to prevent hazardous shocks from overhead power lines. Safety is assured within the industry from compliance with the requirements specifying the minimum national safe operating clearances applicable in areas where the line might be accessible to the public.

The applicant's stated intention to implement the GO-95-related measures against direct contact with the energized line (SES 2008a, p.3-29) would serve to minimize the risk of hazardous shocks. Staff's recommended Condition of Certification **TLSN-1** would be adequate to ensure implementation of the necessary mitigation measures.

Nuisance Shocks

Nuisance shocks are caused by current flow at levels generally incapable of causing significant physiological harm. They result mostly from direct contact with metal objects electrically charged by fields from the energized line. Such electric charges are induced in different ways by the line's electric and magnetic fields.

There are no design-specific federal or state regulations to limit nuisance shocks in the transmission line environment. For modern overhead high-voltage lines, such shocks are effectively minimized through grounding procedures specified in the National Electrical Safety Code (NESC) and the joint guidelines of the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers (IEEE). For the proposed project line, the project owner will be responsible in all cases for ensuring compliance with these grounding-related practices within the right-of-way.

The potential for nuisance shocks around the proposed line would be minimized through standard industry grounding practices (SES 2008a, p. 3-31). Staff recommends Condition of Certification **TLSN-4** to ensure such grounding for the proposed project.

Electric and Magnetic Field Exposure

The possibility of deleterious health effects from EMF exposure has increased public concern in recent years about living near high-voltage lines. Both electric and magnetic fields occur together whenever electricity flows, and exposure to them together is generally referred to as *EMF exposure*. The available evidence as evaluated by the CPUC, other regulatory agencies, and staff has not established that such fields pose a significant health hazard to exposed humans. There are no health-based federal regulations or industry codes specifying environmental limits on the strengths of fields from power lines. Most regulatory agencies believe, as staff does, that health-based limits are inappropriate at this time. They also believe that the present knowledge of the issue does not justify any retrofit of existing lines.

Staff considers it important, as does the CPUC, to note that while such a hazard has not been established from the available evidence, the same evidence does not serve as proof of a definite lack of a hazard. Staff therefore considers it appropriate, in light of present uncertainty, to recommend feasible reduction of such fields without affecting safety, efficiency, reliability, and maintainability.

While there is considerable uncertainty about EMF health effects, the following facts have been established from the available information and have been used to establish existing policies:

- Any exposure-related health risk to the exposed individual will likely be small.
- The most biologically significant types of exposures have not been established.
- Most health concerns are about the magnetic field.

- There are measures that can be employed for field reduction, but they can affect line safety, reliability, efficiency, and maintainability, depending on the type and extent of such measures.

State's Approach to Regulating Field Exposures

In California, the CPUC (which regulates the installation and operation of many high-voltage lines owned and operated by investor-owned utilities) has determined that only no-cost or low-cost measures are presently justified in any effort to reduce power line fields beyond levels existing before the present health concern arose. The CPUC has further determined that such reduction should be made only in connection with new or modified lines. It requires each utility within its jurisdiction to establish EMF-reducing measures and incorporate such measures into the designs for all new or upgraded power lines and related facilities within their respective service areas. The CPUC further established specific limits on the resources to be used in each case for field reduction. Such limitations were intended by the CPUC to apply to the cost of any redesign to reduce field strength or relocation to reduce exposure. Publicly owned utilities, which are not within the jurisdiction of the CPUC, voluntarily comply with these CPUC requirements. This CPUC policy resulted from assessments made to implement CPUC Decision 93-11-013.

The CPUC has recently revisited the EMF management issue to assess the need for policy changes to reflect the available information on possible health impacts. The findings specified in Decision D.06-1-42 of January 2006, did not point to a need for significant changes to existing field management policies. Since there are no residences in the immediate vicinity of the proposed project line, there would not be the long-term residential EMF exposures mostly responsible for the health concern of recent years. The only project-related EMF exposures of potential significance would be the short-term exposures of plant workers, regulatory inspectors, maintenance personnel, visitors, or individuals in the vicinity of the line. These types of exposures are short term and well understood as not significantly related to the health concern.

In keeping with this CPUC policy, staff requires a showing that each proposed overhead line would be designed according to the EMF-reducing design guidelines applicable to the utility service area involved. These field-reducing measures can impact line operation if applied without appropriate regard for environmental and other local factors bearing on safety, reliability, efficiency, and maintainability. Therefore, it is up to each applicant to ensure that such measures are applied in ways that prevent significant impacts on line operation and safety. The extent of such applications would be reflected by ground-level field strengths as measured during operation. When estimated or measured for lines of similar voltage and current-carrying capacity, such field strength values can be used by staff and other regulatory agencies to assess the effectiveness of the applied reduction measures. These field strengths can be estimated for any given design using established procedures. Estimates are specified for a height of one meter above the ground, in units of kilovolts per meter (kV/m), for the electric field, and milligauss (mG) for the companion magnetic field. Their magnitude depends on line voltage (in the case of electric fields), the geometry of the support structures, degree of cancellation from nearby conductors, distance between conductors, and, in the case of magnetic fields, amount of current in the line.

Since the CPUC currently requires that most new lines in California be designed according to the EMF-reducing guidelines of the electric utility in the service area involved, their fields are required under this CPUC policy to be similar to fields from similar lines in that service area. Designing the proposed project line according to existing SCE field strength-reducing guidelines would constitute compliance with the CPUC requirements for line field management.

Industry's and Applicant's Approach to Reducing Field Exposures

The present focus is on the magnetic field because unlike electric fields, it can penetrate the soil, buildings, and other materials to produce the types of human exposures at the root of the health concern of recent years. The industry seeks to reduce exposure, not by setting specific exposure limits, but through design guidelines that minimize exposure in each given case. As one focuses on the strong magnetic fields from the more visible high-voltage power lines, staff considers it important, for perspective, to note that an individual in a home could be exposed to much stronger fields while using some common household appliances than from high-voltage lines (National Institute of Environmental Health Services and the U.S. Department of Energy, 1998). The difference between these types of field exposures is that the higher-level, appliance-related exposures are short term, while the exposures from power lines are lower level, but long term. Scientists have not established which of these types of exposures would be more biologically meaningful in the individual. Staff notes such exposure differences only to show that high-level magnetic field exposures regularly occur in areas other than around high-voltage power lines.

As with similar SCE lines, specific field strength-reducing measures would be incorporated into the proposed line's design to ensure the field strength minimization currently required by the CPUC in light of the concern over EMF exposure and health.

The field reduction measures to be applied include the following:

1. increasing the distance between the conductors and the ground to an optimal level;
2. reducing the spacing between the conductors to an optimal level;
3. minimizing the current in the line; and
4. arranging current flow to maximize the cancellation effects from interacting of conductor fields.

Since the routes of the proposed project lines would have no nearby residences, the long-term residential field exposures at the root of the health concern of recent years would not be a significant concern. The field strengths of most significance in this regard would be as encountered at the edge of the line's right-of-way. These field intensities would depend on the effectiveness of the applied field-reducing measures. The applicant (SES 2008a, p. 3-34 and Appendix I) calculated the maximum electric and magnetic field intensities expected along the proposed route. The maximum electric field strength was calculated as 0.2 kV/m at the edge of the 200-foot right-of-way while the maximum magnetic field strength was calculated as 25 mG at the same location. These field strength values are similar to those of similar SCE lines (as required under current CPUC regulations) but, in the case of the magnetic field, the estimate is much less than the 200 mG currently specified by the few states with regulatory limits. The requirements in Condition of Certification **TLSN-2** for field strength measurements are intended to validate the applicant's assumed field reduction efficiency.

C.12.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be a 275 MW solar facility located within the central portion of the proposed 850 MW project. This alternative is analyzed because it could be constructed without upgrading the SCE Lugo-Pisgah transmission line. These alternative's boundaries reflect the revisions to the locations of the transmission line, substation, laydown area, and control facilities as shown in **Alternatives Figure 1**.

C.12.5.1 SETTING AND EXISTING CONDITIONS

As with the proposed project, the Reduced Acreage Alternative would include numerous groups of 60 solar collectors connected by underground electrical cables. It is after aggregation at the project substation that the generated power would be transmitted to SCE's existing 230-kV Pisgah Substation. There would be fewer solar collector groups in this alternative but the system of aggregation and method of power transmission would be the same as the proposed project. Please see the discussion of existing conditions within the potentially affected BLM lands under Section C.12.4.1

C.12.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff's analysis focuses on the transmission line required to serve the generation facility, and addresses the following issues taking into account both the physical presence of the line and the physical interactions of its electric and magnetic fields:

- aviation safety;
- interference with radio-frequency communication;
- audible noise;
- fire hazards;
- hazardous shocks;
- nuisance shocks; and
- electric and magnetic field (EMF) exposure.

As with the proposed project, the power from the proposed Reduced Acreage Alternative would be transmitted to the SCE power grid through the Pisgah Substation using the same 230-kV as proposed; the field impacts on the line would be proportionately smaller. Since the line would be designed and operated according to the applicable SCE guidelines, the magnitude of the field and nonfield impacts of concern in this analysis would be as expected for SCE lines of the same voltage and current-carrying capacity. These impacts would manifest themselves as the noted effects on radio frequency communication, audible noise, hazardous and nuisance shocks, electric and magnetic field levels, fire hazards and aviation safety.

C. 12.5.3 CEQA LEVEL SIGNIFICANCE

Since staff finds the impacts of line operations to be potentially less than significant for the proposed SCE design, staff would expect the design's implementation for the Reduced Acreage Alternative (as required by the four recommended conditions for certification) to result in impacts that would be less than significant.

C.12.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated Acquired Lands Alternative would be a facility of approximately 720 MW located within the boundaries of the proposed 850 MW project. This alternative, the related transmission lines, substation laydown and control facilities are shown in **Figure 2** in the **ALTERNATIVES** section.

C.12.6.1 SETTING AND EXISTING CONDITIONS

As with the proposed project, the Avoidance of Donated and Acquired Land Alternative would include numerous groups of 60 solar collectors connected by underground cables. When aggregated at the project substation, the generated power would be transmitted to the SCE Pisgah 230-kV Substation. There would be fewer solar collector groups in this alternative but the system of aggregation and power transmission would be the same as for the proposed project.

The Avoidance of Donated and Acquired Lands Alternative would consist of 28,800 solar collectors occupying the entire footprint of the proposed project but avoiding use of any lands donated to the BLM or acquired by BLM through the Land and Water Conservation Fund program. Like the proposed project, the power from this alternative would be transmitted to the grid through the Pisgah Substation and would require infrastructure similar to that of the proposed 850 MW including water storage tanks, transmission line, and substation. Like the proposed project, this alternative would require the 65-mile upgrade to the Lugo-Pisgah transmission line. The setting is generally the same as that described in Section C.12.4.1.

C.12.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff's analysis focuses on the transmission line required to serve the generation facility, and addresses the following issues taking into account both the physical presence of the line and the physical interactions of its electric and magnetic fields:

- aviation safety;
- interference with radio-frequency communication;
- audible noise;
- fire hazards;
- hazardous shocks;
- nuisance shocks; and

- electric and magnetic field (EMF) exposure.

The Avoidance of Donated and Acquired Lands Alternative would use approximately 85% of the solar collectors, provide 85% of the generated power and use approximately 86% of the land (7,050 acres) used by the proposed 850 MW project. It would therefore, require fewer solar collector groups to generate the 275 MW but would require transmission with a line of the same voltage as the proposed Calico Solar Project. Since such a line would (a) be constructed, operated, and maintained according to SCE's guidelines for line safety and field management which conform to applicable laws, ordinances, regulations and standards and (b) traverse undisturbed desert land with no nearby residents, its use would eliminate the potential for residential electric and magnetic field exposures as would the proposed project.

C.12.6.3 CEQA LEVEL OF SIGNIFICANCE

With the four conditions of certification recommended for the proposed project, any safety and nuisance impacts from the line for the Avoidance of Donated and Acquired Lands Alternative would be less than significant.

C.12.7 NO PROJECT/NO ACTION ALTERNATIVE

There are three No Project/No Action Alternatives evaluated as follows:

NO PROJECT/NO ACTION ALTERNATIVE #1

No Action on the Calico Solar Project Application and on CDCA Land Use Plan Amendment

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur.
- The land on which the project is proposed may or may not become available to other uses (including another solar project), depending on BLM's actions with respect to the amendment of the California Desert Conservation Area Plan.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no new transmission system construction or upgrades. As a result, no impacts to transmission line safety and nuisance from construction or operation of the proposed project would occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

If this project is not approved, renewable projects would likely be developed on other sites in the California Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are large solar and wind projects proposed on BLM land along the Interstate 40 corridor within a few miles of the Calico Solar Project site. In addition, there are currently over 70 applications for solar projects covering over 650,000 acres pending with BLM in California.

NO PROJECT/NO ACTION ALTERNATIVE #2

No Action on Calico Solar Project and Amend the CDCA Land Use Plan to Make the Area Available for Future Solar Development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with a different solar technology. As a result, the construction of new transmission lines or upgrades to the existing system would result from the construction and operation of another renewable facility and would likely result in impacts to transmission line safety and nuisance similar to those of the proposed project. As such, this No Project/No Action Alternative could result in impacts to transmission line safety and nuisance similar to the impacts under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3

No Action on the Calico Solar Project Application and Amend the CDCA Land Use Plan to Make the Area Unavailable for Future Solar Development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no corresponding land disturbance. As a result, the transmission system impacts are not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in impacts to transmission line safety and nuisance. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.12.8 PROJECT-RELATED FUTURE ACTIONS - TRANSMISSION LINE SAFETY AND NUISANCE

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.12.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

The 275 MW Early Interconnection would consist of construction of approximately one to two new 220 kV structures within SCE's existing 220 kV ROW and/or within the expanded Pisgah Substation fence line to support the gen-tie line coming from the Calico Solar Project to facilitate the 220 kV service drop from the last Calico Solar Project's gen-tie structure into the Pisgah Substation.

The 850 MW Full Build-Out would consist of the construction of a single-circuit 500 kV transmission lines on approximately 57.1 miles of existing ROW and approximately 9.8 miles of new ROW. The existing 220 kV Lugo-Pisgah No. 2 transmission line would be rebuilt with 500 kV single circuit structures. The completed project would result in a new single circuit transmission line built to 500 kV standards on both existing and new ROW from the Pisgah Substation to the Lugo Substation. The upgrades also involves looping the existing 500 kV Eldorado-Lugo single circuit transmission line into the Pisgah Substation. The new 500 kV line would cross over the existing 220 kV Cima–Eldorado No. 1 and No. 2 circuits. All portions of the transmission lines would be designed to CPUC General Order 95 standards.

C.12.8.2 ENVIRONMENTAL IMPACTS

The potential safety and nuisance issues associated with the proposed upgrades include public health effects from EMF exposure, noise, communications interference, aviation, fire, and electric shock hazard. The proposed transmission line would be built to meet specifications by the CPUC General Order 95, SCE, other regulatory agencies, and local governments designed to minimize these potential nuisances and hazards.

Electromagnetic Field. Since the upgraded 500 kV line would be operated at a higher voltage than the existing 220 kV line, the magnitude of the electric field along the line route would increase. The magnetic field may also change, because its intensity depends directly on current levels, however, phasing with the other existing lines in the corridor can actually reduce magnetic fields in some instances. SCE would prepare an Electric and Magnetic Field (EMF) Management Plan as part of its project application to the CPUC that would include changes in EMF levels associated with the upgrades.

There remains a lack of consensus in the scientific community in regard to public health impacts due to EMF at the levels expected from electric power facilities. Since the work would largely be within existing corridors, the upgrade-related increases in EMF intensity would lead to corresponding increases in human exposure to the line's magnetic fields. The nearest residences may be adjacent to the new ROW near the City of Hesperia and Lugo Substation. Line workers would also be exposed to EMF in close proximity to the lines; however, this type of short-term exposure is not significantly related to the present health concern.

There are no federal or State standards limiting human exposure to EMFs from transmission lines or substation facilities in California. For those reasons, EMF is not considered in this analysis as a CEQA/NEPA issue and no impact significance is presented.

Other potential impacts related to electric power facility projects, are both safety and nuisance issues, and include: radio/television/electronic equipment interference; induced currents and shock hazards and potential effects on cardiac pacemakers.

Noise and Communications Interference. Audible noise can be produced by a transmission line and is related to the corona which is a function of line voltage, diameter, and condition. Corona noise is discussed under the **NOISE** section above. Corona can also cause interference with radio and television reception. The project would be designed to minimize corona noise and interference by proper selection of the conductor and associated hardware.

Induced Electric Fields. A conducting object, such as a vehicle or person in an electric field, would experience induced voltages and currents. The strength of the induced current depends on the electric field strength, the size and shape of the conducting object, and the object-to ground resistance. When a conducting object is isolated from the ground and a grounded person touches the object, a perceptible current or shock may occur as the current flows to the ground. Proper design standards would be implemented to prevent hazardous and nuisance shocks by ensuring that metallic objects on or near the ROW are grounded and that sufficient clearances are provided at roadways and parking lots to keep electric fields at these locations low enough to prevent vehicle short-circuit currents from exceeding 5 milliamperes (mA).

Electric Shock Hazards. Magnetic fields can also induce voltages and currents in conducting objects. Typically, this requires a long metallic object, such as a wire fence or above-ground pipeline that is grounded at only one location. A person who closes an electrical loop by grounding the object at a different location would experience a shock similar to that described above for an ungrounded object. Design standards for managing this issue dictate multiple grounds on fences or pipelines, especially those that are oriented parallel to the transmission line. The SCE upgrades would be constructed in conformance with CPUC GO 95 and Title 8 CCR 2700 requirements. These regulations require sufficient grounding to ensure that hazardous shocks do not occur. Therefore, hazardous shocks are unlikely as a result of project construction, operation, or maintenance. A shield wire would be installed as a feature of the project.

Aviation Safety. Standards for determining obstructions in navigable airspace such as a transmission line are determined by the Federal Aviation Administration (FAA). The upgrades would be built in conformance with FAA requirements to protect aviation safety.

Fire Hazard. The CPUC has established clearances for transmission lines from other man-made and natural structures as well as tree-trimming requirements to avoid fire hazards. SCE would maintain the transmission line corridor and immediate area in accordance with existing regulations and accepted industry practices that would include identification and abatement of any fire hazards.

C.12.8.3 MITIGATION

Because there is no agreement among scientists that exposure to EMF creates any potential health risk, and because CEQA and NEPA do not define or adopt any standards to address the potential health risk impacts of possible exposure to EMFs, this analysis does not consider magnetic fields in the context of CEQA/NEPA and determination of environmental impacts.

However, recognizing that public concern remains, the CPUC does require, pursuant to GO 131-D, Section X.A, that all applications for a Certificate of Public Convenience and Necessity (CPCN) include a description of the measures taken or proposed by the utility to reduce the potential for exposure to EMFs generated by the project. The CPUC has developed an interim policy that requires utilities, among other things, to identify the no-cost measures undertaken, and the low-cost measures implemented, to reduce the potential EMF impacts. The benchmark established for low-cost measures is 4% of the total budgeted project cost that results in an EMF reduction of at least 15% (as measured at the edge of the utility ROW). Therefore, SCE would need to incorporate specific field-reducing measures into the design of the 500 kV upgraded line prior of its submittal of its CPCN application to the CPUC.

Other public concerns related to electric power facility projects, are both safety and nuisance issues, and include: radio/television/electronic equipment interference; induced currents and shock hazards and potential effects on cardiac pacemakers. SCE is under jurisdiction of the CPUC and the upgraded facilities would be designed and operated according to CPUC General Order 95 in California. CPUC General Order 95 also addresses shock hazards to the public by providing guidelines on minimum clearances to be maintained for practical safeguarding of persons during the installation, operation, or maintenance of overhead transmission lines and their associated equipment.

The Conditions of Certification in the Calico Solar Project Staff Assessment/EIS are intended to ensure compliance with CPUC policy as related to field strengths, perceivable field effects, electric shocks, and human exposure. The line would be operated according to SCE's guidelines, which would be in compliance with the applicable (non-EMF) health and safety LORS.

C.12.8.4 CONCLUSION

The upgraded 500 kV transmission line would be designed, built and operated (largely within the existing ROW) according to SCE's requirements, reflecting compliance with the health and safety (non-EMF) LORS. Therefore, its operation is not expected to pose a significant health and safety hazard to individuals in the area.

C.12.9 CUMULATIVE IMPACTS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

When field intensities are measured or calculated for a specific location, they reflect the interactive, and therefore, cumulative effects of fields from all contributing conductors. This interaction could be additive or subtractive depending on prevailing conditions. Since the proposed project's transmission line would be designed, built, and operated according to applicable field-reducing SCE guidelines (as currently required by the CPUC for effective field management), any contribution to cumulative area exposures should be at levels expected for SCE lines of similar voltage and current-carrying capacity. It is this similarity in intensity that constitutes compliance with current CPUC requirements on EMF management. The actual field strengths and contribution levels for the proposed line design would be assessed from the results of the field strength measurements specified in Condition of Certification **TLSN-2**. Therefore, no cumulative impacts related to transmission line safety or nuisance are expected.

C.12.10 COMPLIANCE WITH LORS

As previously noted, current CPUC policy on safe EMF management requires that any high-voltage line within a given area be designed to incorporate the field strength-reducing guidelines of the main area utility lines to be interconnected. The utility in the case of the Calico Solar Project is SCE. Since the proposed project's 230-kV line and related switchyards would be designed according to the respective requirements of the LORS listed in **TLSN Table 1**, and operated and maintained according to current SCE guidelines on line safety and field strength management, staff considers the proposed design and operational plan to be in compliance with the health and safety requirements of concern in this analysis. The actual contribution to the area's field exposure levels would be assessed from results of the field strength measurements required in Condition of Certification **TLSN-2**.

C.12.11 NOTEWORTHY PUBLIC BENEFITS

Since the proposed tie-in line would pose specific, although insignificant risks of the field and nonfield effects of concern in this analysis, its building and operation would not yield any public benefits regarding the effort to minimize any human risks from these impacts.

C.12.12 FACILITY CLOSURE

If the proposed Calico Solar Project were to be closed and decommissioned, and all related structures are removed as described in the **PROJECT DESCRIPTION** section, the minimal electric shocks and fire hazards from the physical presence of this tie-in line would be eliminated. Decommissioning and removal would also eliminate the line's field impacts assessed in this analysis in terms of nuisance shocks, radio-frequency impacts, audible noise, and electric and magnetic field exposure. Since the line would be designed and operated according existing SCE guidelines, these impacts would be as expected for SCE lines of the same voltage and current-carrying capacity and therefore, at levels reflecting compliance with existing health and safety LORS.

C.12.13 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

TLSN-1 The project owner shall construct the proposed transmission line (anywhere along the area identified by the applicant as available for its routing) according to the requirements of California Public Utility Commission's GO-95, GO-52, GO-131-D, Title 8, and Group 2, High Voltage Electrical Safety Orders, sections 2700 through 2974 of the California Code of Regulations, and Southern California Edison's EMF reduction guidelines.

Verification: At least 30 days before starting the transmission line or related structures and facilities, the project owner shall submit to the Compliance Project Manager (CPM) a letter signed by a California registered electrical engineer affirming that the lines will be constructed according to the requirements stated in the condition.

TLSN-2 The project owner shall use a qualified individual to measure the strengths of the electric and magnetic fields from the line at the points of maximum intensity along the route for which the applicant provided specific estimates. The measurements shall be made before and after energization according to the American National Standard Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) standard procedures. These measurements shall be completed no later than 6 months after the start of operations.

Verification: The project owner shall file copies of the pre-and post-energization measurements with the CPM within 60 days after completion of the measurements.

TLSN-3 The project owner shall ensure that the rights-of-way of the proposed transmission line are kept free of combustible material, as required under the provisions of section 4292 of the Public Resources Code and section 1250 of Title 14 of the California Code of Regulations.

Verification: During the first 5 years of plant operation, the project owner shall provide a summary of inspection results and any fire prevention activities carried out along the right-of-way and provide such summaries in the Annual Compliance Report on transmission line safety and nuisance-related requirements.

TLSN-4 The project owner shall ensure that all permanent metallic objects within the right-of-way of the project-related lines are grounded according to industry standards regardless of ownership.

Verification: At least 30 days before the lines are energized, the project owner shall transmit to the CPM a letter confirming compliance with this condition.

C.12.14 CONCLUSIONS

Since staff does not expect the proposed 230-kV transmission tie-in line to pose an aviation hazard according to current FAA criteria, we do not consider it necessary to recommend specific location changes on the basis of a potential hazard to area aviation.

The potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current SCE guidelines (reflecting standard industry practices). These field-reducing measures would maintain the generated fields within levels not associated with radio-frequency interference or audible noise.

The potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route.

Since electric or magnetic field health effects have neither been established nor ruled out for the proposed Calico Solar Project and similar transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed line's design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information. The long-term, mostly residential magnetic exposure of health concern in recent years would be insignificant for the proposed line given the absence of residences along the proposed route. On-site worker or public exposure would be short term and at levels expected for SCE lines of similar design and current-carrying capacity. Such exposure is well understood and has not been established as posing a significant human health hazard.

Since the proposed project's line would be operated to minimize the health, safety, and nuisance impacts of concern to staff and would be routed through an area with no nearby residences, staff considers the proposed design, maintenance, and construction plan as complying with the applicable LORS. With implementation of the four recommended conditions of certification, any such impacts would be less than significant.

C.12.15 REFERENCES

EPRI — Electric Power Research Institute 1982. Transmission Line Reference Book: 345 kV and Above.

National Institute of Environmental Health Services 1998. *An Assessment of the Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields*. A

Working Group Report. August 1998.

SES (Stirling Systems Solar Three and Solar Six, LLC) 2008a. Application for Certification for the Stirling Energy Systems (SES) Solar One Project, Volumes I and II (tn:49181). Submitted to the California Energy Commission on December, 2008.

C.13 – VISUAL RESOURCES

Testimony of William Kanemoto and James Jewell

C.13.1 SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management (BLM) staff and California Energy Commission staff (hereafter jointly referred to as staff) have analyzed visual resource-related information pertaining to the proposed Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) and conclude that both the proposed project and Avoidance of Donated Lands Alternative would substantially degrade the existing visual character and quality of the site and its surroundings, resulting in potentially significant impacts to motorists on Highway Interstate 40 and National Trails Highway/Route 66. With staff-recommended mitigation measures, these impacts could be greatly reduced, but would remain significant and unavoidable. The BLM is in the process of establishing visual resource management classifications for the proposed project and surrounding areas.

Staff concludes that under the proposed project and the Avoidance of Donated and Acquired Lands Alternative, the character and quality of some views from foreground and near-middle-ground areas of the Cady Mountains Wilderness Study Area would be adversely affected under NEPA, but the overall effect on views from the Cady Mountains Wilderness Study Area is considered to be less-than-significant under CEQA.

In general, impacts of the proposed project and the Avoidance of Donated and Acquired Lands Alternative would be essentially similar under CEQA and NEPA.

Impacts of the Reduced Acreage Alternative would be substantially less than the Proposed Project and the Avoidance of Donated Lands Alternative under NEPA, and are considered less-than-significant under CEQA.

The anticipated visual impacts of both the Calico Solar Project and the two alternatives, in combination with past and foreseeable future local projects in the immediate project viewshed, and past and foreseeable future region-wide projects in the southern California desert, are considered cumulatively considerable, potentially significant, and unavoidable under CEQA.

C.13.2 INTRODUCTION

The following analysis evaluates potential visual impacts of the Calico Solar Project; its consistency with applicable Laws, Ordinances, Regulations and Standards (LORS); and conformance with applicable guidelines of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

In order to provide a consistent framework for the analysis, a standard visual assessment methodology developed by the California Energy Commission (Energy Commission) staff and applied to numerous siting cases in the past was employed in this study. A description of this methodology is provided in **Appendix VR-1.** The BLM and the Energy Commission have agreed that this methodology is the most appropriate for this site, as described in Section C.13.3.

As noted above, the project has been evaluated for conformance with applicable LORS. Adopted expressions of local public policy pertaining to visual resources are also given great weight in determining levels of viewer concern. In accordance with staff's procedure, conditions of certification are proposed as needed to reduce potentially significant impacts to less than significant levels, and to ensure LORS conformance, if feasible.

C.13.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

To determine whether there is a potentially significant visual resources impact generated by a project, Energy Commission staff reviews the project using the CEQA Guidelines Appendix G Environmental Checklist pertaining to "Aesthetics." The checklist questions include the following:

A. Would the project have a substantial adverse effect on a scenic vista?

B. Would the project substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?

C. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

D. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

In addition, staff evaluates potential impacts in relation to standard criteria described in detail in Appendix VR-1. Staff evaluates both the existing visible physical environmental setting, and the anticipated visual change introduced by the proposed project to the view, from representative, fixed vantage points called "Key Observation Points" (KOPs). KOPs are selected to be representative of the most characteristic and most critical viewing groups and locations from which the project would be seen. The likelihood of a visual impact exceeding Criterion C. of the CEQA Guidelines, above, is determined in this study by two fundamental factors: the susceptibility of the setting to impact as a result of its existing characteristics (reflected in its current level of visual quality, the potential visibility of the project, and the sensitivity to scenic values of its viewers); and the degree of visual change anticipated as a result of the project. These two factors are summarized respectively as *visual sensitivity* (of the setting and viewers), and *visual change* (due to the project) in the discussions below. Briefly, KOPs with high sensitivity (due to outstanding scenic quality, high levels of viewer concern, etc.) that experience high levels of visual change from a project are more likely to experience adverse impacts.

The National Environmental Policy Act (NEPA) requires that the federal government use "all practicable means to ensure all Americans safe, healthful, productive, and *aesthetically* (emphasis added) and culturally pleasing surroundings" (42 U.S. Code 4331[b][2]).

Typically, U.S. Bureau of Land Management (BLM) evaluates visual effects of actions with the use of its Visual Resource Management (VRM) system. In this methodology BLM conducts inventories, delineating landscape units and assigning one of four visual resource inventory classes reflecting the existing scenic quality, viewer sensitivity, and distance zone to areas under its jurisdiction. These inventories are then used to assign visual resource *management* (VRM) classes to these lands. However, in the case of the area managed under the California Desert Conservation Area (CDCA) Plan (including this project), VRM classes were not assigned under that management plan. In some areas, VR inventories have been conducted within portions of the CDCA, and Interim VRM Classes have been assigned by BLM to some portions.

However, in the case of the Calico Solar Project site, no current visual inventories by BLM are available, and no Interim VRM Classes have been assigned. The BLM is currently in the process of beginning visual inventories of areas within the CDCA that have not yet been inventoried, including this site. However, the results of those studies are not anticipated within the time frame of this project application, and delineations of scenic quality rating units or visual resource inventory classes are not available. Therefore, it was agreed by Energy Commission and BLM that this analysis would be conducted using the Energy Commission's standard visual assessment methodology.

In staff's professional opinion, despite certain differences in approach and emphasis between the two methodologies, the assessment framework and impact thresholds of the Energy Commission method used in this study are substantially consistent with those typically applied by BLM under its own procedures. Staff thus considers that the conclusions of this analysis are substantially equivalent to those that would be reached by applying BLM-specific methods of visual assessment.

Staff also reviews federal, state, and local LORS and their policies or guidelines for aesthetics or preservation and protection of sensitive visual resources that may be applicable to the project site and surrounding area. These LORS include local government land use planning documents (e.g., General Plan, zoning ordinance).

Please refer to **Appendix VR-1** for a complete description of staff's visual resources evaluation criteria.

C.13.4 PROPOSED PROJECT

C.13.4.1 SETTING AND EXISTING CONDITIONS

Regional Landscape

The proposed Calico Solar Project site comprises approximately 8,230 acres (12.8 square miles) of BLM land in San Bernardino County. The site is roughly 37 miles east of the town of Barstow and 17 miles east of Newberry Springs. It is adjacent to the north side of Interstate 40 (I-40) and near the historic Route 66/National Trails Highway that generally parallels I-40 on the south in this area. The site is on BLM-administered land and is largely bounded by BLM-administered land, although private tracts abut some portions of the site and a BNSF Railroad line traverses the site.

The 84,400-acre Cady Mountain Wilderness Study Area borders the site on the north and the Pisgah Area of Critical Environmental Concern (ACEC) is adjacent to the site's eastern/southeastern boundary. The Kelso Dunes Wilderness and Bristol Mountains Wilderness are approximately 10 miles east of the site. Much of the Cady Mountain WSA and all of the Pisgah ACEC would be within in the Mojave Trails National Monument proposed as part of the proposed 2010 California Desert Protection Act legislation. The proposed monument would extend from the site's east boundary to near Needles. I-40 forms the southern boundary of the site. Three miles south of I-40 is the northern boundary of a closed live-fire training area on Twentynine Palms Marine Corps Base. Also south of I-40 and immediately southwest of the project site is the Ord-Rodman Desert Wildlife Management Area (DWMA). The Rodman Mountains Wilderness is 3 miles distant, also to the southwest. The west side of the site is bounded by undesignated BLM-administered land. **Visual Resources Figure 1, Project Setting**, depicts the project site in its immediate regional context in relation to these various protected areas.

The site lies within the east-west trending Mojave Valley, a broad desert valley resting between the Cady and Bristol Mountains to the north and northeast and the Bullion, Lava Bed, Rodman, and Newberry Mountains to the south and southwest. The valley floor ranges from approximately 1,800-feet to 2,200-feet in elevation; the mountains rise to between 3,000-feet and 4,400-feet in elevation.

Native vegetation cover of the region consists of sparse, low-growing green-to-tan Mojave creosote bush scrub typical of the western Mojave Desert.

Project Site

Visual Resources Figures 2a, b, and c, Character Photos of Project Area, depict views of the Calico Solar Project site and vicinity (AFC, Figures 5.13-3, -4, -5). (All figures referred to in the text may be found at the end of this section.)

The project site comprises over 8,200 acres of public land administered by the BLM. It does not include any private land. Although not part of the project, three adjacent tracts of private land are each surrounded on three sides by the proposed project. The most prominent man-made features at or near the site are I-40, which abuts the site on the south, and the BNSF Railroad traversing the site. These features, though evident, remain visually subordinate to the vast open expanse of the site and surroundings.

The site occupies a band of *bajadas*, or alluvial fans typical of the Mojave Desert landscape, which slope gently but noticeably southward toward the railroad and highway, from the feet of the prominently visible Cady Mountains immediately north of the site. The site is largely undisturbed and is currently managed by BLM as Multiple-Use Class (MUC) M (Moderate Use), except for a very small portion along the northern boundary of the project, which is classified as MUC Class L (Limited Use).

No communities lie within the project viewshed, which extends 5 miles from the site boundaries. The nearest rural residence is located about 2 miles east of the site.

Project Visual Setting: Viewshed, and KOPs

Project Viewshed

A feature of this desert landscape is the potential for large projects to be seen over great distances where even slightly elevated viewpoints exist, due to the large open areas of level topography and absence of intervening landscape features and screening vegetation. However, as illustrated in **Visual Resources Figure 3**, Project Viewshed, which presents a computer-generated GIS viewshed map depicting areas from which the site would be visible, the project is situated within a broadly enclosed viewshed defined by the Cady Mountains to the west, north, and east, and by Pisgah Crater, Sunshine Peak, and the Lava Bed and Rodman Mountains to the south and southwest. The site is thus largely visually isolated from the Mojave Valley to the west by topography and distance, and from the Broadwell Valley to the east by topography (SES 2008a). The project would be visible from locations throughout this contained viewshed. Intermittent views of the site extend up to 4 miles north into the Cady Mountains, and in general the project would be visible from various locations falling within a 5-mile radius, with the exception of mountainous areas to the north and east where terrain encloses views near the site boundary. As indicated in the figure, visibility within the Cady Mountains WSA is spotty and fragmented, due to rough, irregular terrain.

KOPs: Visual Quality, Viewer Concern, and Viewer Exposure

Visual Resources Figure 4 depicts Key Observation Points (KOPs) as well as locations from which photographs were taken to depict the general character of the site and vicinity. KOPs are used in the Energy Commission visual analysis method as the basis for evaluating potential project impacts, and represent the key sensitive viewer groups and viewing locations likely to be affected by the project.

In the Energy Commission assessment approach, KOPs are rated according to the visual quality of their setting, and an assessment of their level of viewer concern and viewer exposure. Those three primary attributes are summarized in a KOP's *overall visual sensitivity* rating, which reflects an assessment of the overall susceptibility to visual impact of the viewer group/receptors it represents. These sensitivity ratings serve as the environmental baseline against which potential project impacts, measured in terms of level of *visual change*, are evaluated.

KOPs used in this study include those used in the project AFC, which were selected for the AFC in consultation with Energy Commission staff. To minimize confusion, the numbering of viewpoints used in the AFC has been retained in this analysis.

In the following discussion, distance zone terminology is used in the context of the Energy Commission method, as follows: 'foreground' is used generically to refer to viewing distances under ½-mile; 'middle-ground' to distances between ½ and 5 miles; 'near middle-ground' refers to that portion of middle-ground under roughly one mile; and 'background' to distances over 5 miles.

KOP photos are selected to represent key sensitive viewer groups who would potentially be affected by the project. Project simulations are then imposed on these views to illustrate how the same view would appear with the project in place. In the discussion that follows, the reader is referred to these ‘before project’ photos. The figure numbers referring to each KOP below thus appear out of sequence, but may be found along with all other figures, at the end of this section. In each case, the designation “**a**” after the figure number indicates the existing (before project) view from a KOP, while the second image is a simulation of the future condition, should the project be constructed as proposed.

KOP 1 is from a point along Route 66 looking generally northeast into the site across I-40. KOP 2 is a view looking south into the site, from an elevated position just inside the Cady Mountain WSA. KOP 3 is a view looking northwest toward the site from the vicinity of the nearest residence to the project. KOP 4 is a view north into the site from where the BNSF Railroad crosses under an existing electric transmission line about 800 feet from the eastern edge of the site. KOP 5 is a view from I-40 eastbound, looking east-northeast across westbound I-40 into the site.

Route 66/I-40 - KOP 1

KOP 1 is taken from Route 66 (National Old Trails Highway), which parallels I-40 slightly to the south in this segment. Despite its name, this portion of old Route 66 does not have Scenic Byway or other officially designated status. It is maintained by the County and is a remnant of the original National Old Trails Highway established in the early 20th century between Maryland and California. It remains the focus of efforts to preserve and maintain it by groups interested in its historic status and associated historic features. I-40 is an eligible state scenic highway but has not been officially designated. It receives relatively high levels of traffic (15,600 vehicles per day) (AFC 5.13-5) (SES 2008a). The KOP is fairly representative of motorists on both of these roadways, though it differs from typical views from I-40 in that the project is seen from Route 66 at a greater distance. **Visual Resources Figure 8a** depicts the existing view from KOP 1. The project would begin beyond I-40, seen in the foreground, directly across the median from this vantage point. As depicted in this photograph, views of the site from Route 66 would generally have I-40 and low-voltage utility lines in the immediate foreground. The landscape beyond is relatively featureless, characterized by large expanses of gently sloping fan or *bajada* topography, dissected by intermittent seasonal washes. Land cover is low-growing, nondescript bush scrub (primarily Mojave Desert creosote bush scrub) that is naturally sparse, lending a brown to green hue to the lighter tan colored soil surface. Beyond the highway and middle-ground bajada, the Cady Mountains, a Wilderness Study Area, dominate the background.

Visual Quality: Visual quality of this landscape is considered moderate. Although some visually compromising elements (including the highway, low-voltage utility lines, the BNSF rail line, and disturbance from a pipeline right-of-way) are present, these remain visually subordinate and the bajadas comprising the project site, descending from the intact and visually vivid Cady Mountains nearby, appear predominantly undisturbed and intact. The typical bajada landscape is common in the region and relatively featureless, but provides a characteristic and fairly undisturbed foreground to the rugged nearby mountains.

Viewer Concern: Viewer concern is considered moderately high; the focus of many Route 66/Historic Trails Highway users would be on the historic nature of this roadway and the encompassing landscape through which earlier travelers would have experienced. In this context, the integrity of the view would be of high importance. Similarly, the I-40's state-eligible scenic status contributes to a higher level of viewer concern.

Viewer Exposure: Viewer exposure is high. Views of the site, which adjoins I-40, are unobstructed. The sloping of the site's fan topography, which ranges from 1,800 feet in elevation in the southern portion of the project site to approximately 2,200 feet in elevation in the northern portion of the project site, is oriented to the highway, increasing its overall exposure.

Overall visual sensitivity was thus considered to be moderately high.

Cady Mountains WSA – KOP 2

Visual Resources Figure 9a depicts the existing view from KOP 2 looking south across the project area. It provides a view of the project site from within the Cady Mountains WSA, as viewed from approximately 1,500 feet from the northern boundary of the site and somewhat elevated above the site. The WSA occupies the high ground above the project site on the north. The immediate foreground is dominated by sparse vegetation, cobbles, and the smaller landforms on the lower slopes of the Cady Mountains. Views of level open desert terrain characterized by light tan colored soils and sparse scrub vegetation occupy the visual middle-ground. The BNSF Railroad, approximately 3 miles away, and I-40, which is approximately 5 miles distant, create linear elements crossing the middle-ground, but are visually subordinate in the broad landscape. The ridges of the Rodman and Lava Bed Mountains are 12 to 14 miles away and dominate the background.

Visual Quality: While man-made intrusions and ground disturbance remain visually subordinate within the relatively intact natural landscape, landforms and vegetation of the site lack exceptional vividness. Visual quality is enhanced by the high skyline of the Lava Bed and Ordman Mountains in the distance and the panoramic views of the valley floor, with Pisgah Crater and unusual, contrasting lava features visible in the middleground The visual foreground from this area, though not depicted in this particular view, would also be characterized by visually interesting contrasting patterns of rugged outcrops and ridges, and alluvial washes. Visual quality from this KOP was characterized as moderately high.

Viewer Concern: Viewer concern from this KOP is considered moderately high – wilderness areas generally would be considered to have high sensitivity, but the number of visitors at this distance to the project is believed to be very low.

Viewer Exposure: Viewer exposure at this distance is moderate; while open and unobstructed views are present within the WSA to background distances, as indicated in the viewshed map depicted in **Visual Resources Figure 3**, visibility is intermittent, often obstructed by intervening rock outcrops in the very rough terrain, characterized by highly irregular rocky peaks and ridges separated by lower alluvial washes. In addition, increasing viewing distance diminishes visibility and prominence of the project and the background mountains are a dominant feature in all southward views. Finally, viewer numbers are believed to be very low because of the remoteness and difficulty of the location, although the area has experienced increasing OHV activity in recent years.

Overall visual sensitivity is considered to be moderately high.

Eastside View – KOP 3

KOP 3 is a view from the nearest residence to the proposed project site. **Visual Resources Figure 10a** depicts the existing view from this location. The project's eastern boundary would be at the existing transmission line visible in the middle-ground at a distance of approximately 1-1/2 mile. This KOP is at approximately the same elevation as much of the project site. As with most of the KOPs, views of level, relatively featureless open desert characterized by light tan colored soils and sparse scrub vegetation occupy the visual foreground and middle-ground. The existing transmission line, visible at a distance of about 1-1/2 miles, detracts from the intactness of the landscape setting, but remains visually subordinate at this distance. Ridges of the westernmost Cady Mountains are visible at a distance of roughly 9 miles; the taller, distant Calico Mountains can be seen on the horizon at background distances of 25 miles or more.

Visual Quality: Visual quality is moderate. The level, open fore- and middle-ground is typified by characteristic non-descript creosote scrub vegetation, with moderate levels of existing visual intrusion by existing transmission lines. The existing power line, an existing electric substation, the BNSF Railroad, and I-40, which are approximately one mile south and west of this point, intrude into views from this location and detract from their intactness. The openness of the landscape, and the background mountain ridges are the principal distinctive features.

Viewer Concern: Viewer concern is considered moderately low due to the absence of other similar viewers. This residence may the only one within the project viewshed and is not representative of a typical viewer group.

Viewer Exposure: Views within this landscape are open and largely unobstructed; however, viewer exposure to the project is considered moderate. The project would occupy the level middle-ground at a similar elevation as the viewpoint, thereby occupying a narrow portion of the overall field of view due to the oblique viewing angle. This narrow band thus tends to be dominated by the foreground, which has variety in color and texture, and the background ridges, which break the horizon and dominate attention. This moderation of exposure due to oblique viewing angle is somewhat off-set however by the vast horizontal extent of the project from viewpoints at this distance, and high contrast of anticipated mirror brightness under many typical conditions.

Overall visual sensitivity of this KOP is thus considered to be moderate.

BNSF Railroad/I-40 West – KOP 4

Visual Resources Figure 11a depicts the view from the BNSF rail line, looking northwest into the project's eastern boundary at a distance of roughly 800 feet. KOP 4 was included in the AFC analysis because the AMTRAK Southwest Chief route from Los Angeles to Chicago travels on the BNSF rail line through the middle of the project site. However, the Southwest Chief passenger train travels through the site only at night in both directions. For that reason, train passengers are not considered to be a potentially sensitive viewer group within the project viewshed, and will not be analyzed further in this discussion.

However, KOP 4 closely resembles viewing conditions of I-40 motorists in close proximity to the project boundaries and, particularly, the SunCatcher units, as they could be along much of the I-40 project frontage, and as they would be at the project's eastern boundary a short distance (approximately ½-mile) to the south of this viewpoint. Particularly because the simulation of this viewpoint is very useful in visualizing the potential effects of the project on motorists when seen at close distance, this KOP has been retained in this discussion to address effects on that viewer group.

Because the KOP is being discussed in relation to viewing conditions on I-40, the setting/sensitivity discussion applicable to this KOP is essentially the same as that under KOP 5, below.

Interstate 40 East – KOP 5

KOP 5 is a view northeastward from eastbound I-40 across the opposite lanes of I-40. **Visual Resources Figure 12a** depicts the existing view from KOP 5. The view is similar to that from KOP 1, also facing northeastward. The visual foreground consists of the median of the highway and opposite westbound lanes and the utility poles along the highway.

Visual Quality: Visual quality is moderate. The middleground consists of the relatively intact, sloping bajadas descending from the Cady Mountains, characterized by light tan soils and sparse scrub vegetation. The alignment of the BNSF Railroad forms a relatively inconspicuous linear element across the near-middleground. Hills and ridges of the Cady and Bristol Mountains at middleground distance are vivid features, with interesting patterns of contrast between dark, rugged rock outcrops and ridges against lighter–colored strata and alluvial washes. At this middleground distance, the mountains enclose and dominate the view, strongly enhancing an otherwise fairly featureless landscape, elevating visual quality for eastbound travelers.

Viewer Concern: Viewer concern is considered moderately high, due to an elevated level of concern with scenic values presumed within the CDCA in general, and a relatively high proportion of motorists on I-40 concerned with those scenic values.

Viewer Exposure: Viewer exposure is high; views are predominantly open and unobstructed over an extensive area, and the project site is viewed at foreground and middle-ground distance, with terrain sloping downward toward the viewer along a highway frontage of roughly 4 miles. The view from KOP 5 is of the project site seen at a distance of a little over 1 mile across a privately held tract of land not in the project. Viewer numbers on I-40 are relatively high (15,600 vehicles per day) (cite: AFC 5.13-5).

Overall visual sensitivity of this KOP is thus considered to be moderately high.

C.13.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Significance Criteria

The following regulatory criteria were considered in determining whether a visual impact would be significant.

Federal

Significance under NEPA is defined in terms of a) context and b) intensity. Context means that the significance of an action must be analyzed in several circumstances or situations, such as society, the affected region, affected interests, and locale. Intensity refers to the severity of impact, and includes a variety factors to be considered (40 CFR 1508.27).

Some of the intensity factors potentially relevant to visual impacts include ‘unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands . . . ,’ degree of controversy, degree of uncertainty about possible effects, degree to which an action may establish a precedent for future actions, and potential for cumulatively significant impacts.

State

The CEQA *Guidelines* define a “significant effect” on the environment to mean a “substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including . . . objects of historic or aesthetic significance.” (Cal. Code Regs., tit.14, § 15382.) Appendix G of the *Guidelines*, under Aesthetics, lists the following four questions to be addressed regarding whether the potential impacts of a project are significant:

1. Would the project have a substantial adverse effect on a scenic vista?
2. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?
3. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?
4. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Local

Energy Commission staff considers any local goals, policies, or designations regarding visual resources. Conflicts with such laws, ordinances, regulations, and standards can constitute significant visual impacts. See the section on Applicable **Laws, Ordinances,Regulations, and Standards (LORS)**.

Project Visual Description

Power Plant

Visual Resources Figure 5 depicts the layout of the two proposed project phases. **Visual Resources Figure 6** depicts architectural elevations of the Calico Solar Project Main Services Complex, (AFC). **Visual Resources Figure 7** depicts elevations of the proposed mirrored solar dish units (Data Response #125) (SES 2009p).

The proposed project includes approximately 34,000, 38-foot solar dish Stirling systems (i.e., SunCatchers) and associated equipment and infrastructure within a fenced boundary, occupying approximately 8,230 acres (roughly 12.8 square miles) of undeveloped land. Associated proposed facilities on the site include:

- Main Services Complex located generally in the center of the site for administration and maintenance activities, which would include buildings up to 78 feet in height, parking and access roads;
- Staging Area adjacent to the Main Services Complex for use during construction
- Staging Area adjacent to the eastern site boundary, near the existing power line and railroad
- 220 kV Substation located generally in the center of the site, south of the Main Services Complex.

Site Layout

A specific detailed site layout of the SunCatcher units is not provided in the AFC. However, large-scale schematic layouts such as AFC Figure 3-4 suggest that the rows of SunCatchers under Phase 2 could abut the Highway I-40 right-of-way in the western portions of the project. AFC Figure 3-4 also suggests that in the eastern portion of the I-40 frontage, the southernmost SunCatchers would be located immediately north of the existing pipeline right-of-way (SES 2008a).

Construction Staging Area

Four construction staging/lay-down areas are proposed. Two 26-acre laydown areas will be placed at the south entrance off Hector Road and I-40, and the east entrance north of the Pisgah Substation, respectively. A 14-acre laydown area will be provided adjacent to the Main Services Complex. A 6-acre laydown area will be provided adjacent to the Satellite Services Complex.

Site Grading

Site grading would potentially represent a significant visual component of the proposed project during construction. Surface disturbance of the proposed site, as in most desert landscapes of the region, can often result in high contrast between the disturbed area and surroundings, due to high contrast between the disturbed soil color and solar reflection (albedo), and the color and albedo of the existing undisturbed, vegetated surface. Furthermore, effectiveness of revegetation in this arid environment is difficult, of limited effectiveness, and capable of recovery only over a very long-term time frame.

Plant Night Lighting

According to the AFC, night lighting of the Main Services Complex would consist of 400-watt high-pressure sodium lights, with illumination falling to 0.0 foot-candles on the ground a short distance from the facility (AFC, Figure 3-20, -21)(SES 2008a).

Parking and roadway lighting would consist of full cut-off luminaires to minimize night sky light pollution. Preliminary photometric studies provided in the AFC depict illumination from these fixtures falling to 0.0 foot-candles a short distance from each roadway intersection (AFC Figure 3-23) (SES 2008a).

Linear Facilities

- a 1.7-mile 730-MW/220-kV transmission line intended to connect to the existing Southern California Edison (SCE) Pisgah Substation located at the southeast boundary of the project site
- three overhead 34.5 kV collection circuits to convey power to the substation within the project. The height and length of these lines is not described in the AFC, but are visible in some of the AFC visual simulations
- approximately 38 miles of paved roads, approximately 587 miles of unpaved access roads.

<u>Visual Impact Assessment</u>

Staff Discussion of AFC Analysis

Despite various differences in methodology and specific conclusions, staff is in general agreement with the overall conclusions of the applicant's AFC visual analysis. That is, the AFC concluded that potential project visual impacts from KOPs 1, 2, 4, and 5 are potentially significant. The visual impact assessment below provides staff's independent analysis of visual resource impacts, and includes staff comments on the applicant's AFC visual analysis where appropriate. Visual simulations provided in the AFC are utilized to support or complement staff's analysis. The KOP analysis below is staff's own.

Direct Project Impacts

Project Operation Impacts

Impacts of Structures on Key Observation Points

KOP 1 – Route 66/I-40. ***Visual Resources Figures 8A and 8B.***
As described in Section C.13.4.1, above, overall visual sensitivity of this KOP, and much of the viewshed generally, is considered to be moderately high. Overall, existing scenic quality of this landscape is considered moderate. However, viewer concern is considered moderately high; the focus of many Route 66/National Trails Highway users would be on the historic nature of this roadway and the encompassing landscape which

earlier travelers would have experienced. Viewer concern is also elevated by the I-40's state eligible scenic highway status. Viewer exposure is high.
Staff also notes that internal project transmission lines, depicted in the other simulations, are not included in the applicant's simulation of KOP 1. These features would add a contrasting vertical visual element that would detract somewhat from the visual unity of the mirror field and contribute to a more industrial overall visual character.

According to information provided in Data Response #124 (SES 2009p), the project condition depicted in the simulation of KOP 1 contradicts the layout indicated in the AFC project description as shown in AFC Figure 3-2 (SES 2008a). It does, however, correspond roughly to the assumption that SunCatchers would be located only north of the existing pipeline right-of-way. As discussed further, below, these differences are critical to the accuracy of both the simulated view, and the impact analyses presented in this study.

Figures 8A and 8B depict a view northward from Route 66 (National Trail Highway), at a foreground distance of less than 1,000 feet to the site. However, as discussed further below, the nearest SunCatcher units depicted in this simulation are located over 1,700 feet away. Staff considers this to be a reasonably representative viewpoint. The range of actual view of the project would extend from foreground, throughout the middle-ground, to the background 5-miles distant. The project would appear very prominent, dominating the view from foreground locations on Route 66 and I-40. From such viewpoints near the project site, the project would strongly dominate the vista.

Project visual contrast would be very strong. Texture and form contrast with the existing landscape of the vast rows of SunCatchers at this distance would be strong, lending a distinctly man-made, industrial character to the location. Color contrast with the existing natural environment would also be strong, and although the field could at times resemble a vast lake surface, reflecting the sky, at other times the mirrors are expected to appear very bright, to the point of representing a strong nuisance or distraction, though not a hazard to navigation. In addition, the long, linear, bright SunCatcher rows, which are oriented perpendicularly to the highway, would rapidly alternate with the darker-colored land between each row, introducing a large-scale flickering effect at the highway frontage that would compound the nuisance and distraction of glare for some viewers. From some viewpoints, the taller buildings of the Main Services Complex (up to 77 feet tall) could be visible in the middle of the site, exhibiting some vertical form and line contrast and attracting attention, although at this distance they appear relatively inconspicuous. Likewise, poles for the electric collection system, though not depicted in the simulation of KOP 1, would be visible throughout the site and introduce vertical and horizontal elements of visual complexity that would detract from the visual unity of the scene and add to the overall industrial character. However, these features generally would be dwarfed by the vast scale and dominance of the SunCatcher fields.

The project would exert extraordinary horizontal scale and spatial dominance, occupying a vast expanse of the landscape along nearly 5 miles of highway frontage, not including the view when approaching the project on the highway. As depicted in the simulation, the overall proportion of the view occupied by the project would be extensive compared to the foreground terrain, background mountains, and sky, due to the sloping terrain and resulting site exposure.

As depicted in the simulation of KOP 1, the project does not physically block scenic views of the Cady Mountains in the distance from viewpoints along the highway. This feature of the simulation is discussed further, below. Overall visual change to viewers from Route 66 is considered high. The project would demand attention, could not be overlooked, and would be dominant in the landscape.

Impact Significance - In the context of moderately high overall visual sensitivity, the high level of visual change experienced by the majority of Route 66 and I-40 viewers – those within foreground and near-middle-ground distance from the project – would be regarded as significant.

As depicted in the applicant's simulation of KOP 1, the SunCatchers would not physically block scenic views of the Cady Mountains in the distance. Because the SunCatcher units are approximately 38 feet in height, this appears somewhat counter-intuitive. According to information provided in Data Response #124, this phenomenon would occur in large portions of the highway frontage, apparently for two principal reasons: first, Highway I-40 is elevated up to 8 feet above the adjacent plain, and up to 20 feet above the elevation of the nearest simulated SunCatchers, based on assumed siting depicted in the simulations. Elevation of the plain adjoining the highway continues to decline in relation to the highway until the BNSF rail line, over 1 mile from the highway, which generally represents a low point. Second, the simulations depict the site boundary as at least *1,200 feet from the edge of the roadway*, and the nearest SunCatchers set back an additional 500 feet from the site boundary. In the simulation of KOP 1, as depicted in the AFC, the nearest SunCatchers are thus assumed to be at least 1,700 feet from the edge of the roadway and 2,634 feet from the camera viewpoint on Route 66. The drop-off in elevation from the road at that set-back distance apparently accounts for the fact that the SunCatchers do not block views of the mountains behind them, as well as for the diminished visual scale and height of the units within the view, and the fact that the entire field to background distance remains visible Data Response Set 1 Part 2 # 124) (SES 2009p). The siting assumptions depicted in the simulation of KOP 1 and Data Response 124 thus contradict those depicted in AFC Project Description Figure 3-2. They do, however, appear to correspond roughly to the assumption that the project perimeter fencing and SunCatchers would be located *only north of the existing pipeline right-of-way*.

These discrepancies are relevant to this discussion because staff believes that the visual conditions as seen by motorists on I-40 and Route 66 would differ substantially under the siting assumptions presented in AFC Figure 3-2 and in Data Response #124, respectively. Under the assumptions depicted in AFC Figure 3-2, SunCatchers would be sited south of the pipeline ROW within a short distance of the highway. Under those conditions, the mirror units would not only have considerably greater visual magnitude individually, but would be higher in relation to the roadway and would begin to block views of the mountains in the background. At sufficiently close distance, they could completely enclose northward views from the highway. Closer siting would also exacerbate potential nuisance glare effects on motorists, which would be reduced by distance.

However, with the siting assumptions embodied in the simulation of KOP 1 and depicted in Data Response #124 – i.e., setbacks from the roadway to the nearest SunCatchers of

1,700 feet or more – the potential visual effects to motorists would be substantially reduced when compared to potential effects of the project with a much smaller set-back. Potential glare effects, visual scale of the units, and potential view blockage would all be substantially reduced. For these reasons, staff endorses the siting assumptions represented in the simulation of KOP 1, and recommends adoption of a similar approach as part of **Condition of Certification VIS-3**.

Mitigation – Staff recommends **Condition of Certification VIS-3, Set-Back of SunCatchers from Highway I-40**, which proposes siting of the SunCatchers to the north of the existing pipeline ROW, with a minimum set-back of the SunCatchers from the highway of 500 feet.

With this measure, as depicted in the simulation, project effects would remain substantial and continue to dominate the landscape. However, they would be considerably less than a project without these set-backs, retaining views of mountains and reducing potential nuisance glare impacts.

In addition, in order to reduce the contrast of non-mirror project features as seen from all off-site viewpoints, **Condition of Certification VIS-1, Surface Treatment of Non-Mirror Project Structures** is recommended.

With these measures, visual contrast and dominance of the project would be considerably reduced. However, visual contrast and dominance of the projects would remain strong, and impacts would remain significant.

Staff discussion of landscape screening measures: In the AFC, the applicant has suggested possible landscape screening measures as a potential mitigation measure to address project visual impacts. Staff has not recommended landscape screening measures, for the following reasons:

a) the amount of water that would be needed in this desert landscape to make such screening viable would be very substantial, and it is unclear that the resulting screening would represent a visual mitigation commensurate with its high social, monetary, and environmental cost.

b) any such screening would be nearly as out-of-character with the existing native landscape of the Mojave Desert as the project itself. Although many people may indeed prefer tree rows or other tall vegetation to the view of mechanical devices, the degree of visual change from the native landscape of miles of tall, non-native vegetation would be nearly as high as from the proposed project.

KOP 2 - Cady Mountains WSA. ***Visual Resources Figures 9A and 9B.***

KOP 2 represents a view of the project site from within the Cady Mountains WSA, as viewed from slightly over ¼-mile from the northern boundary of the site, at an elevation of roughly 300 feet above the base of the nearest SunCatchers, and 500 feet above the BNSF rail line visible in the view.

The location of the KOP as indicated in AFC Figure 5.13-2 may be inaccurate, or the accompanying information for the KOP may be inaccurate. According to Figure 5.13.6, the viewpoint faces into a portion of the project area that is ‘not a part’ (NAP) of the project. In Figure 5.13-14, the simulated view is described as a ‘worst-case view.’

However, if the mapped KOP location is correct and the ‘notch’ in the SunCatcher layout visible toward the center of the simulation represents the southwestern corner of the southern excluded (‘not a part of project ‘ (NAP)) area (Section 01, T09N R05E), then far from being a ‘worst case’ view from the Cady Mountains, this view would represent a ‘least case’ view, depicting roughly an area of less than two sections of units at a nearest distance of roughly 2.4 miles. The nearest depicted SunCatchers would thus be those at the northern edge of the large NAP area roughly ½ mile north of the BNSF rail line (Section 12). However, if this interpretation is correct, then the KOP location map clearly indicates that a slight rotation to the left from this or a similar nearby viewpoint within the Cady Mountains would potentially reveal an area of over 8 sections of units, at a closest distance of roughly 1,500 feet or .28 mile. Obviously, if this interpretation is correct, the visual effect of such a view (i.e., directed over the totality of the eastern portions of the project from an elevated position) would be dramatically greater than depicted in this simulation.

The simulation from Cady Mountain is accurately representative in one sense. According to the viewshed mapping depicted in **Visual Resources Figure 3**, visibility of the plain below from the south face of Cady Mountain is highly spotty and fragmented, due to the very rough terrain, so that views may often be hidden by intervening rocky topography, while nearby high points would have clear panoramic views.

As represented in the simulation from KOP 2, project contrast at this distance would generally be moderate. Color and texture contrast with the existing landscape at this distance would be strong, lending a conspicuous, distinctly man-made character to the view. Form and line contrast, however, would be relatively weak, blending with the broad horizontal lines of the level terrain.

In general, at this distance the project would exert strong horizontal scale and spatial dominance, occupying a vast extent of the landscape. Due to the viewshed characteristics in the Cady Mountains described above, however, visual dominance would vary considerably, as a function of visual exposure due to terrain. In the most exposed conditions, for example in the areas north of the proposed project area, viewers could overlook a panorama of up to 8 square miles of SunCatchers or 4 times the area depicted in the simulation, with the nearest of these seen at foreground distance. From such viewpoints, project dominance would be very strong, occupying the largest part of the overall view and overshadowing all other elements. In other cases, as in the simulated view, where the preponderance of the project is hidden by terrain, contrast and dominance could be moderate, and the project would appear to be visually co-dominant with the background mountains.

The project would not block scenic views, occupying the visual foreground of the background mountains, although it would block view of the natural valley floor.

Visual change from KOP 2 and similar middle-ground viewpoints would thus range from moderate to strong depending on location and distance. However, according to viewshed mapping, from the majority of locations at distances approaching a mile or more, visual exposure would decline due to intervening terrain, as would visual dominance due to distance. In view of the very scattered and intermittent visibility of the project predicted by viewshed mapping within the one- and 2-mile distance zones, the relatively low levels of visitation, the small proportion of the WSA that would be affected, and correspondingly limited view durations, overall visual change from the Cady Mountains is considered to be moderate.

Impact Significance - In the context of moderately high overall visual sensitivity, the moderate level of visual change experienced by visitors to Cady Mountains WSA at distances of over roughly one mile would be somewhat adverse. However, in view of the small proportion of the Cady Mountains WSA potentially affected at closer distances, overall impacts to viewers in the WSA are considered to be less than significant.

Mitigation – No mitigation measures are considered necessary at distances of over roughly one mile. No measures are available for nearer viewpoints. Those nearer viewpoints are sufficiently intermittent and represent so small a proportion of the WSA, however, as not to require mitigation.

*KOP 3 - Eastside View, **Visual Resources Figures 10A and 10B.***

KOP 3 represents the view from the nearest residence to the project, situated approximately 1.5 miles to the east of the site. As noted in Section C.13.4.1, above, this viewpoint may be the only residence within the project viewshed and may thus be unique, and not representative of a larger viewer group. It is, however, informative of the appearance of the project at this distance. In staff's opinion, however, the simulation does not accurately convey the level of brightness expected from the face of the mirrors under typical conditions.

As illustrated in the simulation, at this distance the existing SCE 500 kV and 230 kV transmission line towers and poles are evident, though visually subordinate within the view. The line and towers do not intrude into the skyline due to the mountains in the background. The project would begin at the transmission line and extend away from the viewer. However, numerous towers and poles required by the project internal to the site would increase the degree of vertical form and line contrast with the horizontal landscape. The contrast of the combined transmission lines could attract attention and begin to dominate the characteristic landscape. Due to the relatively level grade/elevation relationship between the project and viewpoint, at this distance the project occupies a narrow portion of the overall field of view due to the oblique viewing angle. The reduced dominance due to oblique viewing angle is somewhat off-set however by the vast horizontal extent of the project from viewpoints at this distance, resulting in high spatial dominance; and by high contrast of anticipated mirror brightness under many extended, typical conditions. Although not obstructing views of the distant background, the extensive array of regularly spaced solar units along the project boundary would completely dominate the middle-ground. Accounting for the anticipated brightness of the mirror field for extended periods, and the strong horizontal spatial dominance of the project, overall visual change at this distance would be strong. The project would demand attention, could not be overlooked, and would be dominant in the landscape.

Impact Significance - In the context of moderate overall visual sensitivity from this and similar locations, due to low visual magnitude and very low viewer numbers, the moderately high level of anticipated visual change of the project is considered adverse but less than significant.

Mitigation – No mitigation measures are considered necessary from KOP 3

*KOP 4 - BNSF Railroad/I-40 West. - **Visual Resources Figures 11A** and **11B.***

As discussed in Section C.13.4.1, above, Amtrak passengers on the BNSF rail line were determined not to be sensitive receptors. However, KOP 4 is retained to help convey the appearance of the project at foreground distance from similar viewpoints on I-40.

According to the photo location depicted in the AFC, the camera position is very roughly 700 - 800 feet from the project boundary. When compared to other simulations in which the SunCatchers are located at distances of ½ mile or more, the difference in level of impact as a function of distance is apparent. In addition, KOP 4 illustrates the effect of foreground views where grade relationships are relatively level. In such situations, the mirror units are likely to block and enclose views, as suggested by the simulation.

For most of the frontage of the project, I-40 is elevated in relation to the adjoining ground. However, that amount of elevation is not sufficient by itself to prevent the 38-foot-tall mirror units from blocking views and being highly dominant. Based on USGS topographic maps, however, elevations of the adjoining plain northward from the road edge tend to decrease along much of the highway frontage until the point of the BNSF rail line, which generally represents a low point. Thus, as indicated in simulations of KOP 1, above, and KOP 5, below, sufficient set-backs from the highway are a critical factor in reducing the visual height and magnitude of the mirror units, and for preventing view blockage or enclosure from the highway by the mirror units. Consequently, staff recommends **Condition of Certification VIS-3,** which proposes siting of the SunCatchers to the north of the existing pipeline ROW, with a minimum set-back of the SunCatchers from the highway of 500 feet.

*KOP 5 – Interstate 40 Eastbound, **Visual Resources Figures 12A and 12B.***

Staff Comments on Applicant's Simulation

KOP 5 represents near-middleground views of the project by motorists on I-40 eastbound. Because this view looks across foreground that is not a part of the project, it is not fully representative of what a viewer would experience while travelling on I-40, but depicts views along the roughly 1 mile section of excluded highway frontage. The viewpoint appears from the applicant's KOP map to be roughly 1 mile from the site. The simulation of KOP 5 primarily depicts the south-easternmost corner of project Phase 2, covering an area of roughly two sections (square miles).

At this set-back distance, the contrast and dominance of the project is substantially reduced when compared to KOP 1 and, especially, to KOP 4. Similarly, the spatial dominance of the project appears much less than in KOP 1 because the area depicted is considerably smaller. Based solely on this image one could conclude that the project could appear co-dominant with the surrounding landscape.

However, in order to fully understand the visual effect of the project from this or other viewpoints on I-40, it is important to recall that for approximately 5 miles the project fronts on I-40. In addition, the project would be visible for roughly 3 miles to the east of the project and for roughly 5 miles to the west of the project, particularly during morning and afternoon hours when diffuse reflection could be strongest. (KOP 3 depicts the appearance of the project from a distance of roughly 2 miles). The view in the KOP 5 simulation represents the greatest distance between the highway and the project at any point in the 5 miles of frontage. Over 80% of the frontage on I-40 could be as little as a few yards from the highway right-of-way. Thus, in staff's opinion, a closer approximation of the I-40 experience is provided in KOPs 1 and 4, although as discussed, this would only be true assuming adoption of recommended **Condition of Certification VIS-3**. Without that measure, the project could potentially appear more prominent than depicted in KOP 4 for a considerable portion of the I-40 frontage, because it could be located at a closer distance. Similarly, although spatial dominance of the project in this image appears moderate, a rotation to the left from this same viewpoint would depict a view of most of the 8 square miles of the proposed project behind the BNSF rail line, where the project would extend to its highest elevations at the foot of the Cady Mountains (up to an elevation of approximately 2,200 feet). At that angle, or in views from locations throughout the I-40 frontage directed toward the project, the view would resemble the simulation of KOP 1. Although the simulation is not necessarily inaccurate, staff also understands that the diffuse reflective brightness of the mirror fields could be substantially greater than depicted in this view for a substantial proportion of the day, increasing overall contrast accordingly.

Staff Analysis

For the reasons cited above, staff considers the simulations of KOPs 1 and 4 to be more representative of the I-40 motorist's experience than KOP 5, and together, more representative of the salient aspects of the project's visual characteristics. That is, with sufficient set-backs from the highway, most views from I-40 would resemble KOP 1, exposing the vast area of the mirror fields due to the sloping topography and exhibiting a highly unusual level of character contrast and spatial dominance. Without sufficient set-backs from the highway, the project would resemble the simulation of KOP 4. That is, visual height and magnitude of the individual SunCatchers would be great, collective diffuse glare could be strong, and there would be a potential for scenic view blockage and enclosure by the tall mirror units. Consequently, staff's analysis of impacts to motorists on I-40 (and Route 66) is as discussed under KOPs 1 and 4. KOP 5 provides useful supplemental understanding of the NAP portion of the highway frontage, but is atypical and does not alter staff's conclusions on the overall project effects to motorists. That is, overall visual change to viewers from Route 66 is considered high. The project would demand attention, could not be overlooked, and would be dominant in the landscape.

<u>Impact Significance</u> - In the context of moderately high overall visual sensitivity, the high level of visual change experienced by the majority of Route 66 and I-40 viewers – those within foreground and near-middle-ground distance from the project – would be regarded as significant.

Project Construction Impacts

In addition to the proposed project site, four construction staging/lay-down areas are proposed. Two 26-acre laydown areas will be placed at the south entrance off Hector Road and the east entrance north of the Pisgah Substation, respectively. A 14-acre laydown area will be provided adjacent to the Main Services Complex. A 6-acre laydown area will be provided adjacent to the Satellite Services Complex.

The two 26-acre lay-down sites would be of substantial scale. Both would be visible from I-40. However, only the eastern site at Hector Road would be prominent to motorists. The other two smaller sites would be visually inconspicuous. The eastern 26-acre site would be located along the highway frontage and thus be highly visible for a length of approximately ¼-mile. This exposure could result in unsightly effects for the duration of construction, and in long-term effects if soil and vegetation disturbance were not mitigated. In order to minimize short- and long-term impacts of this staging site to motorists on I-40, staff recommends **Condition of Certification VIS-4.** With this recommended measure, impacts of the staging site would be reduced to less-than-significant levels.

Indirect Impacts

The proposed Calico project is sited within a limited and largely enclosed viewshed in which there are few other likely sites for solar energy development. In addition, the site is largely surrounded by various protected areas. However, the likelihood of implementation of a proposed SES Solar 3 project immediately to the northwest, adjacent to the Calico Solar Project, seems high if the proposed project is approved. The potential cumulative impacts of the combined projects are discussed under Section C.13.9, below. Potential indirect impacts from proposed 275 MW Early Interconnection and 850 MW Full Build-Out options are discussed below in Section C.13.8.

Closure and Decommissioning Impacts and Mitigation

Permanent closures would require the applicant to submit to the Energy Commission a contingency plan or a decommissioning plan. A decommissioning plan would be implemented to ensure compliance with applicable LORS, removal of equipment and shutdown procedures, site restoration, potential decommissioning alternatives, and the costs and source of funds associated with decommissioning activities.

The removal of the existing facility would leave a very prominent visual impact over the entire site due to color contrast created between graded or disturbed soil areas and undisturbed areas in the region of the project site. This color contrast is due particularly to the dark color element contributed by normal scrub vegetation, and the light color of underlying soils in the area. At present, despite some surface disturbance from the railroad and utility rights of way, the site retains a predominantly natural character. However, unlike these rights-of-way, the disturbed area of the site would be highly visible to motorists traveling on 1-40 and Route 66. Revegetation of areas in this desert region is difficult, but has been implemented with success in some cases over time. Thus, visual recovery from land disturbance after closure and decommissioning could take place, although only over a long period of time, with implementation of an active and comprehensive revegetation program for the site. With Condition of Certification BIO-10 in the Biological Resources section of this SA/DEIS, visual recovery could be accomplished and impacts would be reduced to less-than-significant levels in the long term.

C.13.4.3 CEQA LEVEL OF SIGNIFICANCE AND ADVERSE EFFECTS UNDER NEPA

The BLM is in the process of establishing visual resource management classifications for the proposed project and surrounding areas.

Appendix G of the CEQA Guidelines includes four significance criteria for evaluating aesthetic impacts, as follows:

A. Would the project have a substantial adverse effect on a scenic vista?

No specific designated scenic vista locations were identified in the project viewshed. However, as described above, a higher level of viewer concern for scenic values was associated with the project viewshed as seen from the highway due to the eligible State Scenic Highway status of I-40 and the historic interest of Route 66. Views of the background mountains are the most scenic element of views from the highways in the project area, and these could potentially be blocked by the project, if the mirror units are sited sufficiently close to the highway. With recommended **Condition of Certification VIS-3,** those views would be preserved, though the foreground would be strongly altered by the vast array of mirror units, strongly attracting attention to themselves. With this measure, views would not be blocked, but the project's effect on the quality of those views would be strongly adverse and significant. This alteration of visual quality of the surroundings is discussed further under item C, below.

B. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?

The project is adjacent to Highway I-40 and Route 66, which are not listed as State Scenic Highways. I-40 has been identified as eligible for such a listing. No notable scenic features or resources are present on-site. The project would not directly damage any specific scenic resources located within the project site. Potential effects on scenic quality within the project viewshed in general are discussed under Item C, below.

C. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

As described in the main analysis above, the project would substantially degrade the existing visual character and quality of the site and its surroundings. Under the proposed project, an area of 12.8 square miles, including a roughly 5-mile segment of I-40 and Route 66, would experience a dramatic visual transformation from a predominantly natural desert landscape to one of a highly industrial character. The character and quality of views from these transportation facilities would be strongly affected. In the context of a moderately high level of viewer sensitivity of these affected viewpoints, project impacts are considered significant.

D. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

While highway navigation is not expected to be adversely affected by project glare, nuisance glare is a major issue of concern for the Calico Solar Project, primarily for aesthetic and comfort reasons.

Potentially affected receptors would include motorists on the highways; and hikers, climbers and other visitors in Cady Mountains WSA and associated open trails.

Staff conducted an independent review of potential glare impacts based on limited available project data. With recommended **Condition of Certification VIS- 3**, impacts could be reduced to less-than-significant levels.

C.13.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the central portion of the proposed 850 MW project. It was developed because it can be constructed. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

C.13.5.1 SETTING AND EXISTING CONDITIONS

Regionally, the setting and existing conditions for the Reduced Acreage alternative would not differ substantially from the proposed project. However, the setting at the boundary of the alternative would differ substantially from the proposed project. Under the alternative, substantially fewer solar dishes would be deployed and the project would be farther from the boundary of Cady Mountain WSA and nearby ACECs. It would also be farther from the proposed Mojave Trails National Monument. It would not be appreciably different for viewers on I-40, which would remain the southern boundary of the project.

C.13.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The reduced area alternative is 31% the size of the proposed project. Under this alternative, the project site would be set back approximately a mile from the highway, substantially reducing the visual prominence of the mirror field. Because both the proximity to the highway and extent of the mirror fields would be greatly reduced, overall visual change due to this alternative would be substantially less than under the proposed project. Coincidentally, the overall appearance would be somewhat similar to the AFC simulation of KOP 5, which depicts the project at a similar distance to the Reduced Acreage Alternative, and depicts a similarly reduced overall scale. With this setback and reduced area, overall visual change could be considered moderate.

Due to the large set-back, nuisance glare in the eyes of approaching motorists would be substantially reduced due to the much lower proportion of the field of view occupied by the mirrors. Motorists approaching on I-40 from the east in the morning could still be subject to bright glare from the front row of solar units on the eastern edge of the site for a considerable distance approaching the site, since the units would be directly ahead of the motorist. However, except for such short-lived events, overall nuisance glare effects would be substantially reduced due to distance. The reduced acreage alternative would not reduce potential glare impacts on train operators, as the railroad would still pass through the site.

C.13.5.3 CEQA LEVEL OF SIGNIFICANCE AND ADVERSE EFFECTS UNDER NEPA

The reduced acreage alternative would set back the project boundary approximately 1 mile from the highway, and in most instances, nearly 2 miles from the Cady Mountains WSA. This would eliminate the foreground impacts as seen from these two locations. Middle-ground impacts would be reduced, as less of the landscape in the middle-ground would be occupied. Likewise, the increased setback of this alternative would eliminate the possibility of obstructing scenic views of the background mountains. Given the moderate level of existing scenic quality of the viewshed, although the level of overall viewer sensitivity of these viewpoints is considered to be moderately high, the moderate level of overall visual change and the greatly reduced level of nuisance glare of the Reduced Acreage Alternative could be considered acceptable, and less-than-significant. The BLM is in the process of establishing visual resource management classifications for the proposed project and surrounding areas.

C.13.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed 850 MW project. This alternative, the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 2**.

C.13.6.1 SETTING AND EXISTING CONDITIONS

Avoiding donated and acquired lands alters the eastern boundary of the project area and reduces the number of solar dishes. However, with regard to visual setting and existing conditions, this alternative would be very similar to the proposed project, as discussed in Section C.13.4.1. This is because the areas withdrawn by this alternative are remote from the highway and affect only a portion of the boundary with the WSA. The arrays would occupy most of the same surface as in the proposed project.

C.13.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The impacts of avoidance alternative would not differ in a meaningful way from those described in Section C.13.4.2. for the proposed project. The vast size of the site would be reduced, but not in a way that would be readily perceptible to most viewers, in particular those on the highways.

C.13.6.3 CEQA LEVEL OF SIGNIFICANCE AND ADVERSE EFFECTS UNDER NEPA

Because there would be no readily perceptible reduction in visual impact, the impacts would remain significant, as described for the proposed project in Section C.13.4.3. The BLM is in the process of establishing visual resource management classifications for the proposed project and surrounding areas.

C.13.7 NO PROJECT / NO ACTION ALTERNATIVE

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

NO PROJECT/NO ACTION ALTERNATIVE #1

No Action on the Calico Solar Project Application and on CDCA Land Use Plan Amendment

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur.
- The land on which the project is proposed may or may not become available to other uses (including another solar project), depending on BLM's actions with respect to the amendment of the California Desert Conservation Area Plan.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM, and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no new ground disturbance. As a result, no loss or degradation to cultural resources from construction or operation of the proposed project would occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

If this project is not approved, renewable projects would likely be developed on other sites in the California Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are large solar and wind projects proposed on BLM land along the Interstate 40 corridor within a few miles of the Calico Solar Project site. In addition, there are currently over 70 applications for solar projects covering over 650,000 acres pending with BLM in California.

NO PROJECT/NO ACTION ALTERNATIVE #2

No Action on Calico Solar Project and Amend the CDCA Land Use Plan to Make the Area Available for Future Solar Development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM, and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with a different solar technology. As a result, ground disturbance would result from the construction and operation of the facility providing different solar technology and would likely result in a loss or degradation to cultural resources. Different solar technologies require different amounts of grading and maintenance; however, it is expected that all solar technologies require some grading and ground disturbance. As such, this No Project/No Action Alternative could result in impacts to cultural resources similar to the impacts under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3

No Action on the Calico Solar Project Application and Amend the CDCA Land Use Plan to Make the Area Unavailable for Future Solar Development

Under this alternative, the proposed the Calico Solar Project would not be approved by the Energy Commission and BLM, and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no corresponding land disturbance. As a result, the cultural resources of the site are not expected to change noticeably from existing conditions and, as such, this No Project/No

Action Alternative would not result in impacts to cultural resources. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

If this project is not approved, renewable projects would likely be developed on other sites in the California Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are large solar and wind projects proposed on BLM land along the Interstate 40 corridor within a few miles of the Calico Solar Project site. In addition, there are currently over 70 applications for solar projects covering over 650,000 acres pending with BLM in California. If the No Project/No Action Alternative #2 is approved, impacts to visual resources on the project site could still occur as a result of approval of another renewable energy project proposal.

C.13.8 PROJECT-RELATED FUTURE ACTIONS - VISUAL RESOURCES

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios:

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.13.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

The transmission line construction project as proposed would be an upgrade of an existing transmission line. For approximately 57 miles the transmission line would replace an existing 220 kV line, within the existing ROW area for that line. For the remaining approximately 10 miles of the route, the proposed line would be constructed within a new ROW area in the vicinity of Hesperia.

The visual environment associated with the project area is generally natural and not highly altered from predevelopment conditions; however, there are existing and proposed transmission line and other linear features in the area, including the proposed ROW area. Visual resources in the area of the upgrades have been affected along portions of the routes by past and present actions, including highway/roadway construction, and residential and commercial development. The transmission route would pass through BLM lands and run adjacent to wilderness areas and ACECs, including the Ord-Rodman DWMA. The project area includes broad expanses of Basin and Range topography of the Mohave Desert region, and the ROWs generally traverse between alluvial valley debris flows and rugged mountain ranges. Views are generally expansive through this portion of the project area.

No specific Visual Resource Management (VRM) designations have yet been identified for BLM lands crossed by the SCE upgrades; however, based upon the minimal alterations to the existing environment, it is assumed that most of the lands, especially at the northeastern end would have a Class II or III designation with wilderness areas, ACECs and DWMAs classified as Class I. No qualitative evaluations of the project area scenic quality were completed for this study.

C.13.8.2 ENVIRONMENTAL IMPACTS

For the proposed 500 kV route, new dulled galvanized 500 kV LST structures would be installed in the existing and new ROW. Single-circuit LSTs generally range in height between 91 feet and 194 feet. Most of the structure sites would likely require minor to substantial grading and new or re-developed access and spur roads.

The project would require temporary staging areas for equipment and materials storage along the transmission line route. Generally these yards range in size from a few acres to up to approximately 30 acres. Construction of the expanded Pisgah Substation would likely require a temporary laydown area located at or near the existing roadway at the site.

Conductor pulling and tensioning equipment would be located at various sites along the transmission line ROW. Depending on the terrain and the number of angles and dead-end sites, numerous pull sites would likely be needed.

The project would be visible from foreground, middle ground, and distant views from sensitive viewpoints (e.g., highways, residences, trail heads, wilderness areas, and scenic overlooks) located along the proposed ROW. The project would be visible from travelers along I-40 and Highway 66; however, two existing 220 kV transmission lines are currently located within the proposed ROW in these areas. I-40 is currently classified as an eligible state scenic highway, not officially designated (Caltrans 2010). Construction equipment and activities would also be visible to motorists other local roadways and to residents living near the construction activities in Hesperia. Although a BLM visual resource contrast rating analysis has not been completed, due to temporary duration of the project construction, the adverse visual impacts that would occur during construction would not likely be significant. This conclusion assumes that construction areas and the ROW would be restored to their pre-project conditions, as discussed below.

During project operation, the upgrades would include the construction of new permanent spur and access roads to the individual structure sites and Pisgah Substation, which could create permanent visual scars across the undeveloped landscape.

Construction of the 500 kV line would be largely within an existing ROW across undeveloped BLM lands, and would parallel a major existing utility corridor with up to three other existing transmission lines for its length. Because the existing transmission lines and towers are an established part of the setting and the project would include removal of the existing 220 kV line and poles, the adverse visual impacts that would occur due to installation of the new line, and any incremental changes in tower height or design, would likely not be significant. This conclusion assumes that the new wires and towers would incorporate typical measures to mitigate potentially significant adverse visual impacts, such as those listed below.

In locations with no previously existing transmission line corridors, the degree of change may be more evident, particularly if poles or towers are placed in visually sensitive locations, such as near residences, against a skyline, or adjacent to highly traveled roadways. Visual resource contrast rating analysis would be required to be completed for BLM-managed lands and sensitive viewshed locations, such as wilderness areas, crossed by or lying adjacent to the project, to determine the degree of change to visual resources in those areas, particularly in areas where no transmission lines currently exist. Expansion to the Pisgah Substation under both options would be noticeable from travelers along I-40, but for only short periods (e.g., less than 1 minute) and the visual change would be reduced under the 275 MW Early Interconnection which would be within a 270 feet by 100 feet area directly adjacent to the existing substation. Upgrades to the Lugo Substation would occur within the existing footprint and are also not expected to result in significant changes to current conditions.

C.13.8.3 MITIGATION

With the inclusion of mitigation measures similar to those listed below, visual impacts from construction activities related to the upgrades for both options would likely not be significant:

- During project construction, the work site should be kept clean of debris and construction waste. Material and construction storage areas should be selected to minimize views from public roads, trails, and nearby residences.
- For areas where excavated materials would be visible from sensitive viewing locations, excavated materials should be disposed of in a manner that is not visually evident and does not create visual contrasts.
- Maintenance operations work should be conducted in a manner that limits unnecessary scarring or defacing of the natural surroundings to preserve the natural landscape to the extent possible.
- The project owner should revegetate disturbed soil areas to the greatest practical extent. In particular, the area of disturbed soils used for laydown, project construction, and siting of the substation and other ancillary operations and support structures should be revegetated.

The following mitigation measures are associated with the siting and design of the new transmission structures under the 850 MW Full Build-Out option that would help to reduce impacts to visual resources:

- Complete visual resource impact analysis on BLM lands and for other sensitive viewshed locations.
- Attempt to place transmission lines within existing corridors and match tower locations with existing transmission structures.
- Do not place structures against a skyline view or within drainages wherever possible.
- Avoid perpendicular or "straight-line" placement along hillsides wherever possible.
- Non-specular and non-reflective conductors should be used in order to reduce conductor visibility and visual contrast.
- Insulators should be non-reflective and non-refractive.
- Any surface coatings on structures should be applied to new or replacement structures that are visible from sensitive viewing locations with appropriate colors, finishes, and textures to most effectively blend the structures with the visible backdrop landscape. For structures that are visible from more than one sensitive viewing location, if backdrops are substantially different when viewed from different vantage points, the darker color shall be selected, because dark colors tend to blend into landscape backdrops more effectively than lighter colors, which may contrast and produce glare.

C.13.8.4 CONCLUSION

Construction of the SCE upgrades project would require temporary disturbance during construction (i.e., heavy equipment, tensioning, and pull sites). After rehabilitation of temporary construction yards and pulling sites, as required by the suggested mitigation, the portion of the transmission line within the existing corridor would appear largely as it does now, except for the construction of new and permanent spur and access roads, which would permanently scar the fragile desert landscape.

The SCE upgrades would have the potential to cause adverse long-term visual impacts, such as through the use of reflective conductors and/or insulators that would make existing or new structures more dominant in the existing viewshed, and through the construction of new and larger structures. However, project design features and feasible mitigation measures would be available that would ensure that visual impacts of the project would be reduced. With use of non-specular conductors and non-reflective and non-refractive insulators, potential long-term impacts associated with this activity would be reduced as well.

Because the upgrades would be in a largely undeveloped area on BLM land, would parallel an existing utility corridor or be on/within existing facilities, and would include removal of the existing line, it is expected that visual impacts would be reduced to less than significant along most of the line, but a BLM visual resource contrast rating analysis is required to confirm the analysis. In addition, a portion of the 500 kV transmission line route under the 850 MW Full Build-Out would be within a new 500 kV ROW. Even if the upgrades work complies with all applicable laws, ordinances, regulations and standards (LORS), absent a viewshed analysis from sensitive viewpoints, this Staff Assessment/EIS conservatively concludes that the SCE upgrades may create significant and unmitigable impacts to visual resources due to the construction of 10 miles of new ROW from the Mojave River to the Lugo Substation.

C.13.9 CUMULATIVE IMPACTS

C.13.9.1 GEOGRAPHIC EXTENT

Cumulative impacts could occur if implementation of the Calico Solar Project would combine with those of other local or regional projects. The Calico Solar Project is potentially associated with two types of cumulative impact:

1. cumulative impacts within the immediate project viewshed, essentially comprising foreseeable future projects in the Mojave Desert area of San Bernardino County;
2. cumulative impacts of foreseeable future solar and other renewable energy projects within the southern California Desert, or other broad basin of the project's affected landscape type. The widest applicable basin of cumulative effect would include all of the southern California Desert landscapes extending into neighboring states.

Local Projects (Project Viewshed)

Calico Solar Project and Past Projects

Past and present projects occurring in the viewshed of the proposed project site and affecting its existing visual quality include recreational activities managed by the BLM, SCE transmission lines, the Pisgah substation, utility lines, and the I-40 and Route 66 highways.

Calico Solar Project and Foreseeable Future Projects

Past and foreseeable future projects in the vicinity of the Calico Solar Project are depicted in **Cumulative Impacts Figure 3**, and listed in Cumulative Impacts Table **2 .**

As discussed in Section C.13.4.1 above analyzing the setting of the proposed project, the Calico Solar Project is situated within a fairly limited local viewshed, enclosed by nearby mountains. The area within which it could interact with other future projects is thus somewhat limited. Potential projects listed in Figure 3 and Table 3 include the Pisgah-Lugo transmission upgrade described elsewhere in this report, the Pisgah Substation Expansion, SES Solar 3, Oak Creek Wind Energy, and possibly the Power Partners wind project. These are the projects that appear to have the potential to directly interact with the Calico Solar Project visually.

At this level of direct visual interaction, it is difficult to evaluate the cumulative effects of these projects without some further foreseeable project detail, but because staff already finds that the effects of the Calico Solar Project alone would have substantial visual impacts, potential cumulative impacts would also be substantial taken as a whole.

Within the slightly broader Newberry Springs-Ludlow area of potential cumulative effect, the project in combination with foreseeable projects could have the effect of substantially degrading the overall visual quality of a slightly broader segment of Highway I-40. The segment of I-40 west of the Calico Solar Project site however is already considered by staff to be visually compromised by development. The listed projects however have the potential to further degrade a currently intact segment of I-40, which is listed as an eligible State Scenic Highway, from the Calico Solar Project site eastward. This effect could be cumulatively substantial, depending upon the details of the specific projects.

Regional Solar/Renewable Development Projects

Calico Solar Project and Past Regional Projects

The Calico Solar Project is among the first of a large number of existing solar project applications in the CDD. As such, past and present projects have had a negligible region-wide cumulative impact.

Calico Solar Project and Foreseeable Future Projects

The analysis of cumulative impacts is not necessarily restricted to the immediate viewshed of a project, and the need for cumulative analysis over a broad geographic area may often be determined by the affected resource itself. In this case the affected resource is the unique and highly valued landscape type of which the project site forms a small part – the landscape of the Mojave Desert.

The Mojave Desert and California Desert Conservation Area (CDCA) within which the Calico Solar Project is located are a unique and highly valued scenic resource of national importance, as reflected by the presence of three national parks and numerous Wilderness Areas within its boundaries. Cumulative Impacts Table 1 identifies 72 solar projects and 61 wind project applications with a total overall area of over one million acres within the CDCA, which is indicative of the interest in public lands for renewable energy generation at a regional level.

This figure does not include renewable projects within the Nevada and Arizona portions of the Mojave Desert. Of the 61 wind applications in the California Desert District, only five of the applications are for wind development; the remaining proposals are for site testing and monitoring. BLM's experience is that a small percentage of applications for site testing have resulted in wind development proposals. In regards to the solar applications filed with BLM in California, only approximately 10% of the proponents have prepared acceptable detailed Plans of Development required by BLM to begin a NEPA analysis.

Although it is unlikely that all of the future solar and wind development projects proposed in the region would be constructed, it is reasonable to assume that some of them will be constructed, in light of the state and federal mandates for renewable energy development. With this very high number of renewable energy applications currently filed with BLM, the potential for profound widespread cumulative impacts to scenic resources within the southern California is clear.

These cumulative impacts could include a substantial decline in the overall number and extent of scenically intact, undisturbed desert landscapes, and a substantially more urbanized character in the overall southern California desert landscape. In particular, the number of current renewable applications before the BLM and Energy Commission that could potentially be prominently visible from the desert region's major highways is proportionally high, and the proportion of those highways that could be affected is also high. Because these highways are the location from which the vast majority of viewers experience the California desert, this potential effect is of concern to staff. Viewed in the cumulative context of the Southern California desert as a whole, potential visual impacts of renewable energy projects are considered to be cumulatively considerable and potentially significant.

C.13.9.2 CUMULATIVE IMPACT CONCLUSION

The anticipated visual impacts of the Calico Solar Project in combination with past and foreseeable future local projects in the Mohave Desert region, and past and foreseeable future region-wide projects in the southern California desert are considered cumulatively considerable, and potentially significant.

C.13.10 COMPLIANCE WITH LORS

Visual Resources Table 3
Project Compliance with Laws, Ordinances, Regulations, and Standards (LORS)

LORS		Consistency with Staff-Recommended Conditions of Certification (Project)
Federal		
National Environmental Policy Act (NEPA)	As discussed above, applicable federal requirements for visual impact assessment are enacted through application of the BLM VRM methodology, discussed below.	
Federal Land Policy and Management Act of 1976 (FLPMA)	Section 102 (a) of the Federal Land Policy and Management Act of 1976 (FLPMA) states that " . . . . the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values …. " Section 103 (c) identifies "scenic values" as one of the resources for which public land should be managed. Section 201 (a) states that "The Secretary shall prepare and maintain on a continuing basis an inventory of all public lands and their resources and other values (including ... scenic values) ...." Section 505 (a) requires that "Each right-of-way shall contain terms and conditions which will... minimize damage to the scenic and esthetic values...."	Refer to CDCA discussion, below.

LORS		Consistency with Staff-Recommended Conditions of Certification (Project)
California Desert Conservation Area Plan (CDCA Plan)	The CDCA Plan represents the Resource Management Plan (RMP) for the area required under FLPMA. The CDCA Plan did not contain VRM mapping as in most RMPs. The Calico site is classified in the CDCA Plan as Multiple-Use Class (MUC) M (Moderate Use). MUC M lands are managed to provide a wider variety of uses such as mining, grazing, recreation, utilities, and energy development, while conserving desert resources and mitigating damages permitted uses may cause. Under the CDCA Plan Electrical Power Generation Facilities, including Wind/Solar facilities, may be allowed within MUC Class M if NEPA requirements are met.	Consistent. Solar electrical generation plants are specifically allowed for under the MUC Class M Guidelines if NEPA requirements are met. Disclosure of potential visual project effects under NEPA has been conducted through the analysis in this study.
National Historic Preservation Act (NHPA)	Under regulations of the NHPA, visual impacts to a listed or eligible National Register property that may diminish the integrity of the property's ". . . setting . . .(or) feeling . . . ." in a way that affects the property's eligibility for listing, may result in a potentially significant adverse effect. "Examples of adverse effects . . . include . . .: Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features . . . . " (36 CFR Part 800.5)	These potential impacts are addressed in the **Cultural Resources** section of this SA/DEIS.

LORS		Consistency with Staff-Recommended Conditions of Certification (Project)
State		
State Scenic Highway Program (CA. Streets and Highways Code, Section 260 et seq.)	The State Scenic Highway Program promotes protection of designated State scenic highways through certification and adoption of local scenic corridor protection programs that conform to requirements of the State program.	Consistent. Interstate 40 within the project viewshed is eligible to be State scenic highway, but has not been designated as such.
Local		
San Bernardino County General Plan (2007) Applicable Conservation Element Goals, Objectives, Programs	***CONSERVATION ELEMENT*** *GOAL CO 1*. The County will maintain to the greatest extent possible natural resources that contribute to the quality of life within the County. Policy CO 1.2 The preservation of some natural resources requires the establishment of a buffer area between the resource and developed areas. The County will continue the review of the Land Use Designations for unincorporated areas within one mile of any state or federally designated scenic area, national forest, national monument, or similar area, to ensure that sufficiently low development densities and building controls are applied to protect the visual and natural qualities of these areas.	None of the project site is under county jurisdiction; however State and Federal agencies endeavor to conform to local goals, policies, objectives, and ordinances where practicable. County policy is to minimize development density within a mile buffer around designated federal resources in order to preserve visual and natural qualities. The project would not conform to this goal.

LORS		**Consistency with Staff-Recommended Conditions of Certification (Project)**
San Bernardino County General Plan (2007) Applicable Conservation Element Goals, Objectives, Programs (continued)	Policy CO 8.1 Maximize the beneficial effects and minimize the adverse effects associated with the siting of major energy facilities. The County will site energy facilities equitably in order to minimize net energy use and consumption of natural resources, and avoid inappropriately burdening certain communities. Energy planning should conserve energy and reduce peak load demands, reduce natural resource consumption, minimize environmental impacts, and treat local communities fairly. 4. The County will consult with electric utilities during the construction of their major transmission line towers to ensure that they are aesthetically compatible with the surrounding environment. 8. The County shall consult with electric utilities during the planning construction of their major transmission lines towers to ensure that they are aesthetically compatible with the surrounding environment.	While adverse effects will be minimized to the degree feasible, they still will be adverse and significant. There are no communities within the project vicinity.
	OPEN SPACE ELEMENT	
	GOAL OS 4. The County will preserve and protect cultural resources throughout the County, including parks, areas of regional significance, and scenic, cultural and historic sites that contribute to a distinctive visual experience	The project would not be consistent with the goal to preserve and protect scenic sites “that contribute to a distinctive visual experience.”

LORS		Consistency with Staff-Recommended Conditions of Certification (Project)
San Bernardino County General Plan (2007) Applicable Conservation Element Goals, Objectives, Programs (continued)	*GOAL OS 5*. The County will maintain and enhance the visual character of scenic routes in the County. Scenic Route: Interstate 40 from Ludlow northeast to Needles. (p. 223) ***LAND USE ELEMENT*** GOAL D/LU 1. Maintain land use patterns in the Desert Region that enhance the rural environment and preserve the quality of life of the residents of the region. ***CONSERVATION ELEMENT*** GOAL D/CO 3. Preserve the dark night sky as a natural resource in the Desert Region communities. POLICIES D/CO 3.1 Protect the Night Sky by providing information about and enforcing existing ordinances: a. Provide information about the Night Sky ordinance and lighting restrictions with each land use or building permit application. b. Review exterior lighting as part of the design review process. D/CO 3.2 All outdoor lighting, including street lighting, shall be provided in accordance with the Night Sky Protection Ordinance and shall only be provided as necessary to meet safety standards. D/CO 3.3 Allow for desert communities' input on the need for, and placement of, new street lights.	Interstate 40 from Ludlow northeast to Needles is designated by the County as a scenic route. The project site is west of and not visible from this designated section of I-40, therefore the project is consistent with this Goal. Consistent. With recommended Condition of Certification VIS-2, upward illumination would be shielded, and outdoor illumination in general would be minimized. Consistent. Under recommended Condition of Certification VIS-2, the required project lighting plan would be provided to the County for review prior to project construction. Potential for nighttime light pollution would be minimized through shielding, downward-directed lighting, and minimum lighting consistent with safety. Lit areas not occupied on a continuous basis would operate only when the area is occupied. With this condition, the project would conform with these policies.

LORS		Consistency with Staff-Recommended Conditions of Certification (Project)
San Bernardino Development Code Chapter 83.07.040 Glare and Outdoor Lighting - Mountain and Desert Regions.	Sets various standards and conditions for external lighting in residential and commercial situations. Exempts facilities on Federal Property	With staff-recommended Condition of Certification VIS-2, the project would meet the standards set in this Chapter of the Code.

C.13.11 NOTEWORTHY PUBLIC BENEFITS

No noteworthy public benefits in the area of visual resources were identified.

C.13.12 FACILITY CLOSURE

Staff has addressed facility closure and decommissioning impacts to Visual Resource under individual headings in Assessment of Impacts and Discussion of Mitigation above.

C.13.13 CONCLUSIONS

The proposed project and Avoidance of Donated and Acquired Lands Alternative would both substantially degrade the existing visual character and quality of the site and its surroundings. Under the proposed project, an area of 12.8 square miles, including approximately 5 miles of frontage on I-40, would experience a dramatic visual transformation from a predominantly natural desert landscape to one of a highly industrial character, strongly affecting motorists on the highway. Given the moderately high level of viewer sensitivity of these affected viewpoints, project impacts under these two alternatives are considered significant under CEQA. With staff-recommended mitigation measures, these impacts could be greatly reduced, but would remain significant and unavoidable under CEQA.

Under the proposed project and the Avoidance of Donated and Acquired Lands Alternative, the character and quality of some views from foreground and near-middle-ground areas of the Cady Mountains WSA would be adversely affected under NEPA, but the overall effect on views from the Cady Mountains WSA is considered to be less-than-significant under CEQA. The Avoidance of Donated and Acquired Lands Alternative would remain significant to viewers from I-40, and unavoidable. The degree and extent of those impacts would be similar to those of the proposed project under NEPA.

Impacts of the Reduced Acreage Alternative would be substantially less than the proposed project and are considered less-than-significant under CEQA.

The anticipated visual impacts of the Calico Solar Project and alternatives, in combination with past and foreseeable future local projects in the Mojave Desert region, and past and foreseeable future region-wide projects in the southern California desert are considered cumulatively considerable and potentially significant under CEQA.

In the absence of photometric data to the contrary, staff believes that diffuse reflection from the SunCatchers could be an intrusive and distracting nuisance to motorists under at least certain conditions, particularly when an entire row of units could be visible in a near-vertical position to approaching motorists at hours near sunrise and sunset. However, with staff-recommended **Condition of Certification VIS-3,** potential glare/reflection impacts could be reduced to less-than-significant levels under CEQA.

With staff-recommended **Condition of Certification VIS-4**, construction impacts could be mitigated to less- than-significant levels under CEQA.

C.13.14 MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION/APPROVAL

SURFACE TREATMENT OF NON-MIRROR PROJECT STRUCTURES AND BUILDINGS

VIS-1 The project owner shall treat all non-mirror surfaces of all project structures and buildings visible to the public such that a) their colors minimize visual intrusion and contrast by blending with the existing tan and brown color of the surrounding landscape; b) their colors and finishes do not create excessive glare; and c) their colors and finishes are consistent with local policies and ordinances. The transmission line conductors shall be non-specular and non-reflective, and the insulators shall be non-reflective and non-refractive. This measure shall include coloring of security fencing with vinyl or other non-reflective coating; or with slats or similar semi-opaque, non-reflective material, to blend to the greatest feasible extent with the background soil.

The project owner shall submit for CPM review and approval, a specific Surface Treatment Plan that will satisfy these requirements. The treatment plan shall include:

A. A description of the overall rationale for the proposed surface treatment, including the selection of the proposed color(s) and finishes;

B. A list of each major project structure, building, tank, pipe, and wall; the transmission line towers and/or poles; and fencing, specifying the color(s) and finish proposed for each. Colors must be identified by vendor, name, and number; or according to a universal designation system;

C. One set of color brochures or color chips showing each proposed color and finish;

D. A specific schedule for completion of the treatment; and

E. A procedure to ensure proper treatment maintenance for the life of the project.

The project owner shall not specify to the vendors the treatment of any buildings or structures treated during manufacture, or perform the final treatment on any buildings or structures treated in the field, until the project owner receives notification of approval of the treatment plan by BLM's Authorized Officer and the CPM. Subsequent modifications to the treatment plan are prohibited without BLM's Authorized Officer and CPM approval.

Verification: At least 90 days prior to specifying to the vendor the colors and finishes of the first structures or buildings that are surface treated during manufacture, the project owner shall submit the proposed treatment plan to BLM's Authorized Officer and the CPM for review and approval and simultaneously to San Bernardino County for review and comment. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a plan with the specified revision(s) for review and approval by BLM's Authorized Officer and the CPM before any treatment is applied. Any modifications to the treatment plan must be submitted to BLM's Authorized Officer and the CPM for review and approval.

Prior to the start of commercial operation, the project owner shall notify BLM's Authorized Officer and the CPM that surface treatment of all listed structures and buildings has been completed and they are ready for inspection and shall submit to each one set of electronic color photographs from the same key observation points identified in (d) above. The project owner shall provide a status report regarding surface treatment maintenance in the Annual Compliance Report. The report shall specify a): the condition of the surfaces of all structures and buildings at the end of the reporting year; b) maintenance activities that occurred during the reporting year; and c) the schedule of maintenance activities for the next year.

TEMPORARY AND PERMANENT EXTERIOR LIGHTING

VIS-2 To the extent feasible, consistent with safety and security considerations, the project owner shall design and install all permanent exterior lighting and all temporary construction lighting such that a) lamps and reflectors are not visible from beyond the project site, including any off-site security buffer areas; b) lighting does not cause excessive reflected glare; c) direct lighting does not illuminate the nighttime sky, except for required FAA aircraft safety lighting; d) illumination of the project and its immediate vicinity is minimized, and e) the plan complies with local policies and ordinances. The project owner shall submit to BLM's Authorized Officer and the CPM for review and approval and simultaneously to the County of San Bernardino for review and comment a lighting mitigation plan that includes the following:

A. Location and direction of light fixtures shall take the lighting mitigation requirements into account;

B. Lighting design shall consider setbacks of project features from the site boundary to aid in satisfying the lighting mitigation requirements;

C. Lighting shall incorporate fixture hoods/shielding, with light directed downward or toward the area to be illuminated;

D. Light fixtures that are visible from beyond the project boundary shall have cutoff angles that are sufficient to prevent lamps and reflectors from being visible beyond the project boundary, except where necessary for security;

E. All lighting shall be of minimum necessary brightness consistent with operational safety and security; and

F. Lights in high illumination areas not occupied on a continuous basis (such as maintenance platforms) shall have (in addition to hoods) switches, timer switches, or motion detectors so that the lights operate only when the area is occupied.

Verification: At least 90 days prior to ordering any permanent exterior lighting or temporary construction lighting, the project owner shall contact BLM's Authorized Officer and the CPM to discuss the documentation required in the lighting mitigation plan. At least 60 days prior to ordering any permanent exterior lighting, the project owner shall submit to BLM's Authorized Officer and the CPM for review and approval and simultaneously to the County of San Bernardino for review and comment a lighting mitigation plan. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a revised plan for review and approval by BLM's Authorized Officer and the CPM.

The project owner shall not order any exterior lighting until receiving BLM Authorized Officer and CPM approval of the lighting mitigation plan.

Prior to commercial operation, the project owner shall notify BLM's Authorized Officer and the CPM that the lighting has been completed and is ready for inspection. If after inspection, BLM's Authorized Officer and the CPM notify the project owner that modifications to the lighting are needed, within 30 days of receiving that notification the project owner shall implement the modifications and notify BLM's Authorized Officer and the CPM that the modifications have been completed and are ready for inspection.

Within 48 hours of receiving a lighting complaint, the project owner shall provide BLM's Authorized Officer and the CPM with a complaint resolution form report as specified in the Compliance General Conditions including a proposal to resolve the complaint, and a schedule for implementation. The project owner shall notify BLM's Authorized Officer and the CPM within 48 hours after completing implementation of the proposal. A copy of the complaint resolution form report shall be submitted to BLM's Authorized Officer and the CPM within 30 days.

SETBACK OF SUNCATCHERS FROM HIGHWAY I-40

VIS-3 To reduce the visual dominance and glare effects of the SunCatchers to motorists on Highway I-40, the applicant shall set back the nearest units to the area north of the existing pipeline right-of-way, and at a minimum distance of 500 feet from the edge of the roadway, whichever is greater.

Verification: At least 90 days prior to start of construction, the project owner shall present to BLM's Authorized Officer and the CPM a revised plan depicting how the proposed SunCatchers will be set back from the highway. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a revised plan for review and approval by BLM's Authorized Officer and the CPM.

The project owner shall not begin construction until receiving BLM Authorized Officer and CPM approval of the revised plan.

SCREENING, SET-BACK AND RE-VEGETATION OF STAGING AREA

VIS-4 In order to minimize the visual prominence of the proposed staging area adjoining I-40 to motorists, the project owner shall provide opaque screening of the site as seen from the highway, and a set-back from the roadway of at least 250 feet. In addition, the project owner shall provide a re-vegetation plan describing how the staging site will be restored following construction. The plan shall call for beginning of restoration of the site within the shortest feasible time following completion of construction.

Verification: At least 90 days prior to start of construction, the project owner shall present to BLM's Authorized Officer and the CPM a revised staging area site plan including a set-back from I-8 of at least ¼-mile. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a revised plan for review and approval by BLM's Authorized Officer and the CPM. The project owner shall not begin construction until receiving BLM Authorized Officer and CPM approval of the revised plan.

At least 60 days prior to start of operation, the project owner shall present to BLM's Authorized Officer and the CPM a revegetation plan for the staging area. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a revised plan for review and approval by BLM's Authorized Officer and the CPM. The project owner shall not begin operation until receiving BLM Authorized Officer and CPM approval of the revised plan.

C.13.15 REFERENCES

NPS 2009, 2010 California Desert Protect Act Overview (map), December 21, 2009. http://feinstein.senate.gov/public/index.cfm?FuseAction=NewsRoom.PressReleases&ContentRecord_id=B3A780D4-5056-8059-7606-3936A2F7945F , [Map link in Related Resources menu.] Accessed 1/6/2010.

NPS 2008, Cady Mountains Proposed Wilderness and Existing Wilderness Study Area (map), June 24, 2008. http://www.nplnews.com/archives2008.asp [link in 'Hot Topics'.] Accessed 1/6/2010

SES 2008a – Stirling Energy Systems/R. Liden (tn: 49181). Application for Certification, dated December 1, 2008. Submitted to CEC/Docket Unit on December 1, 2008.

SES 2009p - Stirling Energy Systems/C. Champion (tn: 52956). Applicants' Response to Energy Commission & Bureau of Land Management's Data Requests 113-127 of Data Requests Set 1, Part 2, dated August 20, 2009. Submitted to CEC/Docket Unit on August 24, 2009.

USDOI, 1995. State of California Wilderness Status Map.

Caltrans (California Department of Transportation), 2006. Scenic Highway Master Plan.

County of San Bernardino, 2007. General Plan.

ENERGY COMMISSION VISUAL RESOURCE ANALYSIS EVALUATION CRITERIA

Energy Commission staff conducts a visual resource analysis according to Appendix G, “Environmental Checklist Form—Aesthetics,” California Environmental Quality Act (CEQA). The CEQA analysis requires that commission staff make a determination of impact ranging from “Adverse and Significant” to “Not Significant.”

Staff’s analysis is based on Key Observation Points or KOPs. KOPs are photographs of locations within the project area that are highly visible to the public — for example, travel routes; recreational and residential areas; and bodies of water as well as other scenic and historic resources.

Those photographs are taken to indicate existing conditions without the project and then modified to include a simulation of the project. Consequently, staff has a visual representation of the viewshed before and after a project is introduced and makes its analysis accordingly. Information about that analytical process follows.

Visual Resource Analysis Without Project

When analyzing KOPs of existing conditions without the project, staff considers the following conditions: visual quality, viewer concern, visibility, number of viewers, duration of view. Those conditions are then factored into an overall rating of viewer exposure and viewer sensitivity. Information about each condition and rating follows.

Visual Quality

An expression of the visual impression or appeal of a given landscape and the associated public value attributed to the resource. Visual quality is rated from *high* to *low*. A high rating is generally reserved for landscapes viewers might describe as picture-perfect.

Landscapes rated high generally are memorable because of the way the components combine in a visual pattern. In addition, those landscapes are free from encroaching elements, thus retaining their visual integrity. Finally, landscapes with high visual quality are visually coherent and harmonious when each element is considered as part of the whole. On the contrary, landscapes rated *low* are often dominated by visually discordant human alterations.

Viewer Concern

Viewer concern represents the reaction of a viewer to visible changes in the viewshed — an area of land visible from a fixed vantage point. For example, viewers have a high expectation for views formally designated as a scenic area or travel corridor as well as for recreational and residential areas. Viewers generally expect that those views will be preserved. Travelers on highways and roads, including those in agricultural areas, are generally considered to have moderate viewer concerns and expectations.

However, viewers tend to have low-to-moderate viewer concern when viewing commercial buildings. And industrial uses typically have the lowest viewer concern. Regardless, the level of concern could be lower if the existing landscape contains discordant elements. In addition, some areas of lower visual quality and degraded visual character may contain particular views of substantially higher visual quality or interest to the public.

Visibility

Visibility is a measure of how well an object can be seen. Visibility depends on the angle or direction of views; extent of visual screening; and topographical relationships between the object and existing homes, streets, or parks. In that sense, visibility is determined by considering any and all obstructions that may be in the sightline—trees and other vegetation; buildings; transmission poles or towers; general air quality conditions such as haze; and general weather conditions such as fog.

Number of Viewers

Number of viewers is a measure of the number of viewers per day who would have a view of the proposed project. *Number of viewers* is organized into the following categories: residential according to the number of residences; motorist according to the number of vehicles; and recreationists.

Duration of View

Duration of view is the amount of time to view the site. For example, a high or extended view of a project site is one reached across a distance in 2 minutes or longer. In contrast, a low or brief duration of view is reached in a short amount of time—generally less than 10 seconds.

Viewer Exposure

Viewer exposure is a function of three elements previously listed, *visibility*, *number of viewers*, and *duration of view*. Viewer exposure can range from a *low* to *high*. A partially obscured and brief background view for a few motorists represents a low value; and unobstructed foreground view from a large number of residences represents a high value.

Visual Sensitivity

Visual sensitivity is comprised of three elements previous listed, *visual quality*, *viewer concern*, and *viewer exposure*. Viewer sensitivity tends to be higher for homeowners or people driving for pleasure or engaged in recreational activities and lower for people driving to and from work or as part of their work.

Visual Resource Analysis with Project

Visual resource analyses with photographic simulations of the project involve the elements of contrast, dominance, view blockage, and visual change. Information about each element follows.

Contrast

Contrast concerns the degree to which a project's visual characteristics or elements — form, line, color, and texture — differ from the same visual elements in the existing landscape. The degree of contrast can range from *low* to *high*. A landscape with forms, lines, colors, and textures similar to those of a proposed energy facility is more visually absorbent; that is, more capable of accepting those characteristics than a landscape in which those elements are absent.[1] Generally, visual absorption is inversely proportional to visual contrast.

Dominance

Dominance is a measure of (a) the proportion of the total field of view occupied by the field; (b) a feature's apparent size relative to other visible landscape features; and (c) the conspicuousness of the feature due to its location in the view.

A feature's level of dominance is lower in a panoramic setting than in an enclosed setting with a focus on the feature itself. A feature's level of dominance is higher if it is (1) near the center of the view; (2) elevated relative to the viewer; or (3) has the sky as a backdrop. As the distance between a viewer and a feature increases, its apparent size decreases; and consequently, its dominance decreases. The level of dominance ranges from *low* to *high*.

View Blockage

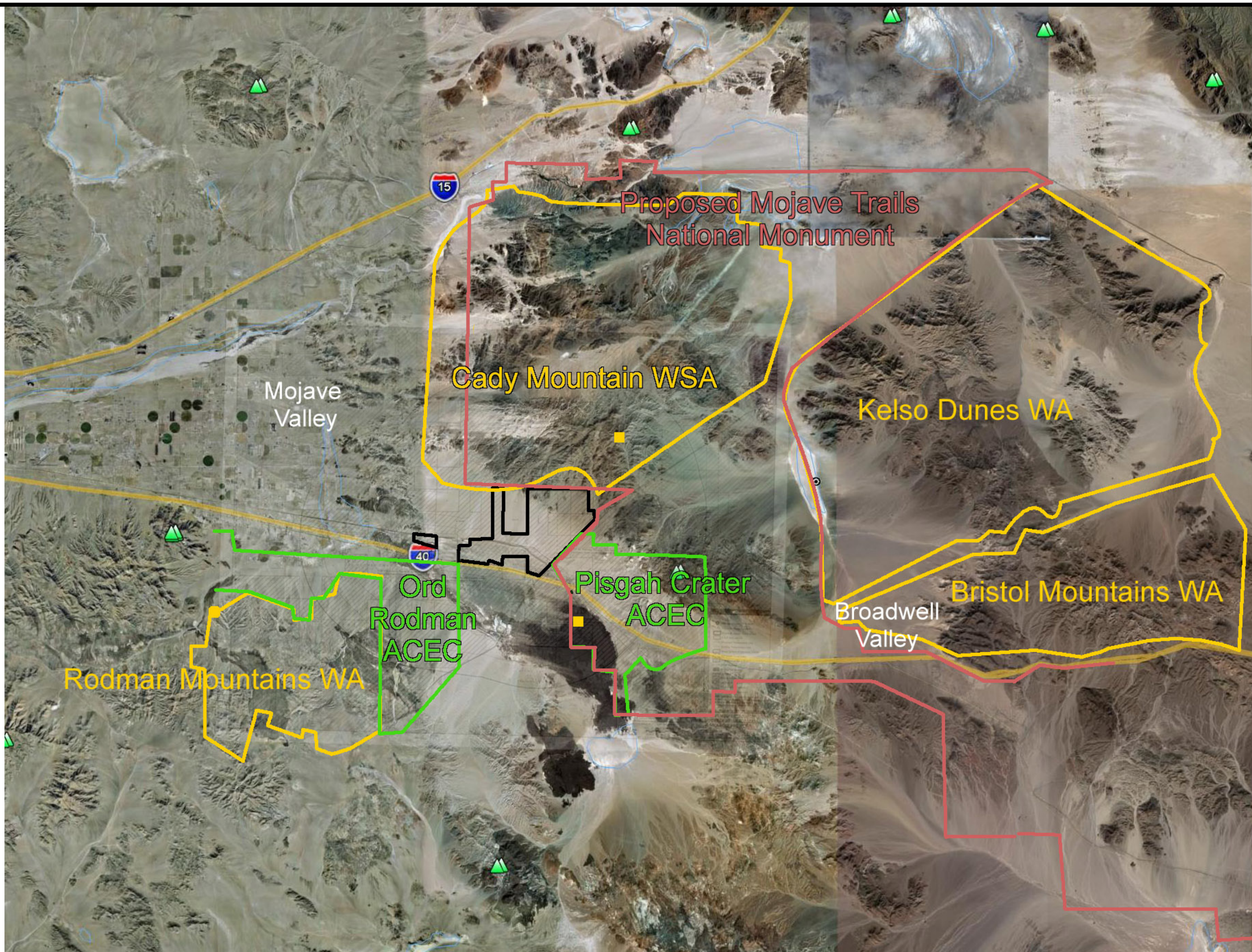
The extent to which any previously visible landscape features are blocked from view constitutes view disruption. The view is also disrupted when the continuity of the view is interrupted. When considering a project's features, higher quality landscape features can be disrupted by lower quality project features, thus resulting in adverse visual impacts. The degree of view disruption can range from *none* to *high*.

Visual Change

Visual change is a function of *contrast*, *dominance*, and *view disruption*. Generally, *contrast* and *dominance* contribute more to the degree of visual change than does *view disruption*.

[1] Typically, the Energy Commission does not consider texture in its visual analyses.

VISUAL RESOURCES - FIGURE 1
Calico Solar Project - Project Setting



SOURCE: BLM, Google, WKA

VISUAL RESOURCES - FIGURE 2A
Calico Solar Project - Character Photos of Project Area

Character Photo Location 1
View of existing transmission lines along eastern boundary of Project site (looking northeast)

Character Photo Location 2
View of existing transmission lines and SCE Pisgah Substation along eastern boundary of Project site (looking south)

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010
SOURCE: AFC Figure 5.13-3

VISUAL RESOURCES - FIGURE 2B

Calico Solar Project - Character Photos of Project Area

Character Photo Location 3
View of closest residence to the Project site (approximately 2.0 miles east of site)

Character Photo Location 4
View of BNSF railroad (and train) which bisects the Project site (looking south from midsection of Phase I)

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010
SOURCE: AFC Figure 5.13-4

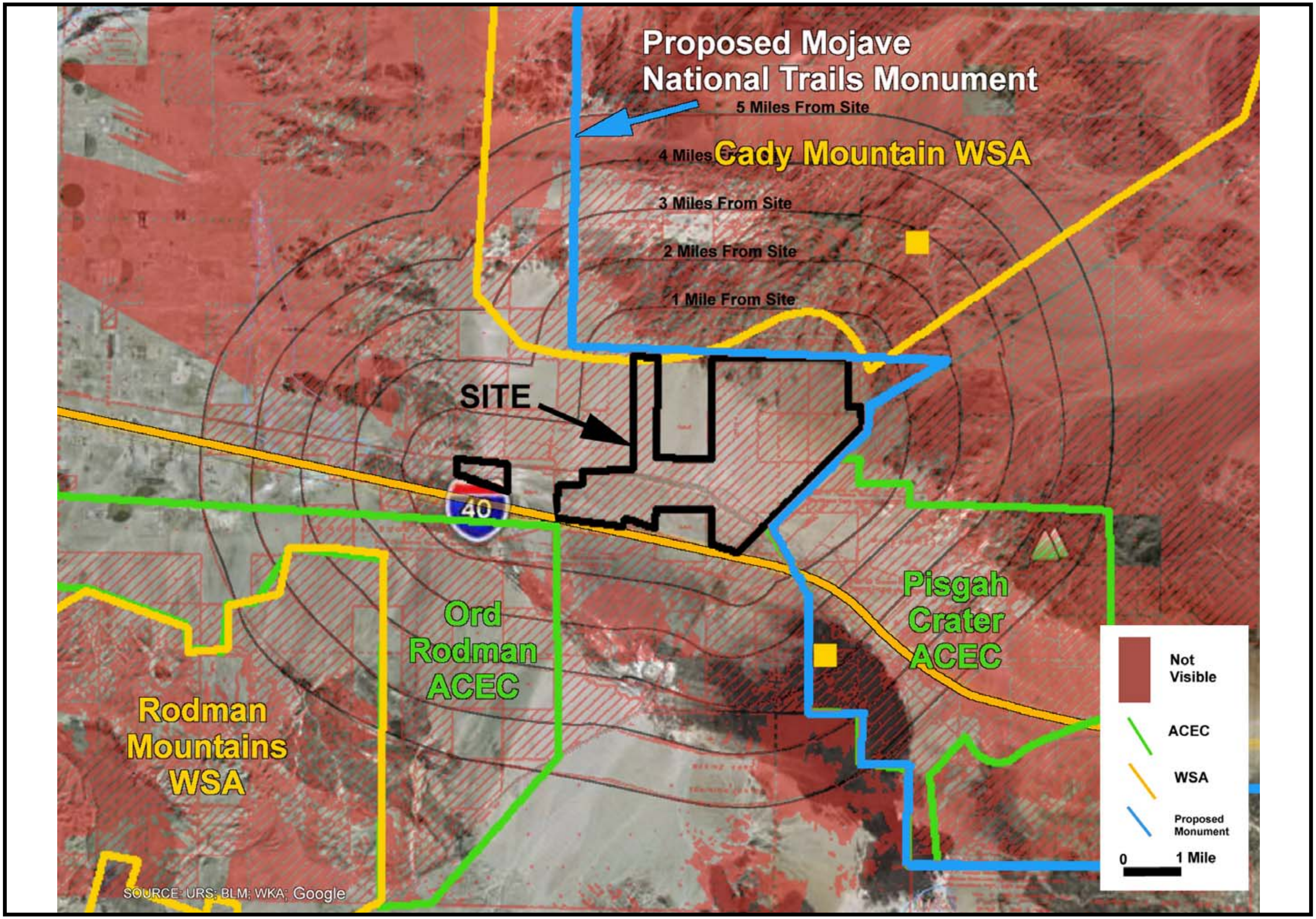
VISUAL RESOURCES - FIGURE 2C
Calico Solar Project - Character Photos of Project Area

Character Photo Location 5
View of Project site from BNSF Railroad

Character Photo Location 6
View of Project site from Hector Road (approximately 1.5 miles west of site)

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010
SOURCE: AFC Figure 5.13-5

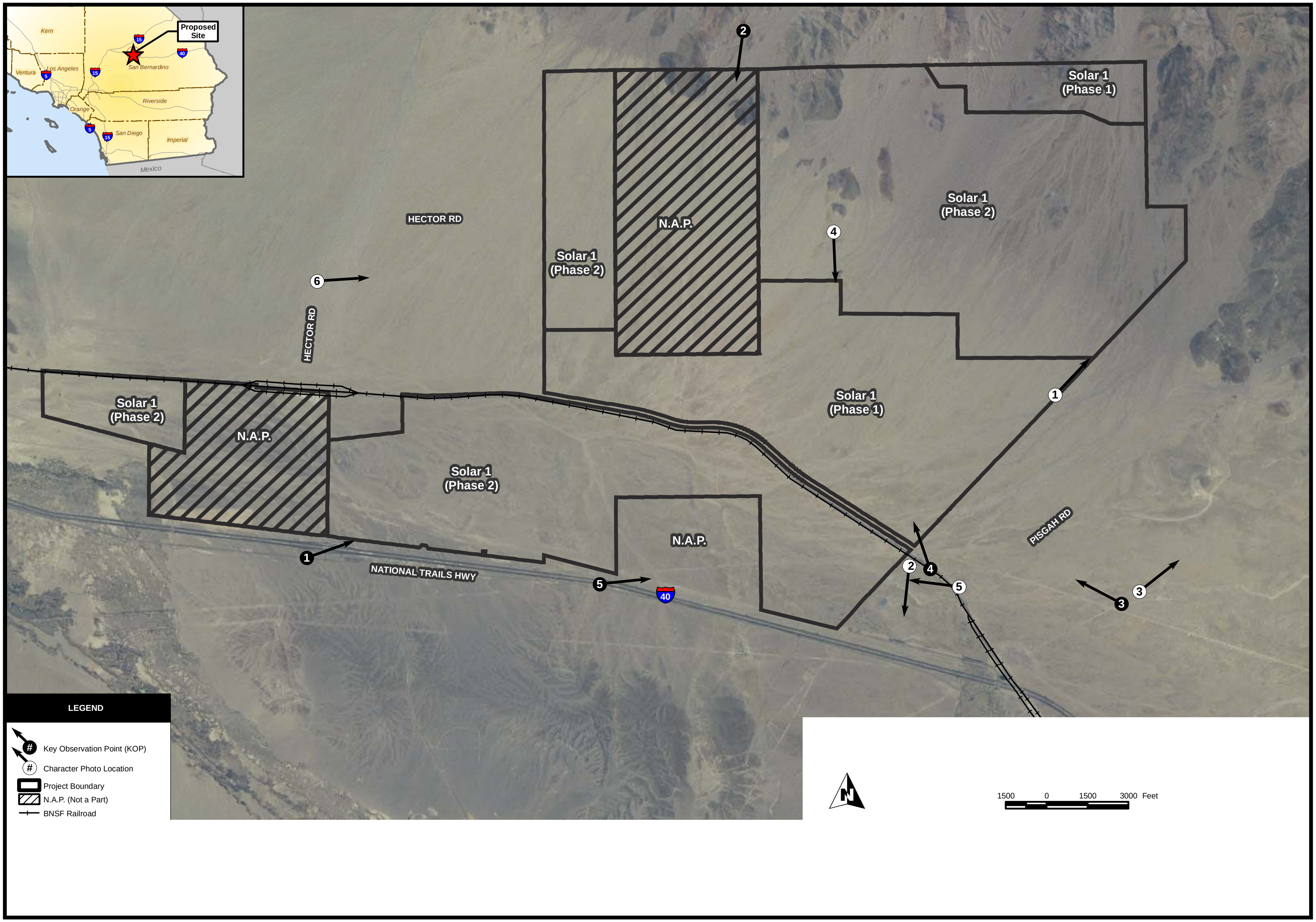
VISUAL RESOURCES - FIGURE 3
Calico Solar Project - Project Viewshed



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010
SOURCE: URS, BLM, Google, WKA

VISUAL RESOURCES - FIGURE 4

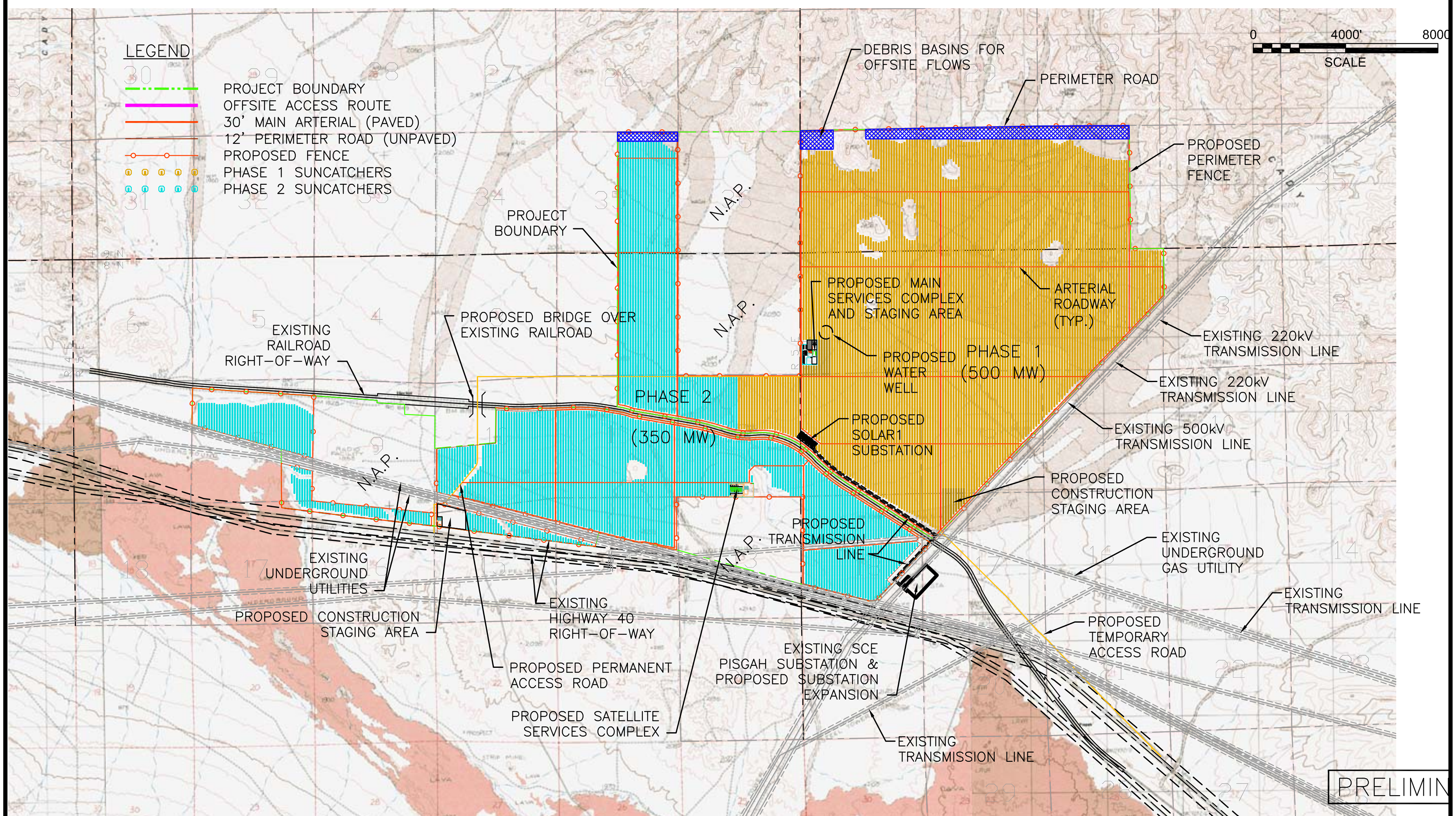
Calico Solar Project - Key Observation Points (KOPs)



SOURCE: AFC Figure 5.13-2

VISUAL RESOURCES - FIGURE 5

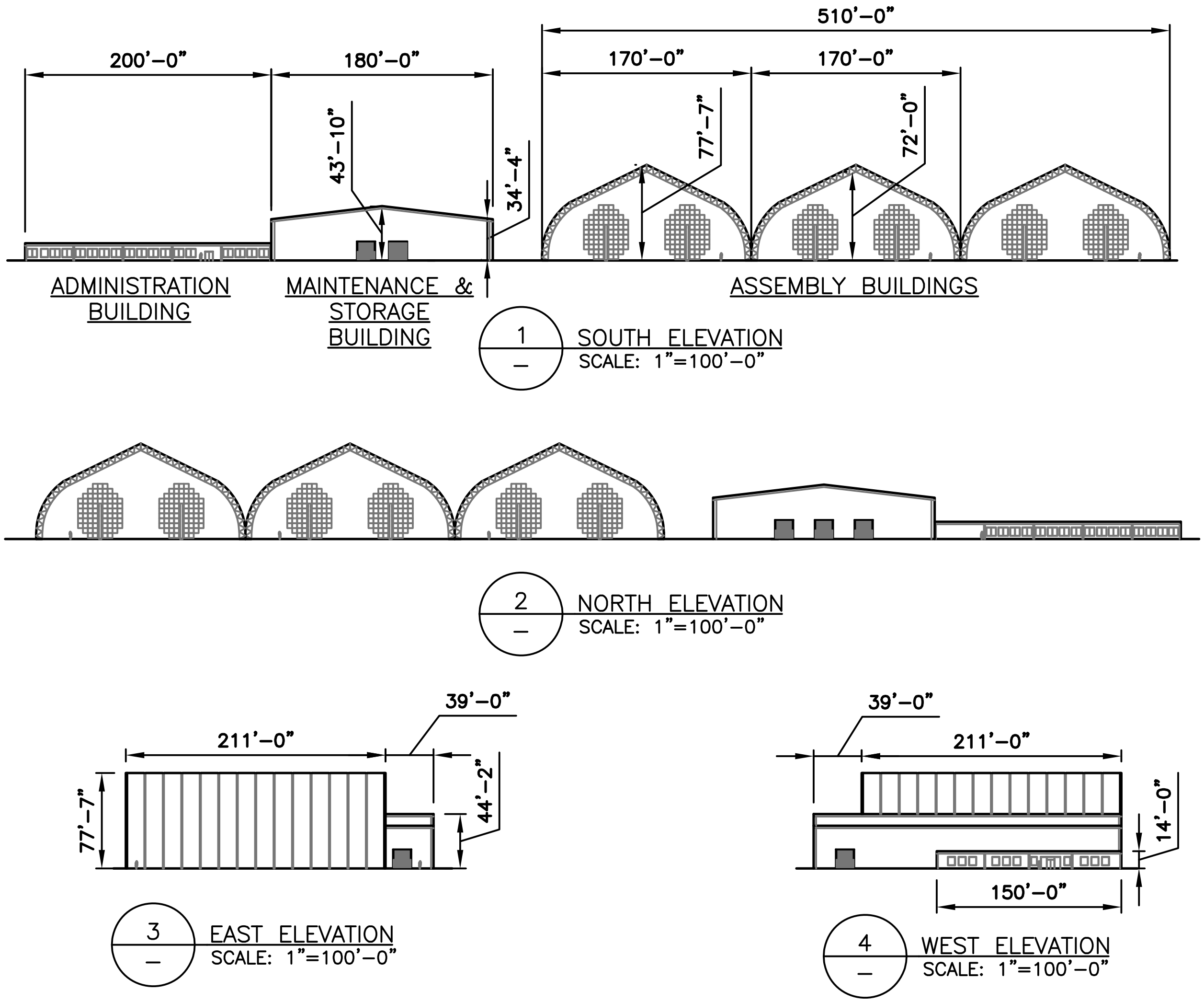
Calico Solar Project - Project Layout



SOURCE: AFC Figure 3-3

VISUAL RESOURCES - FIGURE 6

Calico Solar Project - Elevations of Main Services Complex



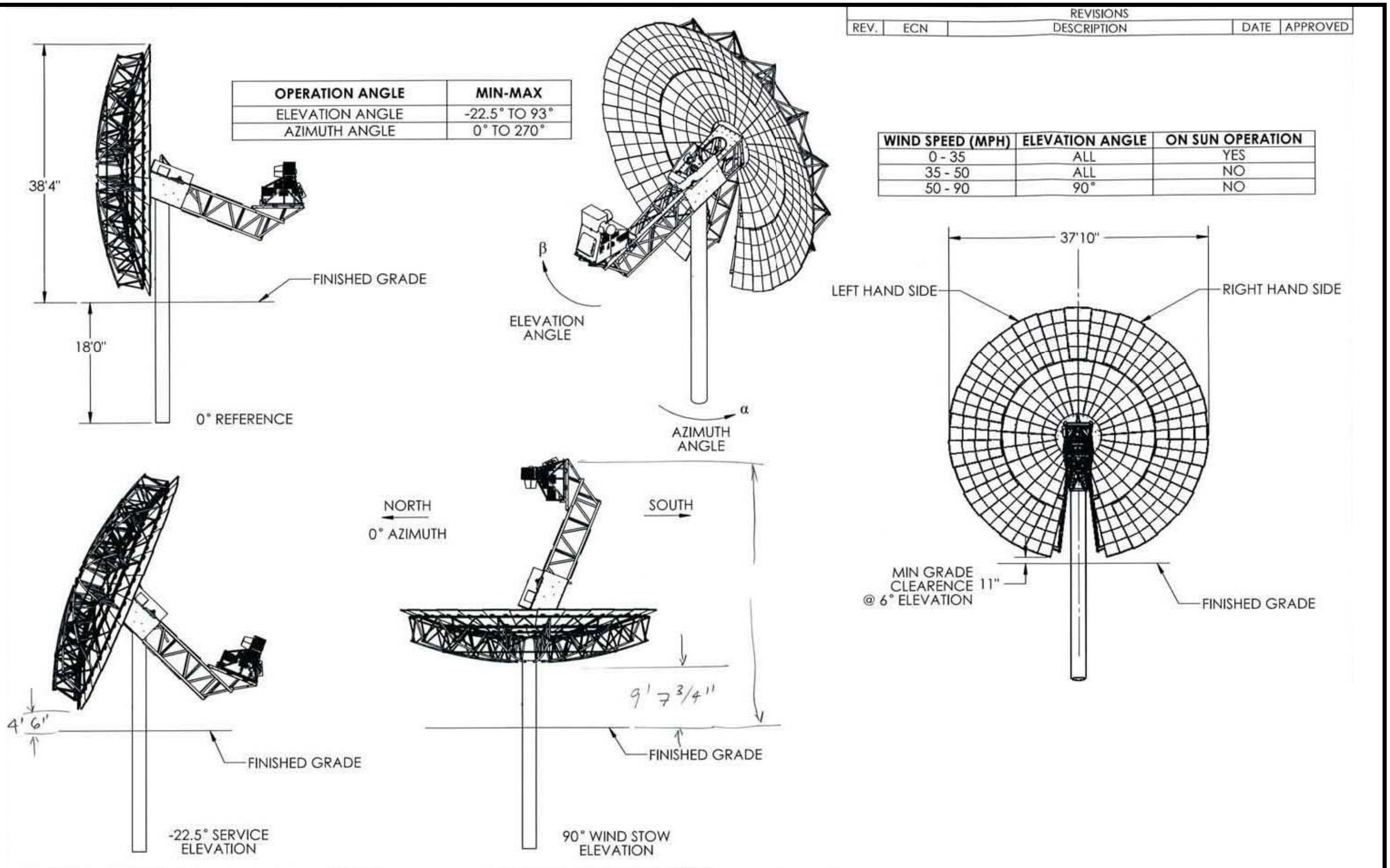
PRELIMINARY

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: AFC Figure 3-26

VISUAL RESOURCES - FIGURE 7

Calico Solar Project - Elevations of Sun Catchers



OPERATION ANGLE	MIN-MAX
ELEVATION ANGLE	-22.5° TO 93°
AZIMUTH ANGLE	0° TO 270°

WIND SPEED (MPH)	ELEVATION ANGLE	ON SUN OPERATION
0 - 35	ALL	YES
35 - 50	ALL	NO
50 - 90	90°	NO

SOURCE: Calico Solar, LLC.

VISUAL RESOURCES - FIGURE 8A

Calico Solar Project - Existing View of Project Site from KOP 1 - Route 66/I-40

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: AFC Figure 5.13-11

VISUAL RESOURCES - FIGURE 8B
Calico Solar Project - Simulated View of Project Site from KOP 1 - Route 66/I-40

SOURCE: AFC Figure 5.13-12

VISUAL RESOURCES - FIGURE 9A

Calico Solar Project - Existing View of Project Site from KOP 2 - Cady Mountains WSA

SOURCE: AFC Figure 5.13-13

VISUAL RESOURCES - FIGURE 9B

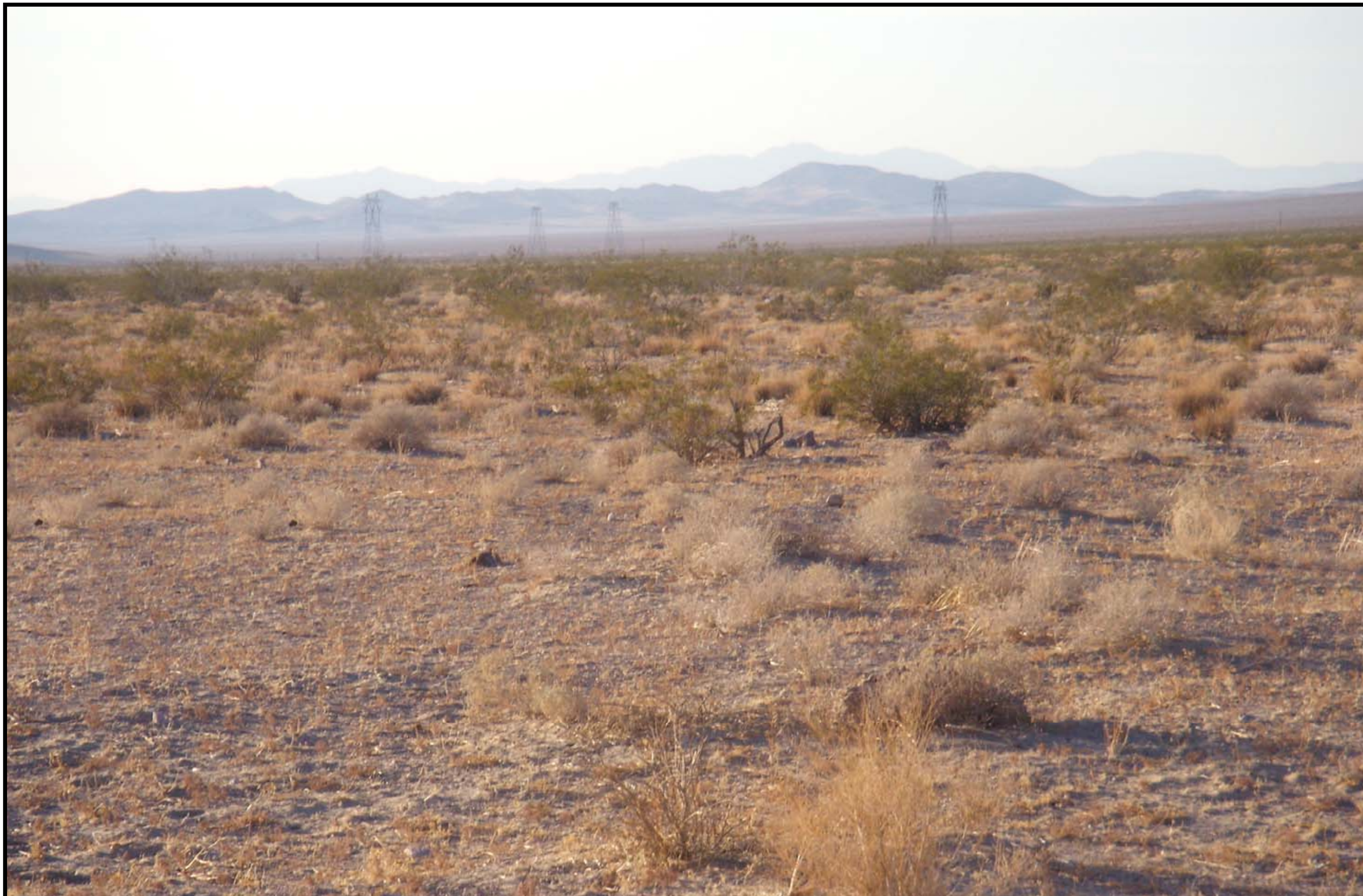
Calico Solar Project - Simulated View of Project Site from KOP 2 - Cady Mountains WSA

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: AFC Figure 5.13-14

VISUAL RESOURCES - FIGURE 10A

Calico Solar Project - Existing View of Project Site from KOP 3 - Eastside View



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: AFC Figure 5.13-15

VISUAL RESOURCES - FIGURE 10B

Calico Solar Project - Simulated View of Project Site from KOP 3 - Eastside View

SOURCE: AFC Figure 5.13-16

VISUAL RESOURCES - FIGURE 11A

Calico Solar Project - Existing View of Project Site from KOP 4 - BNSF Railroad and I-40 West

SOURCE: AFC Figure 5.13-17

VISUAL RESOURCES - FIGURE 11B

Calico Solar Project - Simulated View of Project Site from KOP 4 - BNSF Railroad and I-40 West

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: AFC Figure 5.13-18

VISUAL RESOURCES - FIGURE 12A

Calico Solar Project - Existing View of Project Site from KOP 5 - Interstate 40 Eastbound

SOURCE: AFC Figure 5.13-19

VISUAL RESOURCES - FIGURE 12B

Calico Solar Project - Simulated View of Project Site from KOP 5 - Interstate 40 Eastbound

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, MARCH 2010

SOURCE: AFC Figure 5.13-20

C.14 – WASTE MANAGEMENT

Testimony of Ellen Townsend-Hough

C.14.1 SUMMARY OF CONCLUSIONS

Management of the waste generated during construction and operation of the Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) would not generate a significant impact under the California Environmental Quality Act guidelines or NEPA. There is sufficient landfill capacity, and the project would be consistent with the applicable waste management laws, ordinances, regulations, and standards if the measures proposed in the Application for Certification and staff's proposed conditions of certification are implemented, all of which are integrated into the proposed action that was evaluated by BLM under NEPA. Similar to the proposed project, staff considers project compliance with California Environmental Quality Act guidelines (Appendix G: Environmental Checklist Section XVI-Utilities and Service Systems); applicable waste management laws, ordinances, regulations, and standards; and staff's conditions of certification to be sufficient to ensure that no significant impacts would occur as a result of waste management associated with the Reduced Acreage Alternative, Avoidance of Donated and Acquired Lands Alternative and the No Project/No Action Alternative. Southern California Edison's transmission upgrades would comply with all applicable laws, ordinances, regulations, and standards regulating the management of hazardous and non-hazardous and non-hazardous waste during both construction and operation. Implementing mitigation measures similar to the Conditions of Certification that are proposed in the Calico Solar Project Staff Assessment/Draft Environmental Statement for construction and operation would avoid impacts to construction workers and the environment if applied to the Southern California Edison transmission upgrade options.

C.14.2 INTRODUCTION

This section presents an analysis of issues associated with wastes generated from the proposed construction and operation of the Calico Solar Project. The technical scope of this analysis encompasses solid and liquid wastes existing on site and wastes that would likely be generated during facility construction and operation. Management and discharge of wastewater is addressed in the **SOIL AND WATER RESOURCES** section of this document. Additional information related to waste management may also be covered in the **WORKER SAFETY** and **HAZARDOUS MATERIALS MANAGEMENT** sections of this document.

The Bureau of Land Management (BLM) and Energy Commission staff's (hereafter jointly referred to as staff) objectives in conducting this waste management analysis are to ensure that:

- the management of project wastes would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS). Compliance with LORS ensures that wastes generated during the construction and operation of the proposed project would be managed in an environmentally safe manner.
- the disposal of project wastes would not result in significant adverse impacts to existing waste disposal facilities.

- upon project completion, the site is managed in such a way that project wastes and waste constituents would not pose a significant risk to humans or the environment.

C.14.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

In accordance with California Environmental Quality Act (CEQA) guidelines (Appendix G: Environmental Checklist Section XVI – Utilities and Service Systems), staff evaluated project wastes in terms of landfill capacity and LORS compliance. The following federal, state, and local environmental laws, ordinances, regulations, and standards (LORS) have been established to ensure the safe and proper management of both solid and hazardous wastes in order to protect human health and the environment, and absent any unusual circumstances, compliance would be sufficient to ensure that no significant impacts would occur as a result of project waste management.

Waste Management Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Title 42, United States Code (U.S.C.), §6901, et seq. Solid Waste Disposal Act of 1965 (as amended and revised by the Resource Conservation and Recovery Act of 1976, et al.)	The Solid Waste Disposal Act, as amended and revised by the Resource Conservation and Recovery Act (RCRA) et al., establishes requirements for the management of solid wastes (including hazardous wastes), landfills, underground storage tanks, and certain medical wastes. The statute also addresses program administration, implementation and delegation to states, enforcement provisions, and responsibilities, as well as research, training, and grant funding provisions. RCRA Subtitle C establishes provisions for the generation, storage, treatment, and disposal of hazardous waste, including requirements addressing: • Generator record keeping practices that identify quantities of hazardous wastes generated and their disposition; • Waste labeling practices and use of appropriate containers; • Use of a manifest when transporting wastes; • Submission of periodic reports to the United States Environmental Protection Agency (U.S. EPA) or other authorized agency; and • Corrective action to remediate releases of hazardous waste and contamination associated with RCRA-regulated facilities. RCRA Subtitle D establishes provisions for the design and operation of solid waste landfills. RCRA is administered at the federal level by U.S. EPA and its 10 regional offices. The Pacific Southwest regional office (Region 9) implements U.S. EPA programs in California, Nevada, Arizona, and Hawaii.

Applicable Law	Description
Title 42, U.S.C., §9601, et seq. Comprehensive Environmental Response, Compensation and Liability Act	The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), also known as *Superfund*, establishes authority and funding mechanisms for cleanup of uncontrolled or abandoned hazardous waste sites, as well as cleanup of accidents, spills, or emergency releases of pollutants and contaminants into the environment. Among other things, the statute addresses: • Reporting requirements for releases of hazardous substances; • Requirements for remedial action at closed or abandoned hazardous waste sites, and brownfields; • Liability of persons responsible for releases of hazardous substances or waste; and • Requirements for property owners/potential buyers to conduct “all appropriate inquiries” into previous ownership and uses of the property to 1) determine if hazardous substances have been or may have been released at the site, and 2) establish that the owner/buyer did not cause or contribute to the release. A Phase I Environmental Site Assessment is commonly used to satisfy CERCLA “all appropriate inquiries” requirements.
Title 40, Code of Federal Regulations (CFR), Subchapter I – Solid Wastes	These regulations were established by U.S. EPA to implement the provisions of the Solid Waste Disposal Act and RCRA (described above). Among other things, the regulations establish the criteria for classification of solid waste disposal facilities (landfills), hazardous waste characteristic criteria and regulatory thresholds, hazardous waste generator requirements, and requirements for management of used oil and universal wastes. • Part 257 addresses the criteria for classification of solid waste disposal facilities and practices. • Part 258 addresses the criteria for municipal solid waste landfills. • Parts 260 through 279 address management of hazardous wastes, used oil, and universal wastes (i.e., batteries, mercury-containing equipment, and lamps). U.S. EPA implements the regulations at the federal level. However, California is an RCRA-authorized state, so most of the solid and hazardous waste regulations are implemented by state agencies and authorized local agencies in lieu of U.S. EPA.
Title 49, CFR, Parts 172 and 173. Hazardous Materials Regulations	These regulations address the United States Department of Transportation (DOT) established standards for transport of hazardous materials and hazardous wastes. The standards include requirements for labeling, packaging, and shipping of hazardous materials and hazardous wastes, as well as training requirements for personnel completing shipping papers and manifests. Section 172.205 specifically addresses use and preparation of hazardous waste manifests in accordance with Title 40, CFR, section 262.20.
Federal CWA, 33 USC § 1251 *et seq.*	The Clean Water Act controls discharge of wastewater to the surface waters of the U.S.

Applicable Law	Description
Title 40 CFR Section 112	This establishes procedures, methods, equipment, and other requirements to prevent the discharge of oil from non-transportation-related onshore and offshore facilities into or upon the navigable waters of the United States or adjoining shorelines, or into or upon the waters of the contiguous zone, or in connection with activities under the Outer Continental Shelf Lands Act or the Deepwater Port Act of 1974. Subpart B - The Spill Prevention, Control and Countermeasures (SPCC) Plan includes procedures, methods, and equipment at the facility to prevent discharges of petroleum from reaching navigable waters.
State	
California Health and Safety Code (HSC), Chapter 6.5, §25100, et seq. Hazardous Waste Control Act of 1972, as amended	This California law creates the framework under which hazardous wastes must be managed in California. The law provides for the development of a state hazardous waste program that administers and implements the provisions of the federal RCRA program. It also provides for the designation of California-only hazardous wastes and development of standards (regulations) that are equal to or, in some cases, more stringent than federal requirements. The California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC) administers and implements the provisions of the law at the state level. Certified Unified Program Agencies (CUPAs) implement some elements of the law at the local level.
Title 22, California Code of Regulations (CCR), Division 4.5. Environmental Health Standards for the Management of Hazardous Waste	These regulations establish requirements for the management and disposal of hazardous waste in accordance with the provisions of the California Hazardous Waste Control Act and federal RCRA. As with the federal requirements, waste generators must determine if their wastes are hazardous according to specified characteristics or lists of wastes. Hazardous waste generators must obtain identification numbers; prepare manifests before transporting the waste off site; and use only permitted treatment, storage, and disposal facilities. Generator standards also include requirements for record keeping, reporting, packaging, and labeling. Additionally, while not a federal requirement, California requires that hazardous waste be transported by registered hazardous waste transporters. The standards addressed by Title 22, CCR include: • Identification and Listing of Hazardous Waste (Chapter 11, §66261.1, et seq.). • Standards Applicable to Generator of Hazardous Waste (Chapter 12, §66262.10, et seq.). • Standards Applicable to Transporters of Hazardous Waste (Chapter 13, §66263.10, et seq.). • Standards for Universal Waste Management (Chapter 23, §66273.1, et seq.). • Standards for the Management of Used Oil (Chapter 29, §66279.1, et seq.). • Requirements for Units and Facilities Deemed to Have a Permit by Rule (Chapter 45, §67450.1, et seq.). The Title 22 regulations are established and enforced at the state level by DTSC. Some generator and waste treatment standards are also enforced at the local level by CUPAs.

Applicable Law	Description
HSC, Chapter 6.11 §§25404 – 25404.9 Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program)	The Unified Program consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of the six environmental and emergency response programs listed below. • Aboveground Petroleum Storage Act requirements for Spill Prevention, Control, and Countermeasure (SPCC) Plans. • Hazardous Materials Release and Response Plans and Inventories (Business Plans). • California Accidental Release Prevention (CalARP) Program. • Hazardous Materials Management Plan / Hazardous Materials Inventory Statements. • Hazardous Waste Generator / Tiered Permitting Program. • Underground Storage Tank Program. The state agencies responsible for these programs set the standards for their programs while local governments implement the standards. The local agencies implementing the Unified Program are known as CUPAs. The DTSC's Calexico Field Office is the CUPA for the Calico Solar Project. Note: The Waste Management analysis only considers application of the Hazardous Waste Generator/Tiered Permitting element of the Unified Program.
Title 27, CCR, Division 1, Subdivision 4, Chapter 1, §15100, et seq. Unified Hazardous Waste and Hazardous Materials Management Regulatory Program	While these regulations primarily address certification and implementation of the program by the local CUPAs, the regulations do contain specific reporting requirements for businesses. • Article 9 – Unified Program Standardized Forms and Formats (§§ 15400–15410). • Article 10 – Business Reporting to CUPAs (§§15600–15620).
Public Resources Code, Division 30, §40000, et seq. California Integrated Waste Management Act of 1989	The California Integrated Waste Management Act (CIWMA) establishes mandates and standards for management of solid waste in California. The law addresses solid waste landfill diversion requirements; establishes the preferred waste management hierarchy (source reduction first, then recycling and reuse, and treatment and disposal last); sets standards for design and construction of municipal landfills; and addresses programs for county waste management plans and local implementation of solid waste requirements.

Applicable Law	Description
Title 14, CCR, Division 7, §17200, et seq. California Integrated Waste Management Board	These regulations implement the provisions of the California Integrated Waste Management Act and set forth minimum standards for solid waste handling and disposal. The regulations include standards for solid waste management, as well as enforcement and program administration provisions. • Chapter 3 – Minimum Standards for Solid Waste Handling and Disposal. • Chapter 3.5 – Standards for Handling and Disposal of Asbestos Containing Waste. • Chapter 7 – Special Waste Standards. • Chapter 8 – Used Oil Recycling Program. • Chapter 8.2 – Electronic Waste Recovery and Recycling.
HSC, Division 20, Chapter 6.5, Article 11.9, §25244.12, et seq. Hazardous Waste Source Reduction and Management Review Act of 1989	This law was enacted to expand the state's hazardous waste source reduction activities. Among other things, it establishes hazardous waste source reduction review, planning, and reporting requirements for businesses that routinely generate more than 12,000 kilograms (approximately 26,400 pounds) of hazardous waste in a designated reporting year. The review and planning elements are required to be done on a 4-year cycle, with a summary progress report due to DTSC every fourth year.
Title 22, CCR, §67100.1 et seq. Hazardous Waste Source Reduction and Management Review	These regulations further clarify and implement the provisions of the Hazardous Waste Source Reduction and Management Review Act of 1989 (noted above). The regulations establish the specific review elements and reporting requirements to be completed by generators subject to the act.
Title 23, CCR Division 3, Chapters 16 and 18	These regulations relate to hazardous material storage and petroleum UST cleanup, as well as hazardous waste generator permitting, handling, and storage. The DTSC San Bernardino County CUPA is responsible for local enforcement.
Local	
County of San Bernardino General Plan	The General Plan ensures all new development complies with applicable provisions of the County Integrated Solid Waste Management Plan.
San Bernardino County, Countywide Integrated Waste Management Plan	This document sets forth the county's goals, policies, and programs for reducing dependence on landfilling solid wastes and increasing source reduction, recycling, and reuse of products and waste, in compliance with the CIWMA. The plan also addresses the siting and development of recycling and disposal facilities and programs within the county.

C.14.4 PROPOSED PROJECT

C.14.4.1 SETTING AND EXISTING CONDITIONS

Proposed Project

The proposed Calico Solar Project site is approximately 8,230 acres of Bureau of Land Management (BLM) land located in San Bernardino County, California (SES 2008f page 3-3). The site is located on Hector Road north of Interstate 40, 17 miles east of Newberry Springs and 115 miles east of Los Angeles, California in the Mojave Desert (SES 2008f page 1-1). The project consists of 29 contiguous parcels (SES 2008f Appendix T). The Burlington Northern Santa Fe (BNSF) railroad bisects the site from west to east (SES 2008f 3-22).

The proposed project would utilize SunCatchers – 40-foot tall Stirling dish technology developed by the applicant – which track the sun and focus solar energy onto Power Conversion Units (PCU) (SES 2008f 3-2). The dish assembly collects and focuses solar energy onto the PCU to generate electricity. Each PCU consists of a solar receiver heat exchanger and a closed-cycle, high-efficiency Solar Stirling Engine specifically designed to convert solar power to rotary power via a thermal conversion process. The engine drives an electrical generator to produce grid-quality electricity.

Phase I would be limited to 275 MW, with the remaining 575 MW as part of Phase II. There would be four laydown areas, two laydown areas for each phase of the project. One is a 26-acre laydown site located on the southeast corner of Phase I and the second will be 14 acres located adjacent to the Main Services Complex. The Phase II portion of the project will also have two laydown areas, 26 and 11 acres, located north of Interstate 40 (I-40) and next to the Satellite Services Complex, respectively. In addition to the proposed Calico Solar Project site and construction areas, there are other features and facilities associated with the proposed project (the majority of which are located on the proposed project site or construction laydown area), including:

- Approximately 34,000 SunCatchers and associated equipment and infrastructure within a fenced boundary;
- An onsite, 14.4-acre Main Services Complex located in the north eastern portion of the Phase I section of the project site for administration and maintenance activities. The complex would include buildings, parking and access roads (SES 2008f page 3-62 and Figure 3-4);
- An onsite, 10-acre Satellite Services Complex located in the eastern portion of the Phase II section of the project site for maintenance activities and SunCatcher mirror washing. The complex would include buildings, parking and access roads (SES 2008f page 3-62 and Figure 3-4); and
- An onsite, 2.8-acre 850-MW Calico Solar Project Substation located in the southern portion of the Phase I section of the site (SES 2008f page 3-62 and Figure3-4).

C.14.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This waste management analysis addresses: a) existing project site conditions and the potential for contamination associated with prior activities on or near the project site, and b) the impacts from the generation and management of wastes during project construction and operation.

Existing Project Site Conditions and Potential for Contamination

For any site in California proposed for the construction of a power plant, the applicant must provide documentation about the nature of any potential or existing releases of hazardous substances or contamination at the site. If potential or existing releases or contamination at the site are identified, the significance of the release or contamination would be determined by site-specific factors, including, but not limited to: the amount and concentration of contaminants or contamination; the proposed use of the area where the contaminants/contamination is found; and any potential pathways for workers, the public, or sensitive species or environmental areas to be exposed to the contaminants. Any unmitigated contamination or releases of hazardous substances that pose a risk to human health or environmental receptors would be considered significant by Energy Commission staff.

As a first step in documenting existing site conditions, the Energy Commission's power plant site certification regulations require that a Phase I Environmental Site Assessment (ESA) be prepared[1] and submitted as part of an AFC. The Phase I ESA is conducted to identify any conditions indicative of releases and threatened releases of hazardous substances at the site and to identify any areas known to be contaminated (or a source of contamination) on or near the site.

In general, the Phase I ESA uses a qualified environmental professional to conduct inquiries into past uses and ownership of the property, research hazardous substance releases and hazardous waste disposal at the site and within a certain distance of the site, and visually inspect the property, making observations about the potential for contamination and possible areas of concern. After conducting all necessary file reviews, interviews, and site observations, the environmental professional then provides findings about the environmental conditions at the site. In addition, since the Phase I ESA does not include sampling or testing, the environmental professional may also give an opinion about the potential need for any additional investigation. Additional investigation may be needed, for example, if there were significant gaps in the information available about the site, an ongoing release is suspected, or to confirm an existing environmental condition.

If additional investigation is needed to identify the extent of possible contamination, a Phase II ESA may be required. The Phase II ESA usually includes sampling and testing of potentially contaminated media to verify the level of contamination and the potential for remediation at the site.

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[1] Title 20, California Code of Regulations, section 1704(c) and Appendix B, section (g)(12)(A). Note that the Phase I ESA must be prepared according to American Society for Testing and Materials protocol or an equivalent method agreed upon by the applicant and the Energy Commission staff.

In conducting its assessment of a proposed project, staff will review the project's Phase I ESA and work with the appropriate oversight agencies as necessary to determine if additional site characterization work is needed and if any mitigation is necessary at the site to ensure protection of human health and the environment from any hazardous substance releases or contamination identified.

Impacts from Generation and Management of Wastes during Construction, Operation and Project Closure/Decommissioning

As mentioned previously, staff considers project waste management to result in no significant impacts (as defined per CEQA guidelines in Checklist Section XVI) if there is available landfill capacity and the project complies with LORS. Staff reviewed the applicant's proposed solid and hazardous waste management methods during project construction, operation, and closure/decommissioning, and determined if the methods proposed are consistent with the LORS identified for waste disposal and recycling. Staff also reviewed the capacity available at off-site treatment and disposal sites and determined whether or not the proposed power plant's waste would impact the available capacity.

C.14.4.3 DIRECT/INDIRECT IMPACTS AND MITIGATION

Existing Site Conditions

A Phase I ESA, dated November 14, 2008, was prepared by URS in accordance with the American Society for Testing and Materials Standard Practice E 1527-05 for ESAs. The Phase I ESA addressed conditions on the Calico Solar Project site located near Hector Road north of Interstate 17 east of Newberry Springs, San Bernardino County, California 92365 and is included as Appendix T of the project AFC. The ESA did not identify any Recognized Environmental Conditions (RECs) in connection with historic or current site operations. A REC is the presence or likely presence of any hazardous substances or petroleum products on a property under the conditions that indicated an existing release, past release, or a material threat of a release of any hazardous substance or petroleum products into structures on the property or in the ground, groundwater, or surface water of the property.

The Phase I ESA was prepared for 29 contiguous parcels totaling approximately 8,328 acres of vacant, undeveloped BLM desert land and privately owned land. There are three parcels which total 98 acres of privately owned land that are within the project boundaries that are not part of the project. The site is bisected by the BNSF railroad easement. There is a former rock crusher/ore processing area located in the northeastern corner of the site. The processing area was once a part of Logan Mine (SES 2008f, Appendix T and Tessera Solar 2009g, Data Response 88). The Logan Mine produced primarily manganese and iron with trace production of phosphorus-phosphates, silica and sulfur (SES 2008a, Appendix T and Tessa Solar 2009g, Data Response 89). Staff spoke with George Kenline, senior geologist, County of San Bernardino Land Use Services Division, and verified that manganese and iron ore production and processing were not considered hazardous operations (Kenline 2009). Manganese is a common metal, present in many minerals and in ground water. Naturally occurring manganese ores are not particularly hazardous and are not known to be a carcinogen. Most manganese related health problems have historically been found as an occupational hazard, from inhalation and/or ingestion with workers that mine and process these ores. Recommendations for people working around mining areas particularly metal mines include dust suppression and or respiratory protection (Springer 2009).

In the event that contamination is identified during any phase of construction, staff proposes Condition of Certification **WASTE-1** which would require that an experienced and qualified Professional Engineer or Professional Geologist be available for consultation in the event contaminated soil is encountered. If contaminated soil is identified, **WASTE-2** would require that the Professional Engineer or Professional Geologist inspect the site, determine what is required to characterize the nature and extent of contamination, and provide a report to the Energy Commission Compliance Project Manager (CPM) and DTSC with findings and recommended actions.

Proposed Project

Proposed Project - Construction Impacts and Mitigation

Site preparation and construction of Phases I and II of the proposed Calico Solar Project and its associated facilities would last approximately 48 months and generate both non-hazardous and hazardous wastes in solid and liquid forms (SES 2008f 5.14-1). Before construction can begin, the project owner will be required to develop and implement a Construction Waste Management Plan per proposed Condition of Certification **WASTE-3** to ensure that the waste will be recycled when possible and properly landfilled when necessary.

Non-Hazardous Wastes

Construction activities (including construction of the substation and portable SunCatcher assembly buildings) would generate an estimated 40 cubic yards per week of non-hazardous solid wastes, consisting of scrap wood, steel, glass, plastic, and paper. Of these items, recyclable materials would be separated and removed as needed to recycling facilities. Non-recyclable materials (insulation, other plastics, food waste, roofing materials, vinyl flooring and base, carpeting, paint containers, packing materials, etc.) would be disposed at a Class III landfill; the Applicant expects emptying of a 40-cubic yard container of non-recyclable waste on a weekly basis during construction of the buildings, and once a month thereafter (SES 2008f, Table 5.14-2). Construction of the substation would generate an estimated 1,050 cubic yards of waste (Tessera Solar 2009z, Data Response 173). The SunCatcher assembly buildings would be removed from the site after construction. Decommissioning and removal of the buildings would generate approximately 80 cubic yards of waste consisting of surplus packing materials, lumber, cardboard, lighting, gaskets, and wiring (Tessera Solar 2009z, Data Response 172). Concrete pads under the buildings would remain after the buildings are removed.

Non-hazardous liquid wastes would be generated during construction, and would include storm water runoff and sanitary waste. Storm water runoff would be managed in accordance with appropriate LORS. Sanitary wastes would be pumped to tanker trucks by licensed contractors for transport to a sanitary water treatment plant. Please see the

SOIL AND WATER RESOURCES section of this document for more information on the management of project wastewater.

Hazardous Wastes

During construction, anticipated hazardous wastes include waste paint, spent construction solvents, waste cleaners, waste oil, oily rags, waste batteries, and spent welding materials. Estimated amounts are 1 cubic yard of empty containers (per week), 200 gallons of oils, solvents, and adhesives (every 90 days), and 20 batteries (per year). Empty hazardous material containers would be returned to the vendor or disposed at a hazardous waste facility; solvents, used oils, paint, oily rags, and adhesives would be recycled or disposed at a hazardous waste facility; and spent batteries would be disposed at a recycling facility (SES 2008f, Table 5.14-2).

The generation of hazardous waste requires a unique hazardous waste generator identification number. The hazardous waste generator number is determined based on site location and therefore, both the construction contractor and the project owner/operator could be considered the generator of hazardous wastes at the site. The project owner would be required to obtain a unique hazardous waste generator identification number for the site prior to starting construction, pursuant to proposed Condition of Certification **WASTE-4**. This would ensure compliance with California Code of Regulation Title 22, Division 4.5.

Hazardous waste would be collected in hazardous waste accumulation containers and stored in a laydown area, warehouse/shop area, or storage tank on equipment skids for less than 90 days. The accumulated wastes would then be properly manifested, transported, and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies. Staff reviewed the disposal methods and concluded that all wastes would be disposed of in accordance with all applicable LORS. Should any construction waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by the proposed Condition of Certification **WASTE-5** to notify the Compliance Project Manager (CPM) whenever the owner becomes aware of this action.

Staff has reviewed the proposed waste management methods described in AFC section 5.14.2.1, and in the responses to data requests, and concludes that project construction wastes would be managed in accordance with all applicable LORS.

In the event that construction excavation, grading, or trenching activities for the proposed project encounter potentially contaminated soils, specific waste handling, disposal, or other precautions may be necessary pursuant to hazardous waste management LORS. Staff finds that proposed Conditions of Certification **WASTE-1** and **-2** would be adequate to address any soil contamination contingency that may be encountered during construction of the project and would further support compliance with LORS.

Proposed Project - Construction and Demolition (C&D) Waste Diversion and Mitigation

The Integrated Waste Management Act of 1989 [Assembly Bill (AB) 939, Sher, Chapter 1095, Statutes of 1989] set landfill waste diversion goals of 50% (by 2000) for local jurisdictions. To meet this goal, many jurisdictions require applicants for construction and demolition projects to submit a reuse/recycling plan for at least 50% of C&D materials prior to the issuance of a building or demolition permit. The San Bernardino Integrated Waste management Authority does not have a County Demolition Waste Diversion Program (Tessera Solar 2009g, Data Response 86). While the Calico Solar Project is not responsible to a local jurisdiction staff will require the applicant to meet the 50% waste diversion rate. Adoption of Condition of Certification **WASTE-6** will ensure the applicant meets the waste diversion goals of the C&D program. Staff believes that compliance with proposed Condition of Certification **WASTE-6** would also help ensure that project wastes are managed properly and further reduce potential impacts to local landfills from project wastes.

Proposed Project - Operation Impacts and Mitigation

The proposed Calico Solar Project would generate both non-hazardous and hazardous wastes in solid and liquid forms under normal operating conditions. Table 5.14-2 of the project AFC gives a summary of the anticipated operation waste streams, estimated waste volumes and generation frequency, and proposed management methods. Before operations can begin, the project owner would be required to develop and implement an Operations Waste Management Plan as required in the proposed Condition of Certification **WASTE-7**. This would ensure that an accurate record is maintained of the project's waste storage, generation, and disposal, and compliance with waste regulations is maintained during operation.

Non-Hazardous Solid Wastes

Non-hazardous solid wastes generated during project operations would consist of glass, paper, wood, plastic, cardboard, deactivated equipment and parts, defective or broken electrical materials, empty non-hazardous containers, and other miscellaneous solid wastes. The project would generate approximately 10 cubic yards of non-hazardous solid waste per week (SES 2008f Table 5.14-3). Such wastes would be recycled to the greatest extent possible, and the remainder would be removed on a regular basis for disposal in a Class III landfill. Non-hazardous oily rags (one 55-gallon drum per month) would be laundered at an authorized recycle facility. Sanitary wastewater solids would be treated with an onsite septic system, and sludge would be delivered to an off-site disposal facility.

Non-Hazardous Liquid Wastes

Non-hazardous liquid wastes would be generated during facility operation and are discussed in the **SOIL AND WATER RESOURCES** section of this document.

Hazardous Wastes

The project owner/operator would be considered the generator of hazardous wastes at the site during facility operations. Therefore, the project owner's unique hazardous waste generator identification number, obtained prior to construction in accordance with proposed Condition of Certification **WASTE-4**, would be retained and used for hazardous waste generated during facility operation.

Hazardous wastes that may be generated during routine project operation include motor oil and coolant from the PCU, batteries, oily absorbent and spent oil filters, and used hydraulic fluid (SES 2008af p. 5.14-11). In addition, spills and unauthorized releases of hazardous materials or hazardous wastes may generate contaminated soils or cleanup materials that may also require management and disposal as hazardous waste. Proper hazardous material handling and good housekeeping practices would help keep spill wastes to a minimum. However, to ensure proper cleanup and management of any contaminated soils or waste materials generated from hazardous materials spills, staff proposes Condition of Certification **WASTE-8,** requiring the project owner/operator to document, clean up, and properly manage and dispose of wastes from any hazardous materials spills or releases in accordance with all applicable federal, state, and local requirements. More information on project hazardous materials management spill reporting, containment, and spill control and countermeasures plan provisions for the project are provided in the **HAZARDOUS MATERIALS MANAGEMENT** section of this document.

The amount of hazardous wastes generated during operation of the Calico Solar Project would be minor, with source reduction and recycling of wastes implemented whenever possible. The hazardous wastes would be temporarily stored on site, transported off site by licensed hazardous waste haulers, and recycled or disposed of at authorized disposal facilities in accordance with established standards applicable to generators of hazardous waste (Title 22, CCR, §66262.10 et seq.). Should any operations waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by proposed Condition of Certification **WASTE-5** to notify the CPM when advised of any such action.

Each solar Stirling engine contains 4 quarts of oil (Tessera Solar 20090z, Data Response 167). The PCU engine oil will be stored in four 150-gallon capacity double-walled storage tanks (Tessera Solar 2009z, Data Response 168). Two tanks will store oil recovered from the PCU's while the oil is waiting to be filtered for re-use in the engine. A Hazardous Materials Business Plan, which outlines hazardous materials handling, storage, spill response, and reporting procedures, will be prepared before construction activities. If a spill or release of hazardous materials should occur during operations, the spill area will be bermed or controlled as quickly as practical to minimize the footprint of the spill. Finally, catch pans will be placed under equipment hose connections to catch potential spills during fueling and servicing (Tessera Solar 2009z, Data Response 169).The Lahontan Regional Water Quality Control Board would require a Spill Prevention, Control and Countermeasure Plan (SPCC) (Tessera Solar 2009z, Data Responses 170 & 171) in accordance with Title 40 CFR, Section 112.

Federal Code of Regulations (40 CFR 112 Subpart B) pertains to the SPCC rule which requires owners or operators of non-transportation-related bulk petroleum storage facilities that have an aggregate aboveground storage capacity greater than 1,320 gallons or a buried storage capacity greater than 42,000 gallons to prepare and maintain a site-specific SPCC Plan for their facility. The Calico Solar Project will have more than 34,000 gallons of oil on site. The SPCC Plan would contain information on procedures; methods and equipment at the Calico Solar Project that would be in place to prevent discharges of petroleum from reaching navigable waters. The requirements for a SPCC Plan for the project are further discussed in the **HAZARDOUS MATERIALS MANAGEMENT** section of this document.

Proposed Project - Closure and Decommissioning Impacts and Mitigation

The closure or decommissioning of the Calico Solar Project would produce both hazardous and non-hazardous solid and liquid waste. The project's General Compliance Conditions of Certification, including Compliance Monitoring and Closure Plan (Compliance Plan) have been established as required by Public Resources Code section 25532. The plan provides a means for assuring that the facility is constructed, operated and closed in compliance with public health and safety, environmental and other applicable regulations, guidelines, and conditions adopted or established by the California Energy Commission. Required elements of a facility's closure would be outlined in a facility closure plan as specified in Conditions of Certification **Compliance 11, 12, and 13**. To ensure adequate review of a planned project closure, the project owner shall submit a proposed facility closure plan to the Energy Commission for review and approval at least 12 months (or other period of time agreed to by the CPM) prior to commencement of closure activities. The facility closure plan will document non-hazardous and hazardous waste management practices including: the inventory, management, and disposal of hazardous materials and wastes, and permanent disposal of permitted hazardous materials and waste storage units.

The handling and management of waste generated by the Calico Solar Project will follow the hierarchical approach of source reduction, recycling, treatment, and disposal as specified in California Public Resources Code Sections 40051 and 40196. The first priority of the project owner will be to use materials that reduce the waste that is generated. The next level of waste management will involve reusing or recycling wastes. For wastes that cannot be recycled, treatment will be used, if possible, to make the waste nonhazardous. Finally, waste that cannot be reused, recycled or treated would be transported off site to a permitted treatment, storage, or disposal facility. Staff expects that there will be adequate landfill capacity available to dispose of both non-hazardous and hazardous waste from the closure or decommissioning of the proposed project. Conditions of Certification **WASTE-3** through **-8** would continue to apply to the Calico Solar Project during closure or decommissioning of the project.

Proposed Project - Impact on Existing Waste Disposal Facilities

Non-Hazardous Solid Wastes

Construction and operation of the proposed project would respectively generate 41 cubic yards and 10 cubic yards per week of nonhazardous solid waste (wood, paper/cardboard, glass, plastic, insulation, and concrete), respectively. The waste would be stored onsite for less than 30 days, and then recycled or disposed of in a Class III landfill.

Table 5.14-1 of the project AFC identifies four waste disposal facilities in San Bernardino County that could potentially take the non-hazardous construction and operation wastes generated by the Calico Solar Project. The remaining combined capacity of the four landfill facilities that are currently operating is over 93 million cubic yards Table 5.14-1. The total amount of non-hazardous solid waste generated from project construction is estimated to be 7,872 cubic yards (41 cubic yards per week for 48 months), and the total amount from lifetime operations is estimated to be 20,800 cubic yards (10 cubic yards per week for 40 years). These quantities include both recyclable and non-recyclable wastes; Additional non-recyclable sanitary sludge (the non-liquid portion of 5,000 gallons of wastewater per month during operation) and saltcake (90,200 pounds per year of operation) would also be disposed off-site (SES 2008f Table 5.14-3). The total non-recyclable solid waste would contribute much less than 1% of the available landfill capacity. Staff finds that disposal of the solid wastes generated by the Calico Solar Project can occur without significantly impacting the capacity or remaining life of any of these facilities.

Hazardous Wastes

AFC Table 5.14-1 lists landfills and recycling facilities that could be used to manage project wastes. Two hazardous waste (Class I) disposal facilities are currently accepting waste and could be used to manage Calico Solar Project wastes: the Clean Harbors Buttonwillow Landfill in Kern County and the Chemical Waste Management Kettleman Hills Landfill in Kings County. The Kettleman Hills facility also accepts Class II and Class III wastes. In total, there is a combined excess of 16 million cubic yards of remaining hazardous waste disposal capacity at these landfills, with at least 30 years remaining in their operating lifetimes (EEC2006a, Section 8.14.3.5.2). In addition, the Kettleman Hills facility is in the process of permitting an additional 4.6 to 4.9 million cubic yards of disposal capacity (Waste Management 2009), and the Buttonwillow facility has 40 years to reach its capacity at its current disposal rate (CEC2008aa).

Hazardous wastes generated during construction and operation would be recycled to the extent possible and practical. Those wastes that cannot be recycled would be transported off site to a permitted treatment, storage, or disposal facility. As calculated from waste streams presented in AFC Tables 5.14-2 and 5.14-3 (SES

2008f), staff calculated that approximately 225 cubic yards of recyclable and non-recyclable hazardous waste would be generated over the 48 month construction period. Approximately 50 cubic yards of hazardous non-recyclable waste would be generated over the 40-year operating lifetime. Thus hazardous wastes from the Calico Solar Project requiring off-site disposal would be significantly less than the remaining capacity of either Class 1 waste facility.

C.14.4.3 CEQA LEVEL OF SIGNIFICANCE

Absent any unusual circumstances, staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant impacts (per guidelines in CEQA Appendix G: Environmental Checklist Section XVI – Utilities and Service systems) would occur as a result of project waste management.

C.14.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the central portion of the proposed 850 MW project. It was developed because it could be constructed without the necessity of a new 500 kV transmission line, and would avoid several other environmental impacts. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

C.14.5.1 SETTING AND EXISTING CONDITIONS

The general setting and existing conditions would remain as described in C.14.4.1 although the land requirements would be proportionately reduced to reflect the smaller project size. Locations of laydown areas may also vary.

C.14.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Reduced Acreage Alternative would generate similar types of hazardous and non-hazardous wastes from construction, demolition and operation of the project. However, the quantities of waste would be reduced by 66%. The amount of non-hazardous and hazardous solid wastes generated under a Reduced Acreage Alternative that would require landfill/treatment would be approximately 3,000 and 74 cubic yards, respectively. Similar to the proposed project, wastes requiring off-site disposal would be significantly less than the remaining capacity of off-site disposal facilities. Similar to the proposed project, staff will not require investigation and remediation of soil and groundwater contamination. Disposal methods would remain the same as for the proposed project and the same Conditions of Certification (**WASTE 1 through 8)** would apply.

C.14.5.3 CEQA LEVEL OF SIGNIFICANCE

Similar to the proposed project, staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant impacts would occur as a result of waste management associated with the Reduced Acreage Alternative.

C.14.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed 850 MW project. This alternative, the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 2**.

C.14.6.1 SETTING AND EXISTING CONDITIONS

The general setting and existing conditions would remain as described in C.14.4.1 although the land requirements would be proportionately reduced to reflect the smaller project size. Locations of laydown areas may also vary.

C.14.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The 720 MW Alternative would generate similar types of hazardous and non-hazardous wastes from construction, demolition and operation of the project. However, the quantities of waste would be reduced by 15%. The amount of non-hazardous and hazardous solid wastes generated under a 720 MW Alternative that would require landfill/treatment would be approximately 7,100 and 191 cubic yards, respectively. Similar to the proposed project, wastes requiring off-site disposal would be significantly less than the remaining capacity of off-site disposal facilities. Similar to the proposed project, staff will not require investigation and remediation of soil and groundwater contamination. Disposal methods would remain the same as for the proposed project and the same Conditions of Certification (**WASTE 1 through 8)** would apply.

C.14.6.3 CEQA LEVEL OF SIGNIFICANCE

Similar to the proposed project, staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant impacts would occur as a result of waste management associated with the 720 MW Alternative.

C.14.7 NO PROJECT/NO ACTION ALTERNATIVE

There are three No Project / No Action Alternatives evaluated as follows:

No Project / No Action Alternative #1: No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

The result of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another renewable energy project.

If the proposed project is not approved, renewable projects would likely be developed on other sites in San Bernardino County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District. There would be no impacts on waste management under this no action alternative.

No Project / No Action Alternative #2: No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site. However, there would be no impacts on waste management as a result of this no action alternative; any future project would be evaluated for waste management impacts in a project-specific NEPA analysis.

No Project / No Action Alternative #3: No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended. There would be no impacts on waste management under this no action alternative.

C.14.8 PROJECT-RELATED FUTURE ACTIONS - WASTE MANAGEMENT

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah

Substation, and new telecommunication facilities would be installed within existing SCE ROWs.

- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.14.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

The transmission lines and related facilities would be routed mostly through undeveloped publicly-owned desert and mountainous land with relatively few activities that could generate hazardous wastes or contaminated areas. In the event that contamination is identified during any phase of construction, staff proposes Conditions of Certification **WASTE-1** and **WASTE-2** which would require that a Professional Engineer or Professional Geologist inspect the site, determine what is required to characterize the nature and extent of contamination, and provide a report to the Energy Commission Compliance Project Manager (CPM) and DTSC with findings and recommended actions.

Under the 850 MW Full Build-Out option, all existing 220 kV structures on the 67-mile Lugo-Pisgah 220 kV transmission line would be removed (more than 250 structures), as well as two existing 500 kV structures on the Lugo–Eldorado transmission line. Transmission line equipment to be removed would include existing 220 kV and 500 kV lattice steel structures and associated hardware (i.e., cross arms, insulators, vibration dampeners, suspension clamps, ground wire clamps, shackles, links, nuts, bolts, washers, cotters pins, insulator weights, and bond wires), as well as the transmission line conductor. Steel lattice tower footings, concrete caps and anchors would likely be cut/removed below ground level. Holes would be filled and compressed, and then the area would be smoothed to match surrounding grade. The disposal of or recycling of these structures would occur at permitted facilities.

At the Pisgah Substation, any excavated soil would likely be spread on a portion of the substation property. At the end of construction, all construction materials and debris would be removed from the area and recycled or properly disposed of offsite.

The closest landfills within San Bernardino County near the Pisgah Substation would be the Newberry Springs Medium Volume Transfer/Processing Facility in Newberry Springs (along I-40, approximately 20 miles west of the town of Pisgah), which has a maximum permitted throughput of 15 tons/day and allows Mixed Municipal waste, and the Barstow Sanitary Landfill, which is approximately 3 miles south of Barstow along Highway 247. The Barstow Sanitary Landfill allows a maximum permitted throughput of 750 tons/day, has a remaining capacity of 924,401 cubic yards, and accepts the following waste types:

Agricultural, Construction/demolition, Industrial, Mixed municipal, Other designated, and Sludge (BioSolids). Other landfills along the transmission corridor include the Camp Rock Transfer Station in the Lucerne Valley and four other landfills in the Victorville/Hesperia area (Victorville Sanitary Landfill, Advance Disposal Transfer/Processing Facility, Victor Valley MRF & Transfer Station, and Victor Valley Regional Composting Facility) (CIWMB 2009).

Waste management activities associated with the proposed action would include the storage, transport, recycling, or disposal of all project waste streams. Waste streams generally include solid waste and liquid waste. For the purposes of this analysis, discharges to the atmosphere are not included as waste streams. Atmospheric discharges and air quality are described in the **AIR QUALITY** section. Solid waste would include office type materials (paper, cardboard, newspaper, etc.) and any other solid material that is stored or disposed of as a non hazardous waste. Liquid waste may include human septic waste, process fluid waste, and storm water runoff.

All waste streams are regulated and discharges or disposal of any waste material either requires specific permitting or disposal at a permitted facility based on the type of waste. Both solid and liquid waste streams can be either hazardous or non hazardous, depending on the constituents in the waste stream and the characteristics (ignitability, reactivity, toxicity, and corrosivity) of the waste. The status of the waste stream determines both the storage options for the material, and the disposal method for the material.

Solid waste disposal sites are permitted as either Class III facilities, which accept municipal solid waste, or Class I facilities which accept hazardous waste. Within San Bernardino County, there are seven existing Class III commercial solid waste disposal facilities (CIWMB 2008). The proposed transmission line route has not been reviewed to determine the location of the transmission line relative to existing and proposed solid waste disposal facilities.

Liquid waste disposal facilities include municipal waste water treatment plants and individual sewage disposal systems (ISDS). Municipal waste treatment plants are allowed to receive residential, commercial, and industrial human sewage material, and some regulated industrial liquid waste streams. Residential human sewage waste can also be disposed of in ISDS. Any liquid waste stream that is considered hazardous must be disposed of in a Class I land fill or through a combination of recycling and disposal at a permitted facility.

Uncontrolled solid waste disposal facilities may be present within the proposed transmission line ROW area. These facilities may include historic fill areas associated with urban solid waste disposal, areas of domestic solid waste present on private property, or areas of illegal solid waste disposal on public lands. These types of facilities may or may not be publicly known, mapped, and identified. Public records for these facilities would be reviewed as part of a Phase 1 ESA completed prior to permitting of the project. Unknown areas of solid waste disposal may be encountered during project construction activities.

C.14.8.2 ENVIRONMENTAL IMPACTS

Construction would generate waste largely in the form of soil from structure/substation excavation, concrete from existing foundations, utility line cable, and scrap metal from the replacement of existing structures. The transmission structures, insulators, cross arms and all other associated hardware would be disposed of at an offsite location. This Staff Assessment/DEIS also discusses impacts in the event contaminated soil is encountered. Hazardous wastes generated during construction and operation would be recycled to the extent possible and practical. Those wastes that cannot be recycled would be transported off site to a permitted treatment, storage, or disposal facility.

In addition, although Polychlorinated biphenyls (PCB) have been banned from use with electrical distribution and substation transformers by the U.S. EPA since 1985 (U.S. EPA 2009), some older pieces of electrical equipment within SCE's system may still contain PCBs. There is a likelihood that some PCB containing equipment would need to be removed from some of the project locations during the construction of the project and removal of the existing line. Therefore, there would be a potential for a PCB release to contaminate the environment in the event of a spill while handling and transporting PCBs.

Excavation required to construct the components of the project would primarily be limited to areas at existing and proposed structure locations, at underground fiber optic trench locations, and at the expanded Pisgah Substation locations. A contamination site record search would need to be conducted to determine existing known contaminated sites in the project vicinity. Therefore, it is possible that subsurface construction activities could accidentally disturb documented contamination sites, potentially mobilizing soil and/or groundwater contamination.

Finally, previously undocumented soil and or groundwater contamination could be encountered during tower and pole installation, trenching, grading, or other excavation related activities despite the steps taken to identify and avoid contamination. The applicant would be required to conduct site surveys prior to construction to determine whether these conditions could exist.

The presence of oil in a quantity greater than 1,320 gallons invokes Spill Prevention Control and Countermeasures (SPCC) regulations. The quantity of oil contained in any one of the planned 500/220 kV transformers would be in excess of the minimum quantity that requires such regulations. See **HAZARDOUS MATERIALS** for further discussion on this regulation.

C.14.8.3 MITIGATION

Mitigation, including preparation of a waste management plan, is recommended that would ensure that all construction materials and debris would be removed from the area and recycled or properly disposed of offsite. Conditions of Certification **WASTE-3** and **WASTE-6** outline proposed construction waste management plans and recycling mitigation methods that should be required. Although impacts to solid waste facilities and waste management would not be significant and no mitigation measure would be required, to further reduce adverse effects of the overall volume of waste from all of the project components, mitigation that would require SCE to recycle construction waste where feasible is recommended for implementation to ensure that maximum recycling activities would occur over the course of the entire project.

SCE would also be required to properly store, package, and label all hazardous waste; use only approved transporters; prepare hazardous waste manifests; keep detailed records; and appropriately train employees, in accordance with state and federal hazardous waste management requirements. Hazardous wastes would be accumulated onsite in accordance with accumulation time limits and then properly manifested, transported to, and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies. Utilization of portable liquid waste systems (port-a-potties) at all construction locations, including regular maintenance of the facilities, is recommended.

To identify and avoid documented contamination sites relative to the project sites, record searches specifically for the project locations would need to be conducted. Implementation of mitigation measures should require identification and avoidance of documented contamination sites, thus ensuring that the potential impacts caused by documented contaminated sites would be reduced to less than significant levels.

Soils testing should be conducted and analyzed by a professional, licensed Geotechnical Engineer or Geologist, to determine existing soil conditions. Borings in a sufficient quantity to adequately gather variations in the site soils should be conducted to remove sample cores for testing. The type of soils, soil pressure, relative compaction, resistivity, and percolation factor are among the items that should be tested for. If contaminants are encountered, special studies and remediation measures in compliance with environmental regulations should be implemented by qualified professionals.

During trenching, grading, or excavation work, mitigation measures should be developed that would require the contractor to observe the exposed soil for visual evidence of contamination. If visual contamination indicators are observed during construction, the contractor should be required to stop work until the material is properly characterized and appropriate measures are taken to protect human health and the environment. The contractor would also have to comply with the all local, State, and federal requirements for sampling and testing, and subsequent removal, transport, and disposal of hazardous materials. Requiring Conditions of Certification **WASTE-1** and **WASTE-2** would ensure the appropriate measures are taken to mitigate potential impacts due to the presence and disturbance of contaminated soils.

C.14.8.4 CONCLUSION

SCE transmission upgrades would comply with all applicable LORS regulating the management of hazardous and non-hazardous wastes during both project construction and operation. The Conditions of Certification included in the **WASTE MANAGEMENT** section of this Staff Assessment/DEIS, SCE should be required to recycle construction waste where feasible, and identify potential soil contamination. In addition, the site should be managed such that contaminants would not pose a significant risk to humans or to the environment.

Implementing mitigation measures similar to the Conditions of Certification that are proposed in the Calico Solar Project Staff Assessment/DEIS for construction and operation would avoid impacts to construction workers and environment if applied to the SCE transmission upgrade options.

C.14.9 CUMULATIVE IMPACTS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

There is the potential for substantial future development in the San Bernardino Valley area and throughout the southern California desert region. Analysis of cumulative impacts is based on data provided in the following maps and tables (see **CUMULATIVE SCENARIO**):

- Cumulative Impacts Figure 1, Regional Renewable Applications;
- Cumulative Impacts Figure 2, Renewable Applications in the Barstow & Needles District Areas;
- Cumulative Impacts Figure 3, Newberry Springs/Ludow Area - Existing and Future/Foreseeable Projects;
- Cumulative Impacts Table 1, Renewable Energy Projects in the California Desert District
- Cumulative Impacts Table 2, Existing Projects in the Newberry Springs/Ludow Area; and
- Cumulative Impacts Table 3, Future Foreseeable Projects in the Newberry Springs/Ludlow Area.

The analysis in this section first defines the geographic area over which cumulative impacts related to waste management could occur. The cumulative impact analysis itself describes the potential for cumulative impacts to occur as a result of implementation of the Calico Solar Project along with the listed local and regional projects.

C.14.9.1 GEOGRAPHIC EXTENT

Cumulative impacts can occur within San Bernardino County if implementation of the Calico Solar Project could combine with those of other local or regional projects. Cumulative impacts could also occur as a result of development of some of the many proposed solar and wind development projects that have been or are expected to be under consideration by the BLM and the Energy Commission in the near future. Many of these projects are located within the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona.

The geographic extent for the analysis of the cumulative impacts associated with the Calico Solar Project includes San Bernardino County. This geographic scope is appropriate because waste disposal facilities in San Bernardino County could easily handle all waste generated by the Calico Solar Project.

C.14.9.2 CUMULATIVE IMPACT ANALYSIS

Local Projects

The Calico Solar Project would generate non-hazardous solid waste that would add to the total waste generated in San Bernardino County. Non-hazardous solid waste generated by all of the past, present, and reasonably foreseeable projects presented in Cumulative Impacts Table 2 and Cumulative Impacts Table 3 would also be disposed of within San Bernardino County. However, project wastes would be generated in modest quantities, waste recycling would be employed wherever practical, and sufficient capacity is available at several treatment and disposal facilities to handle the volumes of wastes that would be generated by the project. Most of the reasonably foreseeable projects identified in Cumulative Impacts Table 3 would generate smaller volumes of non-hazardous waste than the Calico Solar Project. The total amount of available solid waste landfill capacity in San Bernardino County expected exceeds 93 million cubic yards (SES 2008f Table 5.14-1). Therefore, even if all 11 of these reasonably foreseeable projects were constructed, staff concludes that the non-hazardous waste generated by the Calico Solar Project would not result in significant cumulative waste management impacts.

As stated above, the non-recyclable component of the 225 cubic yards of hazardous construction waste and the less than 50 cubic yards per year of non-recyclable operations waste from the Calico Solar Project would be far less than staff's threshold of significance and would therefore not significantly impact the capacity or remaining life of the Class I waste facilities. The very small quantities of project hazardous waste and the similarly small quantities of hazardous waste that would potentially be generated by the reasonably foreseeable projects would not result in significant cumulative waste management impacts.

Regional Projects

Implementation of the multiple solar and wind projects proposed to be developed in southeastern California, southern Nevada, and western Arizona would result in an increase in generation of hazardous and non-hazardous solid and liquid waste and would add to the total quantity of waste generated in the states of California and Nevada. However, project wastes would be generated in modest quantities, waste recycling would be employed wherever practical, and sufficient capacity is available at several treatment and disposal facilities to handle the volumes of wastes that would be generated by the project. Therefore, impacts of the Calico Solar Project, when combined with impacts of the future solar and wind development projects currently proposed within southeastern California, southern Nevada, and western Arizona, would not result in significant and unavoidable cumulative impacts with regard to waste management.

C.14.9.3 CUMULATIVE IMPACT CONCLUSION

Impacts of the Calico Solar Project would combine with impacts of past, present, and reasonably foreseeable projects to result in a contribution to local and regional cumulative impacts related to waste management.

The amount of non-hazardous and hazardous wastes generated during construction and operation of the Calico Solar Project would add to the total quantity of hazardous and non-hazardous waste generated in San Bernardino County. However, project wastes would be generated in modest quantities, waste recycling would be employed wherever practical, and sufficient capacity is available at several treatment and disposal facilities to handle the volumes of wastes that would be generated by the project. Therefore, staff concludes that the waste generated by the Calico Solar Project would not result in significant cumulative waste management impacts either locally or regionally.

C.14.10 COMPLIANCE WITH LORS

Energy Commission staff concludes that the proposed Calico Solar Project would comply with all applicable LORS regulating the management of hazardous and non-hazardous wastes during both facility construction and operation. The applicant is required to recycle and/or dispose hazardous and non-hazardous wastes at facilities licensed or otherwise approved to accept the wastes.

Because hazardous wastes would be produced during both project construction and operation, the Calico Solar Project would be required to obtain a hazardous waste generator identification number from U.S. EPA. The Calico Solar Project would also be required to properly store, package, and label all hazardous waste; use only approved transporters; prepare hazardous waste manifests; keep detailed records; and appropriately train employees, in accordance with state and federal hazardous waste management requirements.

C.14.11 NOTEWORTHY PUBLIC BENEFITS

Staff has not identified any noteworthy public benefits associated with Waste Management.

C.14.12 FACILITY CLOSURE

Staff has addressed facility closure and decommissioning impacts to Waste Management under individual headings in Assessment of Impacts and Discussion of Mitigation above. Conditions of Certification **Compliance 11, 12, and 13** also address the requirements for facility closure that would relate to Waste Management.

C.14.13 PROPOSED CONDITIONS OF CERTIFICATION/APPROVAL

WASTE-1 The project owner shall provide the resume of an experienced and qualified professional engineer or professional geologist, who shall be available during site characterization (if needed), demolition, excavation, and grading activities, to the CPM for review and approval. The resume shall show experience in remedial investigation and feasibility studies.

The professional engineer or professional geologist shall be given authority by the project owner to oversee any earth moving activities that have the potential to disturb contaminated soil and impact public health, safety and the environment.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit the resume to the CPM for review and approval.

WASTE-2 If potentially contaminated soil is identified during site characterization, demolition, excavation or grading at either the proposed site or linear facilities, as evidenced by discoloration, odor, detection by handheld instruments, or other signs, the professional engineer or professional geologist shall inspect the site, determine the need for sampling to confirm the nature and extent of contamination, and provide a written report to the project owner, representatives of Department of Toxic Substances Control or Regional Water Quality Control Board, and the CPM stating the recommended course of action.

Depending on the nature and extent of contamination, the professional engineer or professional geologist shall have the authority to temporarily suspend construction activity at that location for the protection of workers or the public. If in the opinion of the professional engineer or professional geologist, significant remediation may be required, the project owner shall contact the CPM and representatives of the Department of Toxic Substances Control or Regional Water Quality Control Board, for guidance and possible oversight.

Verification: The project owner shall submit any reports filed by the professional engineer or professional geologist to the CPM within 5 days of their receipt. The project owner shall notify the CPM within 24 hours of any orders issued to halt construction.

WASTE-3 The project owner shall prepare a Construction Waste Management Plan for all wastes generated during construction of the facility and shall submit the plan to the CPM for review and approval prior to the start of construction. The plan shall contain, at a minimum, the following:

- A description of all construction waste streams, including projections of frequency, amounts generated, and hazard classifications; and
- Management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct

classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans.

Verification: The project owner shall submit the Construction Waste Management Plan to the CPM for approval no less than 30 days prior to the initiation of construction activities at the site.

WASTE-4 The project owner shall obtain a hazardous waste generator identification number from the United States Environmental Protection Agency (USEPA) prior to generating any hazardous waste during project construction and operations.

Verification: The project owner shall keep a copy of the identification number on file at the project site and provide documentation of the hazardous waste generation and notification and receipt of the number to the CPM in the next scheduled Monthly Compliance Report after receipt of the number. Submittal of the notification and issued number documentation to the CPM is only needed once unless there is a change in ownership, operation, waste generation, or waste characteristics that requires a new notification to USEPA. Documentation of any new or revised hazardous waste generation notifications or changes in identification number shall be provided to the CPM in the next scheduled compliance report.

WASTE-5 Upon notification of any impending waste management-related enforcement action by any local, state, or federal authority, the project owner shall notify the CPM of any such action taken or proposed against the project itself, or against any waste hauler or disposal facility or treatment operator with which the owner contracts, and describe how the violation will be corrected.

Verification: The project owner shall notify the CPM in writing within 10 days of becoming aware of an impending enforcement action. The CPM shall notify the project owner of any changes that will be required in the way project-related wastes are managed.

WASTE-6 The project owner shall provide a reuse/recycling plan for at least 50% of construction and demolition materials prior to any building or demolition. The project owner shall ensure compliance and shall provide proof of compliance documentation to the CPM, including a recycling and reuse summary report, receipts, and records of measurement. Project mobilization and construction shall not proceed until the CPM issues an approval document.

Verification: At least 60 days prior to the start of any construction or demolition activities, the project owner shall submit a reuse recycling plan to the CPM for review and approval. The project owner shall ensure that project activities are consistent with the approved reuse/recycling plan and provide adequate documentation of the types and volumes of wastes generated, how the wastes were managed, and volumes of wastes diverted. Project mobilization and construction shall not proceed until CPM issues an approval document. Not later than 60 days after completion of project construction, the project owner shall submit documentation of compliance with the diversion program requirements to the CPM. The required documentation shall include a recycling and reuse summary report along with all necessary receipts and records of measurement from entities receiving project wastes.

WASTE-7 The project owner shall prepare an Operation Waste Management Plan for all wastes generated during operation of the proposed project and shall submit the plan to the CPM for review and approval. The plan shall contain, at a minimum, the following:

- A detailed description of all operation and maintenance waste streams, including projections of amounts to be generated, frequency of generation, and waste hazard classifications;
- Management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans;
- Information and summary records of conversations with the local Certified Unified Program Agency and the Department of Toxic Substances Control regarding any waste management requirements necessary for project activities. Copies of all required waste management permits, notices, and/or authorizations shall be included in the plan and updated as necessary;
- A detailed description of how facility wastes will be managed, and any contingency plans to be employed, in the event of an unplanned closure or planned temporary facility closure; and
- A detailed description of how facility wastes will be managed and disposed of upon closure of the facility.

Verification: The project owner shall submit the Operation Waste Management Plan to the CPM for approval no less than 30 days prior to the start of project operation. The project owner shall submit any required revisions to the CPM within 20 days of notification from the CPM that revisions are necessary.

The project owner shall also document in each Annual Compliance Report the actual volume of wastes generated and the waste management methods used during the year; provide a comparison of the actual waste generation and management methods used to those proposed in the original Operation Waste Management Plan; and update the Operation Waste Management Plan as necessary to address current waste generation and management practices.

WASTE-8 The project owner shall ensure that all spills or releases of hazardous substances, hazardous materials, or hazardous waste are documented and cleaned up and that wastes generated from the release/spill are properly managed and disposed of, in accordance with all applicable federal, state, and local requirements.

Verification: The project owner shall document management of all unauthorized releases and spills of hazardous substances, hazardous materials, or hazardous wastes that occur on the project property or related linear facilities. The documentation shall include, at a minimum, the following information: location of release; date and time of release; reason for release; volume released; how release was managed and material cleaned up; amount of contaminated soil and/or cleanup wastes generated; if the release was reported; to whom the release was reported; release corrective action and cleanup requirements placed by regulating agencies; level of cleanup achieved and actions taken to prevent a similar release or spill; and disposition of any hazardous wastes and/or contaminated soils and materials that may have been generated by the release. A copy of the unauthorized release/spill documentation shall be provided to the CPM within 30 days of the date the release was discovered.

C.14.14 CONCLUSIONS

Consistent with the three main objectives for staff's waste management analysis (as noted in the Introduction section of this analysis), staff provides the following conclusions:

After review of the applicant's proposed waste management procedures, staff concludes that project wastes would be managed in compliance with all applicable waste management LORS. Staff notes that construction, demolition, and operation wastes would be characterized and managed as either hazardous or non-hazardous waste. All non-hazardous wastes would be recycled to the extent feasible, and nonrecyclable wastes would be collected by a licensed hauler and disposed of at a permitted solid waste disposal facility. Hazardous wastes would be accumulated onsite in accordance with accumulation time, and then properly manifested, transported to, and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies.

However, to help ensure and facilitate ongoing project compliance with LORS, staff proposes Conditions of Certification **WASTE-1** through **8**. These conditions would require the project owner to do all of the following:

- Ensure the project site is investigated and any contamination identified is remediated as necessary, with appropriate professional and regulatory agency oversight (**WASTE 1** and **2**).
- Prepare Construction Waste Management and Operation Waste Management Plans detailing the types and volumes of wastes to be generated and how wastes will be managed, recycled, and/or disposed of after generation (**WASTE-3** and **7**).
- Obtain a hazardous waste generator identification number (**WASTE-4**).
- Ensure that all spills or releases of hazardous substances are reported and cleaned-up in accordance with all applicable federal, state, and local requirements (**WASTE-8**).
- Comply with waste recycling and diversion requirements (**WASTE-6**).

- Report any waste management-related LORS enforcement actions and how violations will be corrected (**WASTE-5**).

The existing available capacity for the Class III landfills that may be used to manage nonhazardous project wastes exceeds 3.73 million cubic yards, with another 600 million cubic yards of capacity expected in the future with full operation of the Mesquite Regional Landfill. The total amount of non-hazardous wastes generated from construction, demolition and operation of the Calico Solar Project would contribute much less than 1% of the projected landfill capacity. Therefore, disposal of project generated non-hazardous wastes would have a less than significant impact on Class III landfill capacity.

In addition, the two Class I disposal facilities that could be used for hazardous wastes generated by the construction and operation of Calico Solar Project have a combined remaining capacity in excess of 16 million cubic yards, with another 4.6 to 4.9 million cubic yards of proposed capacity. The total amount of hazardous wastes generated by the Calico Solar Project would be less than significant in relation to the remaining permitted capacity. Therefore, impacts from disposal of Calico Solar Project generated hazardous wastes would also have a less than significant impact on the remaining capacity at Class I landfills.

Staff concludes that management of the waste generated during construction and operation of the Calico Solar Project would not result in any significant adverse impacts, and would comply with applicable LORS, if the waste management practices and mitigation measures proposed in the Calico Solar Project AFC and staff's proposed conditions of certification are implemented.

C.14.15 REFERENCES

CEC 2008g – Staff Data Requests Set 2 (75-94), August 22, 2008.

CEC 2008k – BLM and Energy Commission staff's Data Requests Set 1 Part 1 (1-52). November 14, 2008.

CEC 2008l – Energy Commission staff's Issues Identification Report. November 17, 2008.

CEC 2008m – BLM and Energy Commission staff's Data Requests Set 1 Part 2 (53-127). December 2, 2008.

CEC 2009d – Energy Commission staff's Approach to Cumulative Analysis and Alternatives. February 10, 2009.

CEC 2009p – Data Requests Set 1 (tn: 52052), June 17, 2009.

CEC 2009x – Data Requests Set 2, Part 1 (#s 128-141) (tn: 53729), October 22, 2009.

SES (Stirling Energy Systems Solar Two, LLC) 2008a – Application for Certification for the Stirling Energy Systems (SES) Solar Two Project, Volumes 1 and 2. Submitted to the California Energy Commission, June 30, 2008.

EEC 2006a – Eastshore Energy Center, LLC/ G. Trewitt (tn: 37923) Application for Certification for the Eastshore Energy Center. 09/15/2006 Rec'd 09/22/2006

Kenline 2010 – George Kenline, Senior Geologist, County of San Bernardino, Land Use Services Department, December 30, 2009 discussed Logan Mine operation and hazards of manganese mining operations.

SES 2008d – Supplement to the Application for Certification for the SES Solar Two Project. Submitted to the California Energy Commission, September 28, 2008.

SES 2008f – SES Solar One Project Application for Certification, December 1, 2008 (tn: 49181).

SES 2008g – Applicant's Response to BLM and Energy Commission Data Request Set 1, Part 1 (1-52), December 8, 2008.

SES 2009h – Applicant's Response to BLM and Energy Commission Data Requests 1-3, 5-10, 24-26, 31-33, 36-38, 44, and 111-127, March 19, 2009.

SES 2009i – Applicant's Response to BLM and Energy Commission Data Requests 53-110, March 26, 2009.

SES 2009j – Supplemental Information in Response to CEC Data Adequacy Requests, April 6, 2009.

SES 2009l – Applicant's Supplemental Cumulative Analysis for the SES Solar Two Project. Submitted to the California Energy Commission, April 30, 2009.

SES 2009o – Applicant's Response to BLM and Energy Commission Data Requests 128-141, June 5, 2009.

SES 2009v – Applicant's Response to BLM and Energy Commission Data Requests 31-32 (DESCP/SWPPP- Vol. 1 and 2), July 2, 2009.

SES 2009w – Applicant's Response to BLM and Energy Commission Data Requests 151-155, July 6, 2009.

Springer 2009 – Marc Springer, Geologist, BLM California State Office email, January 4, 2010, discussed manganese mining hazards.

Tessera Solar 2009g – Applicant's Responses to CEC and BLM Data Requests Set 1 Part 1 (tn: 52466), July 17, 2009.

Tessera Solar 2009l – Applicants' Response to CEC & BLM Data Requests 113-127 CEC Data Requests Set 1, Part 2 (tn: 52956), August 20, 2009.

Tessera Solar 2009o – Applicant's Responses to CEC & BLM Data Request 1-91 Data Request Set 1, Part 1 (tn: 53067), August 28, 2009.

Tessera Solar 2009q – Applicant's Responses to CEC and BLM Data Requests 1-48, 81, and 109-112 Set 1 Parts 1 and 2 (tn: 53093), August 31, 2009.

Tessera Solar 2009z – Applicant's Response to CEC & BLM Data Requests Set 2 (tn: 54386), December 4, 2009.

Tessera Solar 2009bb – Applicant's Updated Project Map (tn: 54427), December 10, 2009.

Waste Management 2009 – Kettleman Hills Facility Project Update. <http://www.kettlemanhillsfacts.com/project_update.html>

C.15 – WORKER SAFETY AND FIRE PROTECTION

Testimony of Rick Tyler and Alvin J. Greenberg, Ph.D.

C.15.1 SUMMARY OF CONCLUSIONS

BLM and Energy Commission Staff (hereafter referred to as staff) conclude that if the applicant for the proposed Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) provides project construction safety and health and project operations and maintenance safety and health programs, as required by conditions of certification **WORKER SAFETY-1, -2, -3, -4, -5, -6,** and **-7**, the project would incorporate sufficient measures to both ensure adequate levels of industrial safety and comply with applicable laws, ordinances, regulations, and standards. These proposed conditions of certification ensure that these programs, proposed by the applicant, will be reviewed by the appropriate agencies before they are implemented. The conditions also require verification that the proposed plans adequately ensure worker safety and fire protection and comply with applicable laws, ordinances, regulations, and standards. Therefore, with mitigation, no adverse impacts to worker safety and fire protection are expected under CEQA or NEPA.

Staff has also determined that the project will have a significant impact on the local fire protection services. The proposed facility would be located in an area that is currently served by the San Bernardino County Fire Department (SBCFD). While staff believes that the SBCFD is adequately staffed, trained, and equipped to respond to a fire, hazardous materials spill, or a need for Emergency Medical Services in a reasonable time period given the great distances involved in a desert location, the added emergency response needs will pose significant added demands on local fire protection services, thus resulting in shifting equipment and personal from station to station to cover the entire county (the largest county in California and in the continental United States) and therefore staff proposes Condition of Certification **WORKER SAFETY-6** as mitigation to reduce the impacts to less than significant.

C.15.2 INTRODUCTION

Worker safety and fire protection are regulated through federal, state, and local laws, ordinances, regulations, and standards (LORS). Industrial workers at the facility both operate equipment and handle hazardous materials daily, and could face hazards resulting in accidents and serious injury. Protection measures are employed to eliminate or reduce these hazards or minimize their risk through special training, protective equipment, and procedural controls. The purpose of this **WORKER SAFETY AND FIRE PROTECTION** section of this Staff Assessment/Draft Environmental Impact Statement (SA/DEIS) is to assess the worker safety and fire protection measures proposed by the Calico Solar applicant and determine whether the applicant has proposed adequate measures to:

- Comply with applicable safety LORS;
- Protect workers during the construction and operation of the facility;
- Protect against fire; and
- Provide adequate emergency response procedures.

C.15.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

C.15.3.1 LAWS, ORDINANCES, REGULATION, AND STANDARDS

Worker Safety and Fire Protection Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
29 U.S. Code sections 651 et seq. (Occupational Safety and Health Act of 1970)	This Act mandates safety requirements in the workplace, with the purpose of "[assuring] so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources" (29 USC § 651).
29 CFR sections 1910.1 to 1910.1500 (Occupational Safety and Health Administration Safety and Health Regulations)	These sections define the procedures for promulgating regulations and conducting inspections to implement and enforce safety and health procedures to protect workers, particularly in the industrial sector.
29 CFR sections 1952.170 to 1952.175	These sections provide federal approval of California's plan for enforcement of its own safety and health requirements, in lieu of most of the federal requirements found in 29 CFR §1910.1 to 1910.1500.
State	
2007 Edition of California Fire Code and all applicable NFPA standards (24 CCR Part 9)	NFPA standards are incorporated into the California State Fire Code. The fire code contains general provisions for fire safety, including road and building access, water supplies, fire protection and life safety systems, fire-resistive construction, storage of combustible materials, exits and emergency escapes, and fire alarm systems.
Title 24, California Code of Regulations (24 CCR § 3, et seq.)	The California Building Code is comprised of 11 parts containing building design and construction requirements as they relate to fire, life, and structural safety. It incorporates current editions of the International Building Code, including the electrical, mechanical, energy, and fire codes applicable to the project.
8 CCR all applicable sections (Cal/OSHA regulations)	Requires that all employers follow these regulations as they pertain to the work involved. This includes regulations pertaining to safety matters during the construction, commissioning, and operation of power plants, as well as safety around electrical components, fire safety, and hazardous materials usage, storage, and handling.
24 CCR section 3, et seq.	Incorporates the current edition of the International Building Code.
Health and Safety Code sections 25500 to 25541	Requires a Hazardous Materials Business plan detailing emergency response plans for hazardous materials emergencies at a facility.

Applicable Law	Description
Local (or locally enforced)	
Fire and Hazardous Materials: San Bernardino County Code, Title 2, Division 3, Chapter 1 et seq.	Includes California Fire Code and specific codes to regulate permits activities and administrative penalties. Adopts the 2007 California Fire Code and adopts State requirements and guidelines as governing hazardous materials release response plans and inventories.
Health and Safety: San Bernardino County Code Title 3, Division 1, et seq.	Includes specific codes to regulate permits, activities (e.g., solid waste management), and administrative penalties.
Building and Construction: San Bernardino County Code, Title 6, Division 3, Chapter 1 et seq.	Adopts national standards such as Uniform Building Code and National Electrical Code.

C.15.4 PROPOSED PROJECT

C.15.4.1 SETTING

The proposed Calico Solar Project site is approximately 8,230 acres of Bureau of Land Management (BLM) land located in San Bernardino County, California (SES 2008f page 3-3). The site is located on Hector Road north of Interstate 40, 17 miles east of Newberry Springs, about 37 miles east of Barstow, and 115 miles east of Los Angeles, California in the Mojave Desert (SES 2008a). The project consists of 29 contiguous parcels and the Burlington Northern Santa Fe (BNSF) railroad bisects the site from west to east. The project would be located in an undeveloped part of San Bernardino County adjacent to Interstate 40; lands in this part of the Mojave Desert are managed predominantly by the Bureau of Land Management (BLM). Land uses in the vicinity of the proposed project include transportation use, open space, and resource conservation (SES 2008a, Section 5.9.1). There are a total of three residences within a 3-mile radius of the proposed site, the nearest of which is located approximately 1,300 feet south of the property boundary on the other side of I-40. There are no sensitive receptors in the vicinity of the project site (SES 2008a, Section 5.16.1 and Figure 5.16-1).

The site elevation slopes gently to the northeast and ranges from 1,925 to 3,050 feet above sea level (SES 2008a, Section 5.2). Topography in the vicinity of the project is varied in elevation, with regions of elevated terrain existing mostly to the north and east, where the sloping grade continues beyond the project boundary (SES 2008a, Section 5.2.1 and Figure 5.2-1).

The proposed project would utilize SunCatchers — 40-foot-tall Stirling dish technology developed by the applicant — which track the sun and focus solar energy onto Power Conversion Units (PCU). The dish assembly collects and focuses solar energy onto the PCU to generate electricity. Each PCU consists of a solar receiver heat exchanger and a closed-cycle, high-efficiency Solar Stirling Engine specifically designed to convert solar power to rotary power via a thermal conversion process. The engine drives an electrical generator to produce grid-quality electricity.

Fire support services to the site would be under the jurisdiction of the San Bernardino County Fire Department (SBCFD). However, the nearest fire station is that of Newberry Springs Fire Department and the applicant has stated that “emergency services will be coordinated” with that fire district (SES 2008a, page 5.17-14). Staff believes that the proper jurisdiction is the SBCFD and that all emergency services should be coordinated with San Bernardino County. The applicant appears to agree with staff’s opinion in that the AFC also states that the SBCFD “will provide primary fire protection, fire fighting, and emergency response services to the Project Site (SES 2008 a, page 5.17-17).

There are a total of twenty fire stations within the SBCFD North Desert Division, the closest of which would be the Harvard and Amboy stations. The response time can range from 40 minutes to no response if they are unavailable. In addition to the SBCFD stations and that of Newberry, the Barstow Fire Protection District located about 37 miles away would respond to the Calico site though a mutual aid agreement. All personnel at the SBCFD are trained as Emergency Medical Technicians (EMT) Level-1 and as first responders to hazardous materials incidents. The large majority of personnel are also trained paramedics (SBCFD 2010).

The applicant has stated that certain plant personnel would be trained as a hazardous materials response team and that one or more spill response kits would be available on-site. In the event of a large incident involving hazardous materials, backup support would be provided by the SBCFD which has a hazmat response unit capable of handling any incident at the proposed Calico site. The SBCFD Hazmat unit is located at Station #322 in Adelanto, about one hour away.

Staff has reviewed the response times for fire, HazMat release, and EMS and has found them to be acceptable given the remote location of the Calico facility.

In addition to construction and operations worker safety issues, the potential exists for exposure to contaminated soil during site preparation. A Phase I Environmental Site Assessment (ESA), dated November 14, 2008, was prepared by URS in accordance with the American Society for Testing and Materials Standard Practice E 1527-05 for ESAs. The ESA did not identify any “Recognized Environmental Conditions”. That is, there was no evidence or record of any use, spillage, or disposal of hazardous substances on the site, nor was there any other environmental concern that would require remedial action. To address the unlikely possibility that soil contamination would be encountered during construction of the Calico Solar Project, proposed Conditions of Certification **Waste-1** and **Waste-2** require a registered professional engineer or geologist to be available during soil excavation and grading to ensure proper handling and disposal of contaminated soil. See the staff assessment section on **WASTE MANAGEMENT** for a more detailed analysis of this topic.

C.15.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Method and Threshold for Determining Significance

Two issues are assessed in **WORKER SAFETY AND FIRE PROTECTION:**

1. The potential for impacts on the safety of workers during demolition, construction, operations, and closure and decommissioning activities; and
2. Fire prevention/protection, emergency medical response, and hazardous materials spill response during demolition, construction, operations, and closure and decommissioning activities.

Worker safety is essentially a LORS compliance matter and if all LORS are followed, workers will be adequately protected. Thus, the standard for staff's review and determination of significant impacts on worker health is whether the applicant has demonstrated adequate knowledge of and commitment to implementation of all pertinent and relevant Cal-OSHA standards.

Staff reviews and evaluates the on-site fire-fighting systems proposed by the applicant, as well as the time needed for off-site local fire departments to respond to a fire, medical, or hazardous material emergency at the Calico Solar Project site. If on-site systems do not follow established codes and industry standards, staff recommends additional measures. Staff reviews local fire department capabilities and response times. If Staff determines that the presence of the power plant would cause a significant impact on a local fire department. Staff will recommend that the applicant mitigate this impact.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Proposed Project Worker Safety

Industrial environments are potentially dangerous during both construction and operation. Workers at the proposed project will be exposed to loud noises, moving equipment, trenches, and confined space entry and egress. Workers may sustain falls, trips, burns, lacerations, and other injuries. They may be exposed to falling equipment or structures, chemical spills, hazardous waste, fires, explosions, and electrical sparks or electrocution. It is important that the Calico Solar Project has well-defined policies and procedures, training, and hazard recognition and control to minimize these hazards and protect workers. If the facility complies with all LORS, workers will be adequately protected from health and safety hazards.

A Safety and Health Program will be prepared by the applicant to minimize worker hazards during construction and operation of the project. "Safety and Health Program," for staff, refers to measures that will be taken to ensure compliance with the applicable LORS during the construction and operation of the project.

Construction Safety and Health Program

The Calico Solar Project includes the construction and operation of a Stirling solar power plant. The project will present construction risks and operational risks to workers typical of other solar power projects. In addition the facility will pose risks associated with use of hydrogen as a working gas. The risk to workers is minimized through onsite generation (which reduces storage of hydrogen) and through rigorous safety management practices required by applicable LORS.

Construction safety orders are published at Title 8 of the California Code of Regulations, section 1502 et seq. These requirements are promulgated by Cal/OSHA and apply to the construction phase of the project. The construction safety and health program will include the following:

- Construction injury and illness prevention program (8 CCR § 1509);
- Construction fire prevention plan (8 CCR § 1920);
- Personal protective equipment program (8 CCR §§ 1514–1522); and
- Emergency action program and plan.

Additional programs under General Industry Safety Orders (8 CCR §§ 3200 to 6184), Electrical Safety Orders (8 CCR §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (8 CCR §§ 450 to 544) will include:

- Electrical safety program;
- Motor vehicle and heavy equipment safety program;
- Forklift operation program;
- Excavation/trenching program;
- Fall protection program;
- Scaffolding/ladder safety program;
- Articulating boom platforms program;
- Crane and material handling program;
- Housekeeping and material handling and storage program;
- Respiratory protection program;
- Employee exposure monitoring program;
- Hand and portable power tool safety program;
- Hearing conservation program;
- Back injury prevention program;
- Hazard communication program;
- Heat and cold stress monitoring and control program;
- Pressure vessel and pipeline safety program;
- Hazardous waste program;
- Hot work safety program;
- Permit-required confined space entry program; and
- Demolition procedure (if applicable).

The AFC includes adequate outlines for each of the above programs (SES 2008a). Prior to the project's start of construction, detailed programs and plans will be provided pursuant to Condition of Certification **WORKER SAFETY-1**.

Operations and Maintenance Safety and Health Program

Prior to the start-up of the Calico Solar Project, an operations and maintenance safety and health program will be prepared. This program will include the following programs and plans:

- Injury and illness prevention program (8 CCR § 3203);
- Fire prevention program (8 CCR § 3221);
- Personal protective equipment program (8 CCR §§ 3401 to 3411); and
- Emergency action plan (8 CCR § 3220).

In addition, the requirements under General Industry Safety Orders (8 CCR §§ 3200 to 6184), Electrical Safety Orders (8 CCR §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (8 CCR §§ 450 to 544) will apply to this project. Written safety programs for the Calico Solar Project, which the applicant will develop, will ensure compliance with those requirements.

The AFC includes adequate outlines for an injury and illness prevention program, an emergency action plan, a fire prevention program, and a personal protective equipment program (SES 2008a). Prior to operation of the Calico Solar Project, all detailed programs and plans will be provided pursuant to Condition of Certification **WORKER SAFETY-2**.

Safety and Health Program Elements

As mentioned above, the applicant provided the proposed outlines for both a Construction Safety and Health Program and an Operations Safety and Health Program. The measures in these plans are derived from applicable sections of state and federal law. The major items required in both Safety and Health Programs are as follows:

Injury and Illness Prevention Program (IIPP)

The IIPP will include the following components (BSE2007a, section 5.16.4.4):

- Identify persons with the authority and responsibility for implementing the program;
- Establish the safety and health policy of the plan;
- Define work rules and safe work practices for construction activities;
- Establish a system for ensuring that employees comply with safe and healthy work practices;
- Establish a system to facilitate employer-employee communication;
- Develop procedures for identifying and evaluating workplace hazards and establish necessary program(s);
- Establish methods for correcting unhealthy/unsafe conditions in a timely manner;
- Determine and establish training and instruction requirements and programs;

- Specify safety procedures; and
- Provide training and instruction.

Fire Prevention Plan

The California Code of Regulations requires an operations fire prevention plan (8 CCR § 3221). The AFC outlines a proposed fire prevention plan that is acceptable to staff (SOLAR 2007a, section 6.18.3.1). The plan will include the following:

- Determine general program requirements;
- Determine fire hazard inventory, including ignition sources and mitigation;
- Develop good housekeeping practices and proper materials storage;
- Establish employee alarms and/or communication system(s);
- Provide portable fire extinguishers at appropriate site locations;
- Locate fixed firefighting equipment in suitable areas;
- Specify fire control requirements and procedures;
- Establish proper flammable and combustible liquid storage facilities;
- Identify the location and use of flammable and combustible liquids;
- Provide proper dispensing and determine disposal requirements for flammable liquids;
- Establish and determine training and instruction requirements and programs; and
- Identify contacts for information on plan contents.

Staff proposes that the applicant submit a final fire prevention plan to the California Energy Commission compliance project manager (CPM) for review and approval and to the SBCFD for review and comment to satisfy proposed conditions of certification **WORKER SAFETY-1** and **WORKER SAFETY-2**.

Personal Protective Equipment Program

California regulations require personal protective equipment (PPE) and first aid supplies whenever hazards in the environment, or from chemicals or mechanical irritants, could cause injury or impair bodily function through absorption, inhalation, or physical contact (8 CCR sections 3380 to 3400). The Calico Solar Project operational environment will require PPE.

All safety equipment must meet National Institute of Safety and Health (NIOSH) or American National Standards Institute (ANSI) standards and will carry markings, numbers, or certificates of approval. Respirators must meet NIOSH and Cal/OSHA standards. Each employee must be provided with the following information about protective clothing and equipment:

- Proper use, maintenance, and storage;
- When protective clothing and equipment are used;
- Benefits and limitations; and
- When and how protective clothing and equipment are replaced.

The PPE program ensures that employers comply with applicable requirements for PPE and provides employees with the information and training necessary to protect them from potential hazards in the workplace, and will be required as per proposed Conditions of Certification **WORKER SAFETY-1 and -2**.

Emergency Action Plan

California regulations require an emergency action plan (8 CCR § 3220). The AFC contains a satisfactory outline for an emergency action plan (SES 2008a).

The outline lists the following features:

- Establishes emergency procedures for the protection of personnel, equipment, the environment, and materials;
- Identifies fire and emergency reporting procedures;
- Determines response actions for accidents involving personnel and/or property;
- Develops response and reporting requirements for bomb threats;
- Specifies site assembly and emergency evacuation route procedures;
- Defines natural disaster responses (for example, earthquakes, high winds, and flooding);
- Establishes reporting and notification procedures for emergencies (including on-site, off-site, local authorities, and/or state jurisdictions);
- Determines alarm and communication systems needed for specific operations;
- Includes a spill response, prevention, and countermeasure (SPCC) plan;
- Identifies emergency personnel (response team) responsibilities and notification roster;
- Specifies emergency response equipment and strategic locations; and
- Establishes and determines training and instruction requirements and programs.

An emergency action plan is required by applicable LORS and Staff's proposed Conditions of Certification **WORKER SAFETY-1 and -2**

Written Safety Program

In addition to the specific plans listed above, additional LORS called "safe work practices" apply to the project. Both the construction and operations safety programs will address safe work practices in a variety of programs. The components of these programs include, but are not limited to, the programs found under the heading "Construction Safety and Health Program" in this staff assessment.

In addition, the project owner would be required to provide personnel protective equipment and exposure monitoring for workers involved in activities where contaminated soil and/or contaminated groundwater exist, per staff's proposed Conditions of Certification **WORKER SAFETY-1** and**-2**.

These proposed conditions of certification ensure that workers are properly protected from any hazardous wastes at the site.

Safety Training Programs

Employees will be trained in the safe work practices described in the above-referenced safety programs.

Additional Safety Issues

This solar power plant will present a unique work environment that includes a solar field located in the high desert. The area under the solar arrays must be kept free from weeds and thus herbicides will be applied as necessary. Exposure to workers via inhalation and ingestion of dusts containing herbicides poses a health risk. Finally, workers will regularly inspect the solar array for broken or non-functioning mirrors by driving up and down dirt paths between the rows of mirrors and even under the mirrors. Cleaning and servicing the mirrors will also be conducted on a routine schedule. All these activities will take place year-round and especially during the summer months of peak solar power generation, when outside ambient temperatures routinely reach 115°F and above.

Additional Safety Issues

This solar power plant will present a unique work environment that includes a solar field located in the high desert. The area under the SunCatchers must be kept free from weeds and thus herbicides will be applied as necessary. Exposure to workers via inhalation and ingestion of dusts containing herbicides poses a health risk. Finally, workers will inspect the SunCatcher arrays for hydrogen leaks and broken apparatus on a frequent basis by driving up and down dirt paths between the rows of solar catchers. Cleaning the SunCatchers will also be conducted on a routine schedule. All these activities will take place year-round and especially during the summer months of peak solar power generation, when outside ambient temperatures routinely reach 115 °F and above.

The applicant has indicated that workers will be adequately trained and protected, but has not included specific precautions against heat stress and exposure to herbicides. Therefore, to ensure that workers are indeed protected, staff has proposed additional requirements to proposed Conditions of Certification **WORKER SAFETY-1** and **2**. These requirements consist of the following provisions:

- A worker heat stress protection plan that implements and expands on existing Cal OSHA regulations (8 CCR 3395) requiring heat illness prevention; and
- The development and implementation of Best Management Practices (BMP) for the storage and application of herbicides used to control weeds beneath and around the solar array.
- All herbicide applications would comply with the Record of Decision for BLM's Programmatic EIS for Vegetation Treatments Using Herbicides on Bureau of Land

Management Lands in 17 Western States (see http://www.blm.gov/wo/st/en/prog/more/veg_eis.html). Only herbicides approved in that ROD would be used, and all herbicide use would comply with the use protocol, consultation requirements, monitoring requirements, and standard operating procedures listed therein.

Staff believes that effective implementation of a Heat Stress Protection Plan will mitigate the potential for significant risks to workers from heat during both construction and operations. A BMP requiring proper herbicide storage and application will mitigate potential risks to workers from exposure to herbicides and reduce the chance that herbicides will contaminate either surface water or groundwater. Staff suggests that a BMP follow either the guidelines established by the U.S. EPA (EPA 1993), or more recent guidelines established by the State of California or U.S. EPA.

Additional Mitigation Measures

Protecting construction workers from injury and disease is one of the greatest challenges today in occupational safety and health. The following facts are reported by NIOSH:

- More than seven million persons work in the construction industry, representing 6% of the labor force. Approximately 1.5 million of these workers are self-employed;
- Of approximately 600,000 construction companies, 90% employ fewer than 20 workers. Few have formal safety and health programs;
- From 1980-1993, an average of 1,079 construction workers were killed on the job each year, with more fatal injuries than any other industry;
- Falls caused 3,859 construction worker fatalities, or 25.6% of the total, between 1980 and 1993;
- 15% of workers' compensation costs are spent on construction-related injuries;
- Ensuring safety and health in construction is a complex task involving short-term work sites, changing hazards, and multiple operations and crews working in close proximity to one another;
- In 1990, Congress directed NIOSH to conduct research and training to reduce diseases and injury among construction workers in the United States. Under this mandate, NIOSH funds both intramural and extramural research projects.

The hazards associated with the construction industry are well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex industrial projects like gas-fired power plants. In order to reduce and/or eliminate these hazards, it has become standard industry practice to hire a construction safety supervisor to ensure a safe and healthful environment for all workers. This has been evident in the audits of power plants recently conducted by the staff. The Federal Occupational Safety and Health Administration (OSHA) has also entered into strategic alliances with several professional and trade organizations to promote and recognize safety professionals trained as construction safety supervisors, construction health and safety officers, and other professional designations. The goal of these partnerships is to encourage construction subcontractors to improve their safety and health performance; to assist them in striving to eliminate the four major construction hazards (falls, electrical, caught in/between, and struck-by hazards) that account for the majority of fatalities and injuries in this industry and have been the focus of targeted OSHA inspections; to prevent serious accidents in the construction industry through implementation of enhanced safety and health programs and increased employee training; and to recognize subcontractors that have exemplary safety and health programs.

There are no OSHA or Cal-OSHA requirements that an employer hire or provide for a construction safety officer. OSHA and Cal-OSHA regulations do, however, require that safety be provided by an employer and the term “Competent Person” appears in many OSHA and Cal-OSHA standards, documents, and directives. A “Competent Person” is defined by OSHA as an individual who, by way of training and/or experience, is knowledgeable of standards, is capable of identifying workplace hazards relating to the specific operations, is designated by the employer, and has authority to take appropriate action. Therefore, in order to meet the intent of the OSHA standard to provide for a safe workplace during power plant construction, staff proposes Condition of Certification **WORKER SAFETY-3,** which would require the applicant/project owner to designate and provide for a project site construction safety supervisor.

As discussed above, the hazards associated with the construction industry are well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex industrial projects like power plants.

Accidents, fires, and a worker death have occurred at Energy Commission-certified power plants in the recent past because of both the failure to recognize and control safety hazards and the inability to adequately monitor compliance with occupational safety and health regulations. Safety problems have been documented by Energy Commission staff in safety audits, conducted in 2005, at several power plants under construction. The findings of the audit include, but are not limited to, safety oversights like:

- Lack of posted confined-space warning placards/signs;
- Confusing and/or inadequate electrical and machinery lockout/tagout permitting and procedures;
- Confusing and/or inappropriate procedures for handing over lockout/tagout and confined space permits from the construction team to the commissioning team, and then to operations;
- Dangerous placement of hydraulic elevated platforms under one another;
- Inappropriate placement of fire extinguishers near hotwork;
- Dangerous placement of numerous power cords in standing water on the site, increasing the risk of electrocution;
- Inappropriate and unsecure placement of above-ground natural gas pipelines inside the facility, but too close to the perimeter fence; and
- Lack of adequate employee or contractor written training programs that address the proper procedures to follow in the event of the discovery of suspicious packages or objects either onsite or offsite.

In order to reduce and/or eliminate these hazards, it is necessary for the Energy Commission to require a professional Safety Monitor on-site to track compliance with Cal-OSHA regulations and periodically audit safety compliance during construction, commissioning, and the hand-over to the operations staff. These requirements are outlined in Condition of Certification **WORKER SAFETY-4**. A Safety Monitor, hired by the project owner but reporting to the Chief Building Official (CBO) and the Compliance Project Manager (CPM), will serve as an extra set of eyes to ensure that safety procedures and practices are fully implemented during construction at all power plants certified by the Energy Commission. During audits conducted by staff, most site safety professionals welcomed the audit team and actively engaged them in questions about the team's findings and recommendations. These safety professionals recognized that safety requires continuous vigilance and that the presence of an independent audit team provides a "fresh perspective" of the site.

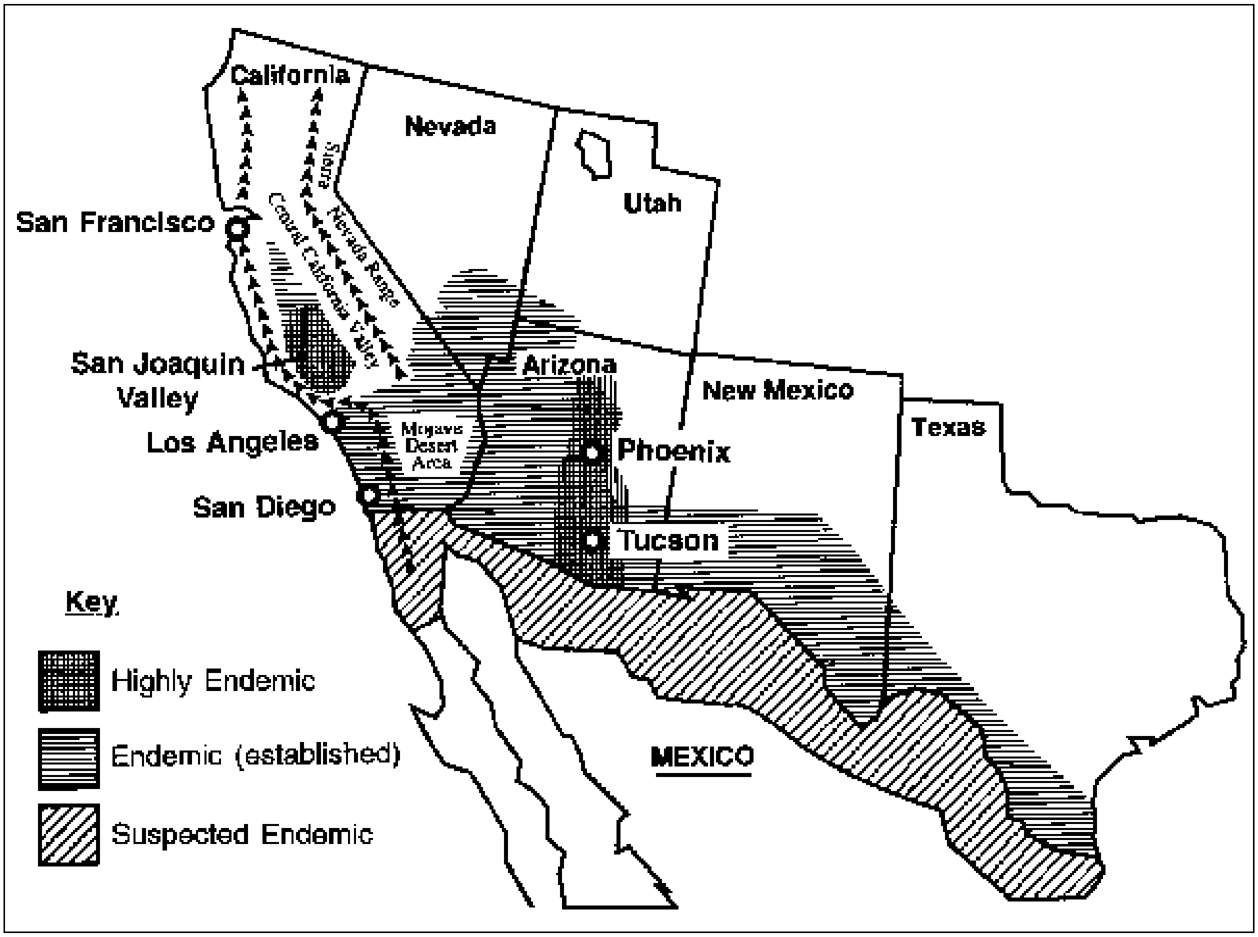
Valley Fever (Coccidioidomycosis)

Coccidioidomycosis or "Valley Fever" (VF) is primarily encountered in southwestern states, particularly in Arizona and California. It is caused by inhaling the spores of the fungus *Coccidioides immitis*, which are released from the soil during soil disturbance (e.g., during construction activities) or wind erosion. The disease usually affects the lungs and can have potentially severe consequences, especially in at-risk individuals such as the elderly, pregnant women, and people with compromised immune systems. Trenching, excavation, and construction workers are often the most exposed population. Treatment usually includes rest and antifungal medications. No effective vaccine currently exists for Valley Fever. VF is endemic to the San Joaquin Valley in California, which presumably gave this disease its common name. Kern County, located at the southern end of San Joaquin valley, is where valley fever occurs most frequently (Valley Fever Vaccine Project of the Americas 2010; KCDPH 2008). While the area where the highest rate was found is that part of Kern County to the west of the Sierra Nevada-Tehachapi Range, the eastern side along with the Mojave Desert in San Bernardino County experiences high rates as well. The proposed Calico project will be in located in the Mojave Desert part of San Bernardino County and thus staff feels that the following discussion which focuses on Kern County is applicable to this project site as well.

In 1991, 1,200 cases of VF were reported to the California Department of Health Services (CDHS) compared with an annual average of 428 cases per year for the period of 1981 to 1990. In 1992, 4,516 cases were reported in California, and 4,137 cases in 1993. Seventy percent of VF cases were reported from Kern County (CDC 1994; Flaherman 2007; CDHS 2010).

A 2004 CDC report found that the number of reported cases of coccidioidomycosis in the US increased by 32% during 2003-2004, with the majority of these cases occurring in California and Arizona. The report attributed these increases to changes in land use, demographics, and climate in endemic areas, although certain cases might be attributable to increased physician awareness and testing (CDC 2006). According to the CDC Morbidity and Mortality Weekly Report of February 2009, incidences of valley fever have increased steadily in Arizona and California in the past decade. Cases of coccidioidomycosis averaged about 2.5 per 100,000 population annually from 1995 to 2000 and increased to 8.0 per

Worker Safety Figure 1
Geographic Distribution of Coccidioidomycosis

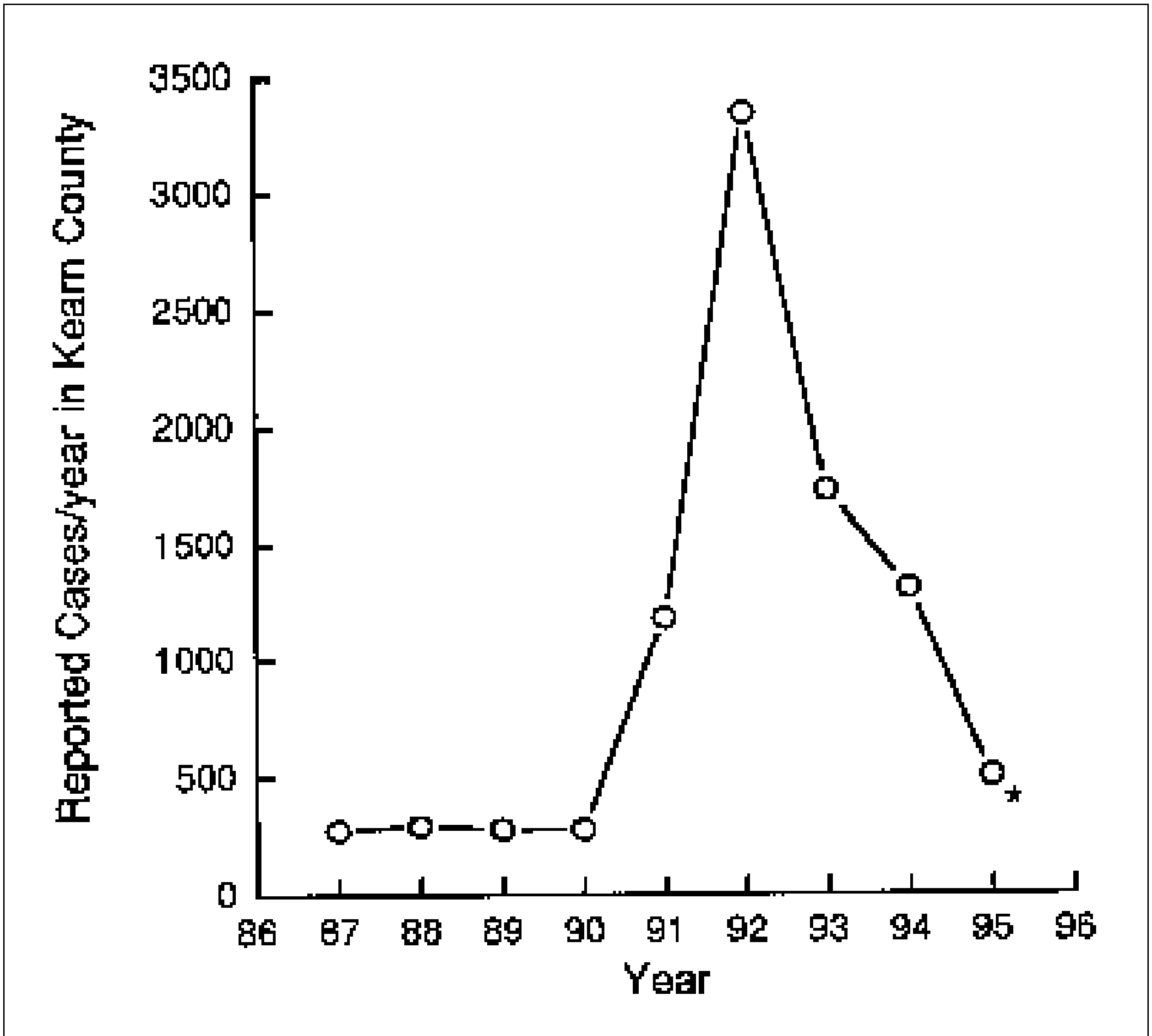


Source: CDC 2006, Figure 2

100,000 population between 2000 and 2006 (incidence rates tripled). In 2007 there was a slight drop in cases, but the rate was still the highest it has been since 1995. The report identified Kern County as having the highest incidence rates (150.0 cases per 100,000 population), and non-Hispanic blacks having the highest hospitalization rates (7.5 per 100,000 population). In addition, between the years 2000 and 2006, the number of valley fever related hospitalizations climbed from 1.8 to 4.3 per 100,000 population (611 cases in 2000 to 1,587 cases in 2006) and then decreased to 1,368 cases in 2007 (3.6 per 100,000 population). Overall in California, during 2000-2007, a total of 752 (8.7%) of the 8,657 persons hospitalized for coccidioidomycosis died (CDC 2009).

A 2007 study published in the Emerging Infectious Diseases journal of the Center for Disease Control and Prevention (CDC), found the frequency of hospitalization for coccidioidomycosis in the entire state of California to be 3.7 per 100,000 residents per year for the period between 1997 and 2002 (see Table 2 below). There were 417 deaths from VF in California in those years, resulting in a mortality rate of 2.1 per 1 million California residents annually. The data shows that Kern County had the highest total number and highest frequency of hospitalizations (Flaherman 2007).

Worker Safety Figure 2
Number of Coccidioidomycosis Cases Identified by Serologic Testing at the Kern County Public Health Laboratory between 1986 and 1996



Source: CDC 2006, Figure 4

Worker Safety Table 2
Hospitalizations for Coccidioidomycosis, California, 1997–2002

Category	Total Hospitalizations	Total Person-Years ($\times 10^6$)	Frequency of Hospitalization[1]	Frequency of Hospitalization for Coccidioidal Meningitis[1]
Total	7,457	203.0	3.67	0.657
Year				
1997	1,269	32.5	3.90	0.706
1998	1,144	32.9	3.50	0.706
1999	1,167	33.4	3.5	0.61
2000	1,100	34.0	3.23	0.62
2001	1,291	34.7	3.7	0.58
2002	1,486	35.3	4.2	0.71
Highest Incidence Counties				
Kern	1,700	3.97	42.8	
Tulare	479	2.21	21.7	
Kings	133	0.77	17.4	
SLO	170	1.48	11.5	

Notes:
1 - Per 100,000 residents per year
Source: Flaherman 2007

A 1996 paper that tried to explain the sudden increase in Coccidioidomycosis cases that began in the early 1990s found that the San Joaquin Valley in California has the largest population of *C. immitis*, which is found to be distributed unevenly in the soil and seems to be concentrated around animal burrows and ancient Indian burial sites. It is usually found 4 to 12 inches below the surface of the soil (CDC 2006). The paper also reported that incidences of coccidioidomycosis vary with the seasons; with highest rates in late summer and early fall when the soil is dry and the crops are harvested. Dust storms are frequently followed by outbreaks of coccidioidomycosis (CDC 2006). A modeling attempt to establish the relationship between fluctuations in VF incidence rates and weather conditions in Kern County found that there is only a weak connection between weather and VF cases (weather patterns correlate with up to 4% of outbreaks). The study concluded that the factors that cause fluctuations in VF cases are not weather-related but rather biological and anthropogenic (i.e. human activities, primarily construction on previously undisturbed soil) (Talamantes 2007).

Data from the Kern County Department of Public Health (KCDPH) on the period between 1995 and 2008 shows that VF cases increased in Kern County during the early 1990's, decreased during the late 1990's, increased again between 2000 and 2005, and have been declining slightly in the last several years. The majority of VF cases are recorded in the Bakersfield area where 50 to 70 percent of all Kern County VF cases occur. Delano, Lamont, and Taft have the next highest recorded incidences of VF. With the exception of the year 2004 when 26 cases of VF were reported in the Ridgecrest area, less than 15 cases have been recorded annually in Ridgecrest since 1995, representing less than 5% of the total cases recorded in Kern County (KCDPH 2008).

Worker Safety Table 3
Valley Fever Cases In Kern County 1995-2008

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Kern County Cases	523	382	307	328	504	406	994	1,055	1,281	1,540	1,578	1,081	1,229	1,128
Rate per 100,000	84.5	61	48.3	51.2	77.1	61	145.7	150.9	177.7	206.9	204.9	135.2	150.4	135.1

Source: KCDPH 2008, Table 1

Worker Safety Figure 3
VF Cases in Kern County 1995-2008

Source: KCDPH 2008, Figure 2

During correspondence with Dr. Michael MacLean of the Kings County Health Department, he noted that according to his experience and of those who study VF, it is very hard to find the fungus in soil that was previously farmed and irrigated, which greatly reduces the risk of infection resulting from disturbance of farmed lands. This does not apply to previously undisturbed lands where excavation, grading, and construction may correlate with increases in VF cases. Dr. MacLean feels that with the current state of knowledge, we can only speculate on the causes and trends influencing VF cases and he does not feel that construction activities are necessarily the cause of VF outbreaks (KCEHS 2009).

Valley Fever is spread through the air. If soil containing the fungus is disturbed by construction, natural disasters, or wind, the fungal spores become airborne and are thus available for inhalation by people. The disease is not spread from person to person. Occupational or recreational exposure to dust is an important consideration. Agricultural workers, construction workers, or others (such as archeologists) who dig in the soil in the disease-endemic area of the Central Valley are at the highest risk for the disease (CDC 2006; CDHS 2010). The risk for disseminated coccidioidomycosis is much higher among some ethnic groups, particularly African-Americans and Filipinos. In these ethnic groups, the risk for disseminated coccidioidomycosis is tenfold that of the general population (CDC 2006).

A VF website claims that most cases of valley fever do not require treatment. Even though 30-60% of the population in areas where the disease is highly prevalent — such as in the southern San Joaquin Valley of California — have positive skin tests indicating previous infection, most were unaware of ever having had valley fever ("Valley Fever Vaccine Project of the Americas" 2010).

Worker Safety Table 4
Disease Forms

Categories	**Notes**
Asymptomatic	• Occurs in about 50% of patients
Acute Symptomatic	• Pulmonary syndrome that combines cough, chest pain, shortness of breath, fever, and fatigue. • Diffuse pneumonia affects immunosuppressed individuals • Skin manifestations include fine papular rash, erythema nodosum, and erythema multiforme • Occasional migratory arthralgias and fever
Chronic Pulmonary	• Affects between 5 to 10% of infected individuals • Usually presents as pulmonary nodules or peripheral thin-walled cavities
Extrapulmonary/Disseminated Varieties	
Chronic skin disease	• Keratotic and verrucose ulcers or subcutaneous fluctuant abscesses
Joints / Bones	• Severe synovitis and effusion that may affect knees, wrists, feet, ankles, and/or pelvis • Lytic lesions commonly affecting the axial skeleton
Meningeal Disease	• The most feared complication • Presenting with classic meningeal symptoms and signs • Hydrocephalus is a frequent complication
Others	• May affect virtually any organ, including thyroid, GI tract, adrenal glands, genitourinary tract, pericardium, peritoneum

Given the available scientific and medical literature on Valley Fever, it is difficult for staff to assess the potential for VF to impact workers during construction and operation of the proposed Calico Solar Project with a reasonable degree of certainty. However, the higher number of cases reported in Kern County indicates that the project site may have an elevated risk for exposure, despite the fact that the Ridgecrest area itself has recorded less than 15 cases per year since 1995. To minimize potential exposure of workers and also the public to coccidioidomycosis during soil excavation and grading, extensive wetting of the soil prior to and during construction activities should be employed and dust masks should be worn at certain times during these activities. The dust (PM10) control measures found in the Air Quality section of this SA/DEIS should be strictly adhered to in order to adequately reduce the risk of contracting VF to less than significant. Towards that, staff proposes Condition of Certification **WORKER SAFETY-7** which would require that the dust control measures found in proposed Conditions **AQ-SC3** and **AQ-SC4** be supplemented with additional requirements.

<u>Proposed Project Fire Hazards</u>

During construction and operation of the proposed Calico Solar Project there is the potential for small fires, major structural fires and wildland fires. Electrical sparks, combustion of fuel oil, natural gas, hydraulic fluid, mineral oil, insulating fluid at the project power plant switchyard or flammable liquids, explosions, and overheated equipment, may cause small fires. Major structural fires in areas without automatic fire detection and suppression systems are unlikely at power plants. Fires and explosions of natural gas or other flammable gasses or liquids are rare. Compliance with all LORS will be adequate to ensure protection from all fire hazards associated with the project. Wildland fires that would use local vegetation as its fuel and could have potential effects on workers and project facilities are not expected to be caused by the project. If wildland fires are external to the Calico Solar Project boundaries, they would not be the responsibility of the project owner to suppress. However, the applicant plans to remove all vegetation in the vicinity of the solar power towers, substation and administration areas, and to cut and maintain vegetation in the solar field. The access road along the perimeter fence lines will also serve as a fire break.

Staff reviewed the information provided in the AFC to determine if available fire protection services and equipment would adequately protect workers, and to further determine the project's impact on fire protection services in the area. The project will rely on both onsite fire protection systems and local fire protection services. The onsite fire protection system provides the first line of defense for small fires. In the event of a major fire, fire support services, including trained firefighters and equipment for a sustained response, would be provided by the SBCFD (which is staffed under joint authority with CalFire).

Construction

During construction, portable fire extinguishers will be located and maintained throughout the site; safety procedures and training will also be implemented (SES 2008a).

Operation

The information in the AFC indicates that the project intends to meet the fire protection and suppression requirements of the California Fire Code, all applicable recommended NFPA standards (including Standard 850, which addresses fire protection at electric generating plants), and all Cal-OSHA requirements. Fire suppression elements in the proposed plant will include both fixed and portable fire extinguishing systems.

The fire protection system would be designed to protect personnel and limit property loss and plant downtime in the event of a fire. The primary source of fire protection water would be stored in the 175,000 gallon demineralized water storage. A diesel fire water pump will increase the water pressure to the level required to serve all fire fighting systems. The applicant has proposed a number of protective measures that would help reduce the potential for harm to plant personnel and damage to facilities. These include removal of all vegetation in the vicinity of the solar power towers, substation and administration areas. The access road along the perimeter fence lines would also serve as a fire break.

In addition to the fixed fire protection system, smoke detectors, flame detectors, high-temperature detectors, appropriate class of service portable extinguishers, and fire hydrants must be located throughout the facility at code-approved intervals. These systems are standard requirements of the fire code, NFPA and staff has determined that they will ensure adequate fire protection.

The applicant would be required by conditions of certification **WORKER SAFETY-1** and **-2** to provide a final fire protection and prevention program to both staff and the SBCFD prior to the construction and operation of the project in order to confirm the adequacy of proposed fire protection measures.

Emergency Medical Services Response

A statewide survey was conducted by staff to determine the frequency of incidents requiring emergency medical services (EMS) for natural gas-fired power plants in California. The purpose of this analysis was to determine what impact, if any, power plants might have on local emergency services. Staff has concluded that incidents at power plants that require EMS response are infrequent and represent an insignificant impact on the local fire departments, except for rare instances where a rural fire department has mostly volunteer fire-fighting staff. However, staff has determined that the potential for both work-related and non-work related heart attacks exists at power plants. In fact, staff's research on the frequency of EMS response to power plants shows that many of the responses for cardiac emergencies involved non-work related incidences, including visitors. The need for prompt response within a few minutes is well documented in the medical literature. Staff believes that the quickest medical intervention can only be achieved with the use of an on-site defibrillator often called an Automatic External Defibrillator or AED; the response from an off-site provider would take longer regardless of the provider location. This fact is also well documented and serves as the basis for many private and public locations including airports, factories, and government buildings, all of which maintain on-site cardiac defibrillation devices. Therefore, staff concludes that with the availability of modern cost-effective AED devices, it is proper in a power plant environment to maintain these devices on-site in order to treat cardiac arrhythmias resulting from industrial accidents or other non-work related causes. Therefore, an additional condition of certification, **WORKER SAFETY-5**, is proposed so that a portable AED will be located on site, and workers trained in its use.

C.15.4.3 CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) LEVEL OF SIGNIFICANCE

Cumulative impacts and mitigation

Staff reviewed the construction and operation of the Calico Solar Project could have on the fire and other emergency service capabilities of the SDCFD. Staff concludes that the Calico Solar Project would have a cumulative significant impact on existing local services.

Noteworthy public benefits

Staff has not identified any noteworthy public benefits associated with the proposed project's potential use of fire and emergency service capabilities of the SBCFD.

C.15.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the central portion of the proposed 850 MW project. It was developed because it could be constructed without the necessity of a new 500 kV transmission line, and would avoid several other environmental impacts. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

C.15.5.1 SETTING AND EXISTING CONDITIONS

The general setting and existing conditions would remain as described in C.15.4.1 although the land requirements would be proportionately reduced to reflect the smaller project size. Locations of laydown areas may also vary.

C.15.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The types of construction and operational impacts of this alternative would be the same as those of the proposed project, as described in Section C.15.4.2. The proposed project impacts are found to be less than significant with the incorporation of conditions of certification, and impacts of this alternative would be even smaller due to the smaller extent of construction disturbance and the smaller number of SunCatchers of the alternative. Construction and operation risk to workers due to the use of hydrogen and use of herbicides will be reduced because of the reduced number of SunCatchers.

C.15.5.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, the construction and operation of the reduced acreage alternative would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of worker safety and fire protection with the adoption of the proposed conditions of certification. The mitigation that would be proposed for the reduced acreage alternative would be the same as that proposed for the proposed project (staff recommended conditions **WORKER SAFETY-1** to **WORKER SAFETY-6**).

C.15.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed 850 MW project. This alternative, the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 2**.

C.15.6.1 SETTING AND EXISTING CONDITIONS

The general setting and existing conditions would remain as described in C.15.4.1 although the land requirements would be proportionately reduced to reflect the smaller project size. Locations of laydown areas may also vary.

C.15.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The types of construction and operational impacts of this alternative would be the same as those of the proposed project, as described in Section C.15.4.2. The proposed project impacts are found to be less than significant with the incorporation of conditions of certification, and impacts of this alternative would be even smaller due to the smaller extent of construction disturbance and the smaller number of SunCatchers of the alternative. Construction and operation risk to workers due to the use of hydrogen and use of herbicides will be reduced because of the reduced number of SunCatchers.

C.15.6.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, the construction and operation of the 720 MW alternative would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of worker safety and fire protection with the adoption of the proposed conditions of certification. The mitigation that would be proposed for the 720 MW alternative would be the same as that proposed for the proposed project (staff recommended conditions **WORKER SAFETY-1** to **WORKER SAFETY-6**).

C.15.7 NO PROJECT/NO ACTION ALTERNATIVES

There are three No Project / No Action Alternatives evaluated as follows:

<u>No Project / No Action Alternative #1: No Action on the Calico Solar Project application and on CDCA land use plan amendment</u>

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Staff concludes that if the applicant for the proposed Calico Solar Project provides project construction safety and health and project operations and maintenance safety and health programs, as required by proposed **WORKER SAFETY** conditions of certification; the Calico Solar Project would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable LORS. As worker safety and fire protection is a LORS-conformity requirement, the No Project/No Action alternative consideration is not applicable to the worker safety topic and thus there would be no significant impacts on the local fire department.

No Project / No Action Alternative #2: No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Staff concludes that if the applicant for the proposed Calico Solar Project provides project construction safety and health and project operations and maintenance safety and health programs, as required by proposed **WORKER SAFETY** conditions of certification; the Calico Solar Project would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable LORS. As worker safety and fire protection is a LORS-conformity requirement, the No Project/No Action alternative consideration is not applicable to the worker safety topic and thus there would continue to a significant impact on the local fire department if another solar project were built at this site.

No Project / No Action Alternative #3: No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Staff concludes that if the applicant for the proposed Calico Solar Project provides project construction safety and health and project operations and maintenance safety and health programs, as required by proposed **WORKER SAFETY** conditions of certification; the Calico Solar Project would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable LORS. As worker safety and fire protection is a LORS-conformity requirement, the No Project/No Action alternative consideration is not applicable to the worker safety topic and thus there would be no significant impacts on the local fire department.

C.15.8 PROJECT-RELATED FUTURE ACTIONS – WORKER SAFETY AND FIRE PROTECTION

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.15.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

Fire support services along the SCE transmission upgrades would be under the jurisdiction of the San Bernardino County Fire Department (SBCFD) and fire suppression support nearby to the Pisgah Substation and the Calico Solar Project would come from the Newberry Springs Fire Department and the SBCFD. The San Bernardino County Fire Department has an estimated response time of 40 minutes and will provide primary fire protection, fire fighting, and emergency response services (SES 2008a). SBCFD North Desert Division Harvard Station #46 (39059 Kathy Lane in Newberry Springs) is 30 miles from the ending point of the transmission upgrades site near Pisgah Substation, and would be the first responder to that area. Station #46 has a one ICS Type 1 structure engine, one ICS Type 4 Brush Patrol unit with 4-wheel drive, and one Type 3 Brush Fire Engine. It has three staff on duty at all times (a captain, and two paid-call firefighters) (SBCFD 2010). The SBCFD North Desert Division also has eight stations in the area between the Lucerne Valley and I-15 in Hesperia that would be able to provide fire suppression along the southwestern portion of the line in the more developed area near Lugo Substation.

In San Bernardino County, hazardous material incidents are handled by the San Bernardino County Interagency Response Team, which is composed of hazardous materials specialists from San Bernardino County and participating city fire agencies. There are over 100 members (15 Registered Environmental Health Specialists and the rest, firefighters), and the organization is a full Level A response team capable of handling all types of chemical, biological, radiological, and nuclear responses. Hazardous materials service for the County is headquartered in the City of San Bernardino and the County is divided into three geographic regions for the purpose of deploying hazmat trained fire service personnel and vehicles and equipment in close proximity to any incident (SBCFD 2010).

C.15.8.2 ENVIRONMENTAL IMPACTS

Industrial environments are potentially dangerous during both construction and operation. The construction activities would include the pre-permitting surveying of the transmission line route and substation expansion areas, the actual construction activities, and the existing line decommissioning activities. For construction of the transmission line towers, accidents can occur during transport of equipment and supplies to the project area, during drilling of the transmission tower foundations, during welding and construction of the tower components, and during overhead work activities on the tower structures. The conductor stringing activities also requires transport of equipment to the project area, vehicle and equipment usage, overhead work activities, and work activities in the vicinity of live high voltage electric lines. The line decommissioning activities would have similar potential for accidents, due to transport of equipment and supplies to the project area, equipment usage, vehicle travel, overhead work activities, and work activities in the vicinity of live high voltage electric lines.

Workers at the project site would be exposed to loud noises, moving equipment, trenches, and confined space entry and egress. Workers may sustain falls, trips, burns, lacerations, and other injuries. They may be exposed to falling equipment or structures, chemical spills, hazardous waste, fires, explosions, and electrical sparks or electrocution. Worker safety impacts can also be caused by vehicle accidents associated with operation of heavy equipment or travel accidents to and from or within the project area. It is important that SCE has well-defined policies and procedures, training, and hazard recognition and control to minimize these hazards and protect workers. If the project complies with all LORS, workers would be adequately protected from health and safety hazards.

During construction and operation of the upgrades there is the potential for both small fires and major structural fires. Electrical sparks; combustion of fuel oil, hydraulic fluid, mineral oil, insulating fluid at the substations, or flammable liquids; explosions; and overheated equipment may cause small fires. Major structural fires are unlikely along transmission lines and at substations. Fires and explosions of flammable gasses or liquids are rare. Compliance with all LORS would be adequate to ensure protection from all fire hazards.

The project would rely on both on-site fire protection systems and local fire protection services. The on-site fire protection system would provide the first line of defense for small fires. In the event of a major fire, fire support services, including trained firefighters and equipment for a sustained response, would be provided by the SBCFD.

C.15.8.3 MITIGATION

SES included the following general recommended mitigation measures for worker safety in Appendix EE of the AFC:

- Adherence to appropriate OSHA safety standards;
- Utilization of applicable permits for all work activities and compliance with permit conditions;
- Preparation and utilization of appropriate traffic control plans;
- Training for all project employees and contractors on job hazards, personnel protective equipment (PPE), and hazard reporting; and
- Preparation of appropriate health and safety plans for each specific work area, monitoring of the implementation of the plan, and modification of the plan as necessary based on work conditions and safety performance.

Mitigation similar to the Conditions of Certification in the **Worker Safety and Fire Protection** of this Staff Assessment/EIS that would require SCE to provide a project construction safety and health program and a project operations and maintenance safety and health program are recommended.

To ensure the safety of workers and the public, SCE has stated that safety devices such as traveling grounds, guard structures, and radio-equipped public safety roving vehicles and linemen would be in place prior to the initiation of wire-stringing activities.

In mountainous areas, benching may be required to provide access for footing construction, assembly, erection, and wire-stringing activities during line construction. It would be used minimally to help ensure the safety of personnel during construction activities.

Construction of the project and construction equipment may impede emergency access through the area. Recommended mitigation would require SCE to coordinate construction schedules, lane closures, and other activities associated with installation of the project with emergency and police services to ensure minimal disruption to response times and access for these services. As is discussed in the **Transportation and Traffic** section of this Staff Assessment/EIS, because guard structures would be installed over roadway crossings such impacts would also be reduced. Therefore, impacts to emergency access and/or public services and facilities would be less than significant.

C.15.8.4 CONCLUSION

Incorporation of the measures discussed above and the Conditions of Certification included in the **Worker Safety** section of this Staff Assessment/EIS would ensure adequate levels of industrial safety and would comply with applicable LORS. This Staff Assessment/EIS also concludes that the project would not have significant impacts on local emergency and fire protection services.

C.15.9 CUMULATIVE IMPACTS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

There is the potential for substantial future development in the San Bernardino Valley area and throughout the southern California desert region. Analysis of cumulative impacts is based on data provided in the following maps and tables (see **Cumulative Scenario**):

- **Cumulative Impacts Figure 1**, Regional Renewable Applications;
- **Cumulative Impacts Figure 2**, Renewable Applications in the Barstow & Needles District Areas;
- **Cumulative Impacts Figure 3**, Newberry Springs/Ludlow Area – Existing and Future/Foreseeable Projects;
- **Cumulative Impacts Table 1**, Renewable Energy Projects in the California Desert District
- **Cumulative Impacts Table 2**, Existing Projects in the Newberry Springs/Ludlow Area; and
- **Cumulative Impacts Table 3**, Future Foreseeable Projects in the Newberry Springs/Ludlow Area.

The analysis in this section first defines the geographic area over which cumulative impacts related to waste management could occur. The cumulative impact analysis itself describes the potential for cumulative impacts to occur as a result of implementation of the Calico Solar Project along with the listed local and regional projects.

Geographic Extent

Cumulative impacts can occur within San Bernardino County if implementation of the Calico Solar Project could combine with those of other local or regional projects. Cumulative impacts could also occur as a result of development of some of the many proposed solar and wind development projects that have been or are expected to be under consideration by the BLM and the Energy Commission in the near future. Many of these projects are located within the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona.

The geographic extent for the analysis of the cumulative impacts associated with the Calico Solar Project includes San Bernardino County. This geographic scope is appropriate because of the solar facilities existing and proposed for San Bernardino County.

Cumulative Impact Analysis

Local and Regional Projects

For this analysis, there are two existing solar projects in the area or region that may require the response from off-site fire departments for fire, HazMat, or EMS emergencies: SEGS at Kramer Junction and at Harper Lake, both located in the far western part of San Bernardino County at least one hour distance from the proposed Calico Solar Project. However, these facilities are not considered by staff to have had an impact on the area or on the existing capabilities of the SBCFD.

Staff has analyzed the potential for Worker Safety/Fire Protection cumulative impacts at many other power plant projects in California. A significant cumulative Worker Safety/Fire Protection impact is defined as the simultaneous need for a fire department to respond to multiple locations such that its resources and those of the mutual aid fire departments (which routinely respond in every-day situations to emergencies at residences, commercial buildings, and heavy industry) are over-whelmed and cannot effectively respond. Staff believes that cumulative impacts are possible and that despite the many safeguards implemented to both prevent and control fires, HazMat releases, and injuries/accidents at solar power plants, the great distances involved in the desert and the many solar plants that are proposed for San Bernardino County all may cause a significant cumulative impact. Staff therefore believes cumulative impacts on the local fire department would be significant. If staff's proposed mitigation as described in Condition of Certification **WORKER SAFETY-6** is adopted, the impact to the SBCFD would be mitigated to less than significant.

Cumulative Impact Conclusion

Impacts of the Calico Solar Project would combine with impacts of past, present, and reasonably foreseeable projects to result in a contribution to local and regional cumulative impacts related to worker safety and fire protection.

The need for off-site emergency services for the Calico Solar Project would add to the total burden of the San Bernardino County Fire Department due to the number of new solar power plants proposed for this region and the great distances involved in responding to emergencies. Response to an emergency at one solar power plant leaves a station vacant for an extended period of time and thus increases the response time to other locations. Staff finds that this project may have a significant cumulative burden on the SBCFD's ability to respond to a fire or medical emergency and recommends mitigation in the form or proposed Condition of Certification **WORKER SAFETY-6** to reduce this impact to less than significance.

C.15.10 COMPLIANCE WITH LORS

Staff concludes that if the applicant for the proposed Calico Solar Project provides project construction safety and health and project operations and maintenance safety and health programs, as required by proposed **WORKER SAFETY** conditions of certification; the Calico Solar Project would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable LORS. As worker safety is a LORS-conformity requirement, the No Project/No Action alternative consideration is not applicable to the worker safety topic.

C.15.11 NOTEWORTHY PUBLIC BENEFITS

Staff has not identified any noteworthy public benefits associated with Worker Safety and Fire Protection.

C.15.12 FACILITY CLOSURE

Upon final facility closure, no workers will remain at the site, except for those necessary to maintain security over any remaining hazardous materials until they are removed from the site. During decommissioning, worker safety would be ensured by the same CAL-OSHA and other regulations requiring safety plans and training for as were needed for construction and operations. A decommissioning **Illness and Injury Prevention Plan** would be included as part of the decommissioning plan.

Facility fire protection systems will remain functional while hazardous materials remain on site, and as long as feasible into the decommissioning process.

C.15.13 PROPOSED CONDITIONS OF CERTIFICATION

WORKER SAFETY-1 The project owner shall submit to BLM's authorized officer and the Compliance Project Manager (CPM) a copy of the Project Construction Safety and Health Program containing the following:

- A Construction Personal Protective Equipment Program;
- A Construction Exposure Monitoring Program;
- A Construction Injury and Illness Prevention Program;
- a Construction heat stress protection plan that implements and expands on existing Cal OSHA regulations as found in 8 CCR 3395;
- A Construction Emergency Action Plan; and
- A Construction Fire Prevention Plan.

The Personal Protective Equipment Program, the Exposure Monitoring The Personal Protective Equipment Program, the Exposure Monitoring Program, the Heat Stress Protection Plan, and the Injury and Illness Prevention Program shall be submitted to the BLM's authorized officer and the CPM for review and approval concerning compliance of the program with all applicable safety orders. The Construction Emergency Action Plan and the Fire Prevention Plan shall be submitted to the San Bernardino County Fire Department for review and comment prior to submittal to the CPM for approval.

Verification: At least thirty (30) days prior to the start of construction, the project owner shall submit to the BLM's authorized officer and the CPM for review and approval a copy of the Project Construction Safety and Health Program. The project owner shall provide a copy of a letter to the CPM from the San Bernardino County Fire Department stating the fire department's comments on the Construction Fire Prevention Plan and Emergency Action Plan.

WORKER SAFETY-2 The project owner shall submit to BLM's authorized officer and the CPM a copy of the Project Operations and Maintenance Safety and Health Program containing the following:

- An Operation Injury and Illness Prevention Plan;
- an Operation heat stress protection plan that implements and expands on existing Cal OSHA regulations (8 CCR 3395);
- a Best Management Practices (BMP) for the storage and application of herbicides;
- An Emergency Action Plan;
- Hazardous Materials Management Program;
- Fire Prevention Program (8 CCR § 3221); and;
- Personal Protective Equipment Program (8 CCR §§ 3401-3411).

The Operation Injury and Illness Prevention Plan, Emergency Action Plan, the Heat Stress Protection Plan, BMP for Herbicides, and Personal Protective Equipment Program shall be submitted to the BLM's authorized officer and to the CPM for review and approval concerning compliance of the programs with all applicable safety orders. The Fire Prevention Plan and the Emergency Action Plan shall also be submitted to the San Bernardino County Fire Department for review and comment.

Verification: At least thirty (30) days prior to the start of first-fire or commissioning, the project owner shall submit to BLM's authorized officer and the CPM for approval a copy of the Project Operations and Maintenance Safety and Health Program. The project owner shall provide a copy of a letter to BLM's authorized officer and the CPM from the San Bernardino County Fire Department stating the Fire Department's comments on the Operations Fire Prevention Plan and Emergency Action Plan.

WORKER SAFETY-3 The project owner shall provide a site Construction Safety Supervisor (CSS) who, by way of training and/or experience, is knowledgeable of power plant construction activities and relevant laws, ordinances, regulations, and standards, is capable of identifying workplace hazards relating to the construction activities, and has authority to take appropriate action to assure compliance and mitigate hazards. The CSS shall:

- Have overall authority for coordination and implementation of all occupational safety and health practices, policies, and programs;
- Assure that the safety program for the project complies with Cal/OSHA and federal regulations related to power plant projects;
- Assure that all construction and commissioning workers and supervisors receive adequate safety training;

- Complete accident and safety-related incident investigations, emergency response reports for injuries, and inform the CPM of safety-related incidents; and
- Assure that all the plans identified in Worker Safety 1 and 2 are implemented.

Verification: At least thirty (30) days prior to the start of site mobilization, the project owner shall submit to BLM's authorized officer and the CPM the name and contact information for the Construction Safety Supervisor (CSS). The contact information of any replacement (CSS) shall be submitted to the CPM within one business day.

The CSS shall submit in the Annual Compliance Report documentation of monthly safety inspection reports to include:

- Record of all employees trained for that month (all records shall be kept on site for the duration of the project);
- Summary report of safety management actions and safety-related incidents that occurred during the month;
- Report of any continuing or unresolved situations and incidents that may pose danger to life or health; and
- Report of accidents and injuries that occurred during the month.

WORKER SAFETY-4 The project owner shall make payments to the Chief Building Official (CBO) for the services of a Safety Monitor based upon a reasonable fee schedule to be negotiated between the project owner and the CBO. Those services shall be in addition to other work performed by the CBO. The Safety Monitor shall be selected by and report directly to the CBO, and will be responsible for verifying that the Construction Safety Supervisor, as required in Worker Safety 3, implements all appropriate Cal/OSHA and Commission safety requirements. The Safety Monitor shall conduct on-site (including linear facilities) safety inspections at intervals necessary to fulfill those responsibilities.

Verification: At least thirty (30) days prior to the start of construction, the project owner shall provide proof of its agreement to fund the Safety Monitor services to BLM's authorized officer and the CPM for review and approval.

WORKER SAFETY-5 The project owner shall ensure that a portable automatic external defibrillator (AED) is located on site during construction and operations and shall implement a program to ensure that workers are properly trained in its use and that the equipment is properly maintained and functioning at all times. During construction and commissioning, the following persons shall be trained in its use and shall be on-site whenever the workers that they supervise are on-site: the Construction Project Manager or delegate, the Construction Safety Supervisor or delegate, and all shift foremen. During operations, all power plant employees shall be trained in its use. The training program shall be submitted to BLM's authorized officer and the CPM for review and approval.

Verification: At least thirty (30) days prior to the start of site mobilization the project owner shall submit to BLM's authorized officer and the CPM proof that a portable AED exists on site and a copy of the training and maintenance program for review and approval.

WORKER SAFETY-6 The project owner shall either (1) reach an agreement with the San Bernardino County Fire Department regarding funding of its project-related share of capital costs to provide appropriate equipment as mitigation of project-related impacts on fire protection, HazMat, and/or EMS services along with an annual payment to maintain and provide these services, **or**, if no agreement can be reached shall (2) fund its share of the capital costs in the amount of $350,000 plus provide an annual payment of $100,000 to the SBCFD for the support of additional fire department staff commencing with the date of site mobilization and continuing annually thereafter on the anniversary until the final date of power plant decommissioning.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall provide to the BLM's authorized officer and the CPM either a copy of the agreement or documentation that the $350,000 payment and the first annual payment has been made.

In the annual compliance report submitted to the CPM, the project owner shall provide documentation that the annual payment has been made unless an agreement is reached with the KCFD that an annual payment is not required.

WORKER SAFETY-7 The project owner shall develop and implement an enhanced Dust Control Plan that includes the requirements described in **AQ-SC3** and additionally requires:

i) site worker use of dust masks (NIOSH N-95 or better) whenever visible dust is present;

ii) site monitoring for the presence of Coccidioides immitis in soil before site mobilization and monthly thereafter; and

iii) Implementation of enhanced dust control methods (increased frequency of watering, use of dust suppression chemicals, etc. consistent with **AQ-SC4**) immediately whenever visible dust comes from or onto the site.

After three consecutive months of not finding significant soil levels of Coccidioides immitis, the project owner may ask the BLM's authorized officer and the CPM to re-evaluate and revise this testing requirement.

Verification: At least 60 days prior to the commencement of site mobilization, the enhanced Dust Control Plan shall be provided to the BLM's authorized officer and the CPM for review and approval.

C.15.14 CONCLUSIONS

Staff concludes that if the applicant for the proposed Calico Solar Project provides project construction safety and health and project operations and maintenance safety and health programs, as required by conditions of certification **WORKER SAFETY -1**, and **-2**; and fulfills the requirements of conditions of certification **WORKER SAFETY-3** through **-7**, Calico Solar would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable LORS. Staff also concludes that the proposed project would have cumulative significant impacts on local fire protection services but that implementation of proposed Condition of Certification **WORKER SAFETY -6** would reduce those impacts to less than significant.

Staff further concludes that none of the project alternatives would materially or significantly change potential impacts form the project with regard to worker safety or fire protection. None of the alternatives would be preferred to the proposed project or reduce any otherwise significant impacts on worker safety or fire protection.

C.15.15 REFERENCES

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ENGINEERING ANALYSIS

D.1 – FACILITY DESIGN

Testimony of Shahab Khoshmashrab

D.1.1 SUMMARY OF CONCLUSIONS

The California Energy Commission staff concludes that the design, construction, and eventual closure of the project and its linear facilities would likely comply with applicable engineering laws, ordinances, regulations and standards. The proposed conditions of certification, below, would ensure compliance with these laws, ordinances, regulations and standards.

Facility Design is not intended to address environmental impacts under either CEQA or NEPA.

D.1.2 INTRODUCTION

Facility design encompasses the civil, structural, mechanical, and electrical engineering design of the Calico Solar Project. The purpose of this analysis is to:

- Verify that the laws, ordinances, regulations and standards (LORS) that apply to the engineering design and construction of the project have been identified;
- Verify that both the project and its ancillary facilities are sufficiently described, including proposed design criteria and analysis methods, in order to provide reasonable assurance that the project will be designed and constructed in accordance with all applicable engineering LORS, in a manner that also ensures the public health and safety;
- Determine whether special design features should be considered during final design to address conditions unique to the site which could influence public health and safety; and
- Describe the design review and construction inspection process and establish the conditions of certification used to monitor and ensure compliance with the engineering LORS, in addition to any special design requirements.

Subjects discussed in this analysis include:

- Identification of the engineering LORS that apply to facility design;
- Evaluation of the applicant's proposed design criteria, including identification of criteria essential to public health and safety;
- Proposed modifications and additions to the application for certification (AFC) necessary for compliance with applicable engineering LORS; and
- Conditions of certification proposed by staff to ensure that the project will be designed and constructed to ensure public health and safety and comply with all applicable engineering LORS.

D.1.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Lists of LORS applicable to each engineering discipline (civil, structural, mechanical, and electrical) are described in the AFC (SES Solar One 2008a, Appendices F, K, M, O, P, Q, R). Key LORS are listed in **Facility Design Table 1,** below:

Facility Design Table 1
Key Engineering Laws, Ordinances, Regulations and Standards (LORS)

Applicable LORS	Description
Federal	Title 29 Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health standards
State	2007 California Building Standards Code (CBSC) (also known as Title 24, California Code of Regulations)
Local	San Bernardino County regulations and ordinances
General	American National Standards Institute (ANSI) American Society of Mechanical Engineers (ASME) American Welding Society (AWS) American Society for Testing and Materials (ASTM)

D.1.4 PROPOSED PROJECT

D.1.4.1 SETTING AND EXISTING CONDITIONS

The Calico Solar Project would be built on an approximately 8,230-acre site located in San Bernardino County, California. For more information on the site and its related project description, please see the **PROJECT DESCRIPTION** section of this document. Additional engineering design details are contained in the AFC, Appendices F, K, M, O, P, Q, R (SES Solar One 2008a).

D.1.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The purpose of this analysis is to ensure that the project would be built to applicable engineering codes and ensure public health and life safety. This analysis further verifies that applicable engineering LORS have been identified and that the project and its ancillary facilities have been described in adequate detail. It also evaluates the applicant's proposed design criteria, describes the design review and construction inspection process, and establishes conditions of certification that would monitor and ensure compliance with engineering LORS and any other special design requirements. These conditions allow both the California Energy Commission (Energy Commission) compliance project manager (CPM) and the applicant to adopt a compliance monitoring scheme that will verify compliance with these LORS.

SITE PREPARATION AND DEVELOPMENT

Staff has evaluated the proposed design criteria for grading, flood protection, erosion control, site drainage, and site access, in addition to the criteria for designing and constructing linear support facilities such as natural gas and electric transmission interconnections. The applicant proposes the use of accepted industry standards (see SES Solar One 2008a, Appendices F, K, M, O, P, Q, R, for a representative list of applicable industry standards), design practices, and construction methods in preparing and developing the site. Staff concludes that this project, including its linear facilities, would most likely comply with all applicable site preparation LORS, and proposes conditions of certification (see below and the **GEOLOGY AND PALEONTOLOGY** section of this document) to ensure that compliance.

MAJOR STRUCTURES, SYSTEMS, AND EQUIPMENT

Major structures, systems, and equipment are structures and their associated components or equipment that are necessary for power production, costly or time consuming to repair or replace, are used for the storage, containment, or handling of hazardous or toxic materials, or could become potential health and safety hazards if not constructed according to applicable engineering LORS. Major structures and equipment are identified in the proposed Condition of Certification **GEN-2**, below. Typically, **Facility Design Table 2** in Condition of Certification **GEN-2** lists the major structures and equipment identified in the AFC and other project related information available before project licensing; this list is based on the preliminary design of the project. The master drawing and master specifications lists described in Condition of Certification **GEN-2**, however, include the project-related documents based on the project's detailed design and may include additional documents for structures and equipment not identified in **Facility Design Table 2**. (Detailed project design typically occurs after project licensing and is not available at this time.)

The Calico Solar Project shall be designed and constructed to the 2007 California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and other applicable codes and standards in effect when the design and construction of the project actually begin. If the initial designs are submitted to the chief building official (CBO) for review and approval after the update to the 2007 CBSC takes effect, the 2007 CBSC provisions shall be replaced with the updated provisions.

Certain structures in a power plant may be required, under the CBC, to undergo dynamic lateral force (structural) analysis; others may be designed using the simpler static analysis procedure. In order to ensure that structures are analyzed according to their appropriate lateral force procedure, staff has included condition of certification **STRUC-1**, below, which, in part, requires the project CBO's review and approval of the owner's proposed lateral force procedures before construction begins.

PROJECT QUALITY PROCEDURES

The project's AFC (SES Solar One 2008a, Appendices F, K, M, O, P, Q, R) describes a quality program intended to inspire confidence that its systems and components will be designed, fabricated, stored, transported, installed, and tested in accordance with all appropriate power plant technical codes and standards. Compliance with design requirements will be verified through specific inspections and audits. Implementation of this quality assurance/quality control (QA/QC) program will ensure that the Calico Solar Project is actually designed, procured, fabricated, and installed as described in this analysis.

COMPLIANCE MONITORING

Under Section 104.2 of the CBC, the CBO is authorized and directed to enforce all provisions of the CBC. The Energy Commission itself serves as the building official, and has the responsibility to enforce the code, for all of the energy facilities it certifies. In addition, the Energy Commission has the power to interpret the CBC and adopt and enforce both rules and supplemental regulations that clarify application of the CBC's provisions.

The Energy Commission's design review and construction inspection process conforms to CBC requirements and ensures that all facility design conditions of certification are met. As provided by Section 104.2.2 of the CBC, the Energy Commission appoints experts to perform design review and construction inspections and act as delegate CBOs on behalf of the Energy Commission. These delegates typically include the local building official and/or independent consultants hired to provide technical expertise that is not provided by the local official alone. The applicant, through permit fees provided by the CBC, pays the cost of these reviews and inspections. While building permits in addition to Energy Commission certification are not required for this project, the applicant pays in lieu of CBC permit fees to cover the costs of these reviews and inspections.

Engineering and compliance staff will invite San Bernardino County or a third-party engineering consultant to act as CBO for this project. When an entity has been assigned CBO duties, Energy Commission staff will complete a memorandum of understanding (MOU) with that entity to outline both its roles and responsibilities and those of its subcontractors and delegates.

Staff has developed proposed conditions of certification to ensure public health and safety and compliance with engineering design LORS. Some of these conditions address the roles, responsibilities, and qualifications of the engineers who will design and build the proposed project (conditions of certification **GEN-1** through **GEN-8**). These engineers must be registered in California and sign and stamp every submittal of design plans, calculations, and specifications submitted to the CBO. These conditions require that every element of the project's construction (subject to CBO review and approval) be approved by the CBO before it is performed. They also require that qualified special inspectors perform or oversee special inspections required by all applicable LORS.

While the Energy Commission and delegate CBO have the authority to allow some flexibility in scheduling construction activities, these conditions are written so that no element of construction (of permanent facilities subject to CBO review and approval) which could be difficult to reverse or correct can proceed without prior CBO approval. Elements of construction that are not difficult to reverse may proceed without approval of the plans. The applicant bears the responsibility to fully modify construction elements in order to comply with all design changes resulting from the CBO’s subsequent plan review and approval process.

D.1.5 REDUCED ACREAGE ALTERNATIVE

The Facility Design section is not intended to address environmental impacts under either CEQA or NEPA.

D.1.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Facility Design section is not intended to address environmental impacts under either CEQA or NEPA.

D.1.7 NO PROJECT / NO ACTION ALTERATIVE

The Facility Design section is not intended to address environmental impacts under either CEQA or NEPA.

D.1.8 PROJECT-RELATED FUTURE ACTIONS

Proposed upgrades to the Southern California Edison (SCE) transmission system, known as the 275 MW Early Interconnection option and the 850 MW Full Build-Out option are considered to be reasonably foreseeable actions that would be contingent on construction of the proposed Calico Solar Project. The SCE upgrades would not impact the facility design of the proposed Calico Solar Project, and therefore, no additional analysis is required.

D.1.9 CUMULATIVE IMPACT ANALYSIS

The Facility Design section is not intended to address environmental impacts under either CEQA or NEPA.

D.1.10 COMPLIANCE WITH LORS

No federal, state, or local/county laws, ordinances, regulations, and standards (LORS) apply to the design of this project.

D.1.11 NOTEWORTHY PUBLIC BENEFITS

Staff has not identified any noteworthy public benefits associated with this Facility Design section.

D.1.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

GEN-1 The project owner shall design, construct, and inspect the project in accordance with the 2007 California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and all other applicable engineering LORS in effect at the time initial design plans are submitted to the CBO for review and approval (the CBSC in effect is the edition that has been adopted by the California Building Standards Commission and published at least 180 days previously). The project owner shall ensure that all the provisions of the above applicable codes are enforced during the construction, addition, alteration, moving, demolition, repair, or maintenance of the completed facility. All transmission facilities (lines, switchyards, switching stations and substations) are covered in the conditions of certification in the **Transmission System Engineering** section of this document.

In the event that the initial engineering designs are submitted to the CBO when the successor to the 2007 CBSC is in effect, the 2007 CBSC provisions shall be replaced with the applicable successor provisions. Where, in any specific case, different sections of the code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

The project owner shall ensure that all contracts with contractors, subcontractors, and suppliers clearly specify that all work performed and materials supplied comply with the codes listed above.

<u>Verification:</u> Within 30 days following receipt of the certificate of occupancy, the project owner shall submit to the CPM a statement of verification, signed by the responsible design engineer, attesting that all designs, construction, installation, and inspection requirements of the applicable LORS and the Energy Commission’s decision have been met in the area of facility design. The project owner shall provide the CPM a copy of the certificate of occupancy within 30 days of receipt from the CBO.

Once the certificate of occupancy has been issued, the project owner shall inform the CPM at least 30 days prior to any construction, addition, alteration, moving, demolition, repair, or maintenance to be performed on any portion(s) of the completed facility that requires CBO approval for compliance with the above codes. The CPM will then determine if the CBO needs to approve the work.

GEN-2 Before submitting the initial engineering designs for CBO review, the project owner shall furnish the CPM and the CBO with a schedule of facility design submittals, and master drawing and master specifications lists. The schedule shall contain a list of proposed submittal packages of designs, calculations, and specifications for major structures and equipment. To facilitate audits by Energy Commission staff, the project owner shall provide specific packages to the CPM upon request.

Verification: At least 60 days (or a project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO and to the CPM the schedule, the master drawing and master specifications lists of documents to be submitted to the CBO for review and approval. These documents shall be the pertinent design documents for the major structures and equipment listed in **Facility Design Table 2**, below. Major structures and equipment shall be added to or deleted from the table only with CPM approval. The project owner shall provide schedule updates in the monthly compliance report.

Facility Design Table 2
Major Structures and Equipment List

Equipment/System	Quantity (Plant)
SunCatcher Power Generating Unit (CT) Foundation and Connections	1 Lot
Administration Building Structure, Foundation and Connections	1
Maintenance Building Structure, Foundation and Connections	1
Assembly Building Structure, Foundation and Connections	3
Satellite Complex Maintenance Building Structure, Foundation and Connections	1
Collector Group Generator Step-up Unit Transformer Foundation and Connections	1 Lot
Generator Collection Power Center	1 Lot
Generator Collection Sub-panel	1 Lot
Power Factor Capacitor	1 Lot
Open Bus Switch Rack	6
Shunt Capacitor Bank	6
Dynamic VAR Compression System	6
Disconnect Switch	15
Power Transformer Foundation and Connections	6
Coupling Capacitor Voltage Transformer Foundation and Connections	6
Diesel Power Generator Set Foundation and Connections	1
Fire Water Pump Foundation and Connections	1
Water Treatment System Foundation and Connections	1
Potable/Fire Water Tank Structure, Foundation and Connections	1
Well Water Storage Tank Structure, Foundation and Connections	1
Demineralized Water Storage Tank Structure, Foundation and Connections	2
Hydrogen Bottles Storage Area	1 Lot
Chemical Storage Area	1 Lot
Drainage Systems (including sanitary drain and waste)	1 Lot
High Pressure and Large Diameter Piping and Pipe Racks	1 Lot
HVAC and Refrigeration Systems	1 Lot
Temperature Control and Ventilation Systems (including water and sewer connections)	1 Lot

Equipment/System	Quantity (Plant)
Building Energy Conservation Systems	1 Lot
Substation, Switchboards, Transformers, Buses and Towers	1 Lot
Electrical Breakers, Cables/Duct Banks	1 Lot
Prefabricated Assemblies	1 Lot

GEN-3 The project owner shall make payments to the CBO for design review, plan checks, and construction inspections, based upon a reasonable fee schedule to be negotiated between the project owner and the CBO. These fees may be consistent with the fees listed in the 2007 CBC, adjusted for inflation and other appropriate adjustments; may be based on the value of the facilities reviewed; may be based on hourly rates; or may be otherwise agreed upon by the project owner and the CBO.

Verification: The project owner shall make the required payments to the CBO in accordance with the agreement between the project owner and the CBO. The project owner shall send a copy of the CBO's receipt of payment to the CPM in the next monthly compliance report indicating that applicable fees have been paid.

GEN-4 Prior to the start of rough grading, the project owner shall assign a California-registered architect, or a structural or civil engineer, as the resident engineer (RE) in charge of the project. All transmission facilities (lines, switchyards, switching stations, and substations) are addressed in the conditions of certification in the **TRANSMISSION SYSTEM ENGINEERING** section of this document.

The RE may delegate responsibility for portions of the project to other registered engineers. Registered mechanical and electrical engineers may be delegated responsibility for mechanical and electrical portions of the project, respectively. A project may be divided into parts, provided that each part is clearly defined as a distinct unit. Separate assignments of general responsibility may be made for each designated part.

The RE shall:

1. Monitor progress of construction work requiring CBO design review and inspection to ensure compliance with LORS;

2. Ensure that construction of all facilities subject to CBO design review and inspection conforms in every material respect to applicable LORS, these conditions of certification, approved plans, and specifications;

3. Prepare documents to initiate changes in approved drawings and specifications when either directed by the project owner or as required by the conditions of the project;

4. Be responsible for providing project inspectors and testing agencies with complete and up-to-date sets of stamped drawings, plans, specifications, and any other required documents;

5. Be responsible for the timely submittal of construction progress reports to the CBO from the project inspectors, the contractor, and other engineers who have been delegated responsibility for portions of the project; and

6. Be responsible for notifying the CBO of corrective action or the disposition of items noted on laboratory reports or other tests when they do not conform to approved plans and specifications.

The resident engineer (or his delegate) must be located at the project site, or be available at the project site within a reasonable period of time, during any hours in which construction takes place.

The RE shall have the authority to halt construction and to require changes or remedial work if the work does not meet requirements.

If the RE or the delegated engineers are reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, the resume and registration number of the RE and any other delegated engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the RE and other delegated engineer(s) within 5 days of the approval.

If the RE or the delegated engineer(s) is subsequently reassigned or replaced, the project owner has 5 days to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within 5 days of the approval.

GEN-5 Prior to the start of rough grading, the project owner shall assign at least one of each of the following California registered engineers to the project: a civil engineer; a soils, geotechnical, or civil engineer experienced and knowledgeable in the practice of soils engineering; and an engineering geologist. Prior to the start of construction, the project owner shall assign at least one of each of the following California registered engineers to the project: a design engineer who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; a mechanical engineer; and an electrical engineer. (California Business and Professions Code section 6704 et seq., and sections 6730, 6731 and 6736 require state registration to practice as a civil engineer or structural engineer in California). All transmission facilities (lines, switchyards, switching stations, and substations) are handled in the conditions of certification in the **TRANSMISSION SYSTEM ENGINEERING** section of this document.

The tasks performed by the civil, mechanical, electrical, or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (for example, proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California registered electrical engineer.

The project owner shall submit, to the CBO for review and approval, the names, qualifications, and registration numbers of all responsible engineers assigned to the project.

If any one of the designated responsible engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned responsible engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

A. The civil engineer shall:

   1. Review the foundation investigations, geotechnical, or soils reports prepared by the soils engineer, the geotechnical engineer, or by a civil engineer experienced and knowledgeable in the practice of soils engineering;

   2. Design (or be responsible for the design of), stamp, and sign all plans, calculations, and specifications for proposed site work, civil works, and related facilities requiring design review and inspection by the CBO. At a minimum, these include: grading, site preparation, excavation, compaction, construction of secondary containment, foundations, erosion and sedimentation control structures, drainage facilities, underground utilities, culverts, site access roads and sanitary sewer systems; and

   3. Provide consultation to the RE during the construction phase of the project and recommend changes in the design of the civil works facilities and changes to the construction procedures.

B. The soils engineer, geotechnical engineer, or civil engineer experienced and knowledgeable in the practice of soils engineering, shall:

   1. Review all the engineering geology reports;

   2. Prepare the foundation investigations, geotechnical, or soils reports containing field exploration reports, laboratory tests, and engineering analysis detailing the nature and extent of the soils that could be susceptible to liquefaction, rapid settlement or collapse when saturated under load;

   3. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with requirements set forth in the 2007 CBC (depending on the site conditions, this may be the

responsibility of either the soils engineer, the engineering geologist, or both); and

4. Recommend field changes to the civil engineer and RE.

This engineer shall be authorized to halt earthwork and to require changes if site conditions are unsafe or do not conform to the predicted conditions used as the basis for design of earthwork or foundations.

C. The engineering geologist shall:

1. Review all the engineering geology reports and prepare a final soils grading report; and

2. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with the requirements set forth in the 2007 CBC (depending on the site conditions, this may be the responsibility of either the soils engineer, the engineering geologist, or both).

D. The design engineer shall:

1. Be directly responsible for the design of the proposed structures and equipment supports;

2. Provide consultation to the RE during design and construction of the project;

3. Monitor construction progress to ensure compliance with engineering LORS;

4. Evaluate and recommend necessary changes in design; and

5. Prepare and sign all major building plans, specifications, and calculations.

E. The mechanical engineer shall be responsible for, and sign and stamp a statement with, each mechanical submittal to the CBO, stating that the proposed final design plans, specifications, and calculations conform to all of the mechanical engineering design requirements set forth in the Energy Commission's decision.

F. The electrical engineer shall:

1. Be responsible for the electrical design of the project; and

2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible civil engineer, soils (geotechnical) engineer and engineering geologist assigned to the project.

At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of construction, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible design engineer, mechanical engineer, and electrical engineer assigned to the project.

The project owner shall notify the CPM of the CBO's approvals of the responsible engineers within 5 days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has 5 days in which to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within 5 days of the approval.

GEN-6 Prior to the start of an activity requiring special inspection, including prefabricated assemblies, the project owner shall assign to the project, qualified and certified special inspector(s) who shall be responsible for the special inspections required by the 2007 CBC. All transmission facilities (lines, switchyards, switching stations, and substations) are handled in conditions of certification in the **TRANSMISSION SYSTEM ENGINEERING** section of this document.

A certified weld inspector, certified by the American Welding Society (AWS), and/or American Society of Mechanical Engineers (ASME) as applicable, shall inspect welding performed on-site requiring special inspection (including structural, piping, tanks and pressure vessels).

The special inspector shall:

1. Be a qualified person who shall demonstrate competence, to the satisfaction of the CBO, for inspection of the particular type of construction requiring special or continuous inspection;

2. Inspect the work assigned for conformance with the approved design drawings and specifications;

3. Furnish inspection reports to the CBO and RE. All discrepancies shall be brought to the immediate attention of the RE for correction, then, if uncorrected, to the CBO and the CPM for corrective action; and

4. Submit a final signed report to the RE, CBO, and CPM, stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications, and other provisions of the applicable edition of the CBC.

<u>Verification:</u> At least 15 days (or project owner- and CBO-approved alternative time frame) prior to the start of an activity requiring special inspection, the project owner shall submit to the CBO for review and approval, with a copy to the CPM, the name(s) and qualifications of the certified weld inspector(s), or other certified special inspector(s) assigned to the project to perform one or more of the duties set forth above. The project owner shall also submit to the CPM a copy of the CBO's approval of the qualifications of all special inspectors in the next monthly compliance report.

If the special inspector is subsequently reassigned or replaced, the project owner has 5 days in which to submit the name and qualifications of the newly assigned special inspector to the CBO for approval. The project owner shall notify the CPM of the CBO's approval of the newly assigned inspector within 5 days of the approval.

GEN-7 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone CBO design review and approval, the project owner shall document the discrepancy and recommend required corrective actions. The discrepancy documentation shall be submitted to the CBO for review and approval. The discrepancy documentation shall reference this condition of certification and, if appropriate, applicable sections of the CBC and/or other LORS.

Verification: The project owner shall transmit a copy of the CBO's approval of any corrective action taken to resolve a discrepancy to the CPM in the next monthly compliance report. If any corrective action is disapproved, the project owner shall advise the CPM, within 5 days, of the reason for disapproval and the revised corrective action to obtain CBO's approval.

GEN-8 The project owner shall obtain the CBO's final approval of all completed work that has undergone CBO design review and approval. The project owner shall request the CBO to inspect the completed structure and review the submitted documents. The project owner shall notify the CPM after obtaining the CBO's final approval. The project owner shall retain one set of approved engineering plans, specifications, and calculations (including all approved changes) at the project site or at another accessible location during the operating life of the project. Electronic copies of the approved plans, specifications, calculations, and marked-up as-builts shall be provided to the CBO for retention by the CPM.

Verification: Within 15 days of the completion of any work, the project owner shall submit to the CBO, with a copy to the CPM, in the next monthly compliance report, (a) a written notice that the completed work is ready for final inspection, and (b) a signed statement that the work conforms to the final approved plans. After storing the final approved engineering plans, specifications, and calculations described above, the project owner shall submit to the CPM a letter stating both that the above documents have been stored and the storage location of those documents.

Within 90 days of the completion of construction, the project owner shall provide to the CBO three sets of electronic copies of the above documents at the project owner's expense. These are to be provided in the form of "read only" (Adobe .pdf 6.0) files, with restricted (password-protected) printing privileges, on archive quality compact discs.

CIVIL-1 The project owner shall submit to the CBO for review and approval the following:

1. Design of the proposed drainage structures and the grading plan;

2. An erosion and sedimentation control plan;

3. Related calculations and specifications, signed and stamped by the responsible civil engineer; and

4. Soils, geotechnical, or foundation investigations reports required by the 2007 CBC.

<u>Verification:</u> At least 15 days (or project owner- and CBO-approved alternative time frame) prior to the start of site grading the project owner shall submit the documents described above to the CBO for design review and approval. In the next monthly compliance report following the CBO's approval, the project owner shall submit a written statement certifying that the documents have been approved by the CBO.

CIVIL-2 The resident engineer shall, if appropriate, stop all earthwork and construction in the affected areas when the responsible soils engineer, geotechnical engineer, or the civil engineer experienced and knowledgeable in the practice of soils engineering identifies unforeseen adverse soil or geologic conditions. The project owner shall submit modified plans, specifications, and calculations to the CBO based on these new conditions. The project owner shall obtain approval from the CBO before resuming earthwork and construction in the affected area.

<u>Verification:</u> The project owner shall notify the CPM within 24 hours, when earthwork and construction is stopped as a result of unforeseen adverse geologic/soil conditions. Within 24 hours of the CBO's approval to resume earthwork and construction in the affected areas, the project owner shall provide to the CPM a copy of the CBO's approval.

CIVIL-3 The project owner shall perform inspections in accordance with the 2007 CBC. All plant site-grading operations, for which a grading permit is required, shall be subject to inspection by the CBO.

If, in the course of inspection, it is discovered that the work is not being performed in accordance with the approved plans, the discrepancies shall be reported immediately to the resident engineer, the CBO, and the CPM. The project owner shall prepare a written report, with copies to the CBO and the CPM, detailing all discrepancies, non-compliance items, and the proposed corrective action.

<u>Verification:</u> Within 5 days of the discovery of any discrepancies, the resident engineer shall transmit to the CBO and the CPM a non-conformance report (NCR), and the proposed corrective action for review and approval. Within 5 days of resolution of the NCR, the project owner shall submit the details of the corrective action to the CBO and the CPM. A list of NCRs, for the reporting month, shall also be included in the following monthly compliance report.

CIVIL-4 After completion of finished grading and erosion and sedimentation control and drainage work, the project owner shall obtain the CBO's approval of the final grading plans (including final changes) for the erosion and sedimentation control work. The civil engineer shall state that the work within his/her area of responsibility was done in accordance with the final approved plans.

Verification: Within 30 days (or project owner- and CBO-approved alternative time frame) of the completion of the erosion and sediment control mitigation and drainage work, the project owner shall submit to the CBO, for review and approval, the final grading plans (including final changes) and the responsible civil engineer's signed statement that the installation of the facilities and all erosion control measures were completed in accordance with the final approved combined grading plans, and that the facilities are adequate for their intended purposes, along with a copy of the transmittal letter to the CPM. The project owner shall submit a copy of the CBO's approval to the CPM in the next monthly compliance report.

STRUC-1 Prior to the start of any increment of construction of any major structure or component listed in **Facility Design Table 2** of condition of certification **GEN-2**, above, the project owner shall submit to the CBO for design review and approval the proposed lateral force procedures for project structures and the applicable designs, plans and drawings for project structures. Proposed lateral force procedures, designs, plans and drawings shall be those for the following items (from **Table 2**, above):

1. Major project structures;

2. Major foundations, equipment supports, and anchorage; and

3. Large field-fabricated tanks.

Construction of any structure or component shall not begin until the CBO has approved the lateral force procedures to be employed in designing that structure or component.

The project owner shall:

1. Obtain approval from the CBO of lateral force procedures proposed for project structures;

2. Obtain approval from the CBO for the final design plans, specifications, calculations, soils reports, and applicable quality control procedures. If there are conflicting requirements, the more stringent shall govern (for example, highest loads, or lowest allowable stresses shall govern). All plans, calculations, and specifications for foundations that support structures shall be filed concurrently with the structure plans, calculations, and specifications;

3. Submit to the CBO the required number of copies of the structural plans, specifications, calculations, and other required documents of the designated major structures prior to the start of on-site fabrication and installation of each structure, equipment support, or foundation;

4. Ensure that the final plans, calculations, and specifications clearly reflect the inclusion of approved criteria, assumptions, and methods used to

develop the design. The final designs, plans, calculations, and specifications shall be signed and stamped by the responsible design engineer; and

5. Submit to the CBO the responsible design engineer's signed statement that the final design plans conform to applicable LORS.

Verification: At least 60 days (or project owner- and CBO-approved alternative time frame) prior to the start of any increment of construction of any structure or component listed in **Facility Design Table 2** of condition of certification **GEN-2**, above, the project owner shall submit to the CBO the above final design plans, specifications and calculations, with a copy of the transmittal letter to the CPM.

The project owner shall submit to the CPM, in the next monthly compliance report, a copy of a statement from the CBO that the proposed structural plans, specifications, and calculations have been approved and comply with the requirements set forth in applicable engineering LORS.

STRUC-2 The project owner shall submit to the CBO the required number of sets of the following documents related to work that has undergone CBO design review and approval:

1. Concrete cylinder strength test reports (including date of testing, date sample taken, design concrete strength, tested cylinder strength, age of test, type and size of sample, location and quantity of concrete placement from which sample was taken, and mix design designation and parameters);

2. Concrete pour sign-off sheets;

3. Bolt torque inspection reports (including location of test, date, bolt size, and recorded torques);

4. Field weld inspection reports (including type of weld, location of weld, inspection of non-destructive testing (NDT) procedure and results, welder qualifications, certifications, qualified procedure description or number (ref: AWS); and

5. Reports covering other structural activities requiring special inspections shall be in accordance with the 2007 CBC.

Verification: If a discrepancy is discovered in any of the above data, the project owner shall, within 5 days, prepare and submit an NCR describing the nature of the discrepancies and the proposed corrective action to the CBO, with a copy of the transmittal letter to the CPM. The NCR shall reference the condition(s) of certification and the applicable CBC chapter and section. Within 5 days of resolution of the NCR, the project owner shall submit a copy of the corrective action to the CBO and the CPM.

The project owner shall transmit a copy of the CBO's approval or disapproval of the corrective action to the CPM within 15 days. If disapproved, the project owner shall advise the CPM, within 5 days, the reason for disapproval, and the revised corrective action to obtain CBO's approval.

STRUC-3 The project owner shall submit to the CBO design changes to the final plans required by the 2007 CBC, including the revised drawings, specifications, calculations, and a complete description of, and supporting rationale for, the proposed changes, and shall give to the CBO prior notice of the intended filing.

Verification: On a schedule suitable to the CBO, the project owner shall notify the CBO of the intended filing of design changes, and shall submit the required number of sets of revised drawings and the required number of copies of the other above-mentioned documents to the CBO, with a copy of the transmittal letter to the CPM. The project owner shall notify the CPM, via the monthly compliance report, when the CBO has approved the revised plans.

STRUC-4 Tanks and vessels containing quantities of toxic or hazardous materials exceeding amounts specified in the 2007 CBC shall, at a minimum, be designed to comply with the requirements of that chapter.

Verification: At least 30 days (or project owner- and CBO-approved alternate time frame) prior to the start of installation of the tanks or vessels containing the above specified quantities of toxic or hazardous materials, the project owner shall submit to the CBO for design review and approval final design plans, specifications, and calculations, including a copy of the signed and stamped engineer's certification.

The project owner shall send copies of the CBO approvals of plan checks to the CPM in the following monthly compliance report. The project owner shall also transmit a copy of the CBO's inspection approvals to the CPM in the monthly compliance report following completion of any inspection.

MECH-1 The project owner shall submit, for CBO design review and approval, the proposed final design, specifications and calculations for each plant major piping and plumbing system listed in **Facility Design Table 2**, condition of certification **GEN-2**, above. Physical layout drawings and drawings not related to code compliance and life safety need not be submitted. The submittal shall also include the applicable QA/QC procedures. Upon completion of construction of any such major piping or plumbing system, the project owner shall request the CBO's inspection approval of that construction.

The responsible mechanical engineer shall stamp and sign all plans, drawings, and calculations for the major piping and plumbing systems, subject to CBO design review and approval, and submit a signed statement to the CBO when the proposed piping and plumbing systems have been designed, fabricated, and installed in accordance with all of the applicable laws, ordinances, regulations and industry standards, which may include, but are not limited to:

- American National Standards Institute (ANSI) B31.1 (Power Piping Code);
- ANSI B31.2 (Fuel Gas Piping Code);

- ANSI B31.3 (Chemical Plant and Petroleum Refinery Piping Code);
- ANSI B31.8 (Gas Transmission and Distribution Piping Code);
- Title 24, California Code of Regulations, Part 5 (California Plumbing Code);
- Title 24, California Code of Regulations, Part 6 (California Energy Code, for building energy conservation systems and temperature control and ventilation systems);
- Title 24, California Code of Regulations, Part 2 (California Building Code); and
- San Bernardino County codes.

The CBO may deputize inspectors to carry out the functions of the code enforcement agency.

<u>**Verification:**</u> At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of any increment of major piping or plumbing construction listed in **Facility Design Table 2**, condition of certification **GEN-2,** above, the project owner shall submit to the CBO for design review and approval the final plans, specifications, and calculations, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with applicable LORS, and shall send the CPM a copy of the transmittal letter in the next monthly compliance report.

The project owner shall transmit to the CPM, in the monthly compliance report following completion of any inspection, a copy of the transmittal letter conveying the CBO's inspection approvals.

MECH-2 For all pressure vessels installed in the plant, the project owner shall submit to the CBO and California Occupational Safety and Health Administration (Cal-OSHA), prior to operation, the code certification papers and other documents required by applicable LORS. Upon completion of the installation of any pressure vessel, the project owner shall request the appropriate CBO and/or Cal-OSHA inspection of that installation.

The project owner shall:

1. Ensure that all boilers and fired and unfired pressure vessels are designed, fabricated, and installed in accordance with the appropriate section of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, or other applicable code. Vendor certification, with identification of applicable code, shall be submitted for prefabricated vessels and tanks; and

2. Have the responsible design engineer submit a statement to the CBO that the proposed final design plans, specifications, and calculations conform to all of the requirements set forth in the appropriate ASME Boiler and Pressure Vessel Code or other applicable codes.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of on-site fabrication or installation of any pressure vessel, the project owner shall submit to the CBO for design review and approval, the above listed documents, including a copy of the signed and stamped engineer's certification, with a copy of the transmittal letter to the CPM.

The project owner shall transmit to the CPM, in the monthly compliance report following completion of any inspection, a copy of the transmittal letter conveying the CBO's and/or Cal-OSHA inspection approvals.

MECH-3 The project owner shall submit to the CBO for design review and approval the design plans, specifications, calculations, and quality control procedures for any heating, ventilating, air conditioning (HVAC) or refrigeration system. Packaged HVAC systems, where used, shall be identified with the appropriate manufacturer's data sheets.

The project owner shall design and install all HVAC and refrigeration systems within buildings and related structures in accordance with the CBC and other applicable codes. Upon completion of any increment of construction, the project owner shall request the CBO's inspection and approval of that construction. The final plans, specifications and calculations shall include approved criteria, assumptions, and methods used to develop the design. In addition, the responsible mechanical engineer shall sign and stamp all plans, drawings and calculations and submit a signed statement to the CBO that the proposed final design plans, specifications and calculations conform with the applicable LORS.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of construction of any HVAC or refrigeration system, the project owner shall submit to the CBO the required HVAC and refrigeration calculations, plans, and specifications, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with the CBC and other applicable codes, with a copy of the transmittal letter to the CPM.

ELEC-1 Prior to the start of any increment of electrical construction for all electrical equipment and systems 480 Volts or higher (see a representative list, below), with the exception of underground duct work and any physical layout drawings and drawings not related to code compliance and life safety, the project owner shall submit, for CBO design review and approval, the proposed final design, specifications, and calculations. Upon approval, the above listed plans, together with design changes and design change notices, shall remain on the site or at another accessible location for the operating life of the project. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS. All transmission facilities (lines, switchyards, switching stations, and substations) are handled in conditions of certification in the **TRANSMISSION SYSTEM ENGINEERING** section of this document.

A. Final plant design plans shall include:

1. one-line diagrams for the 13.8 kV, 4.16 kV and 480 V systems; and

2. system grounding drawings.

B. Final plant calculations must establish:

1. short-circuit ratings of plant equipment;

2. ampacity of feeder cables;

3. voltage drop in feeder cables;

4. system grounding requirements;

5. coordination study calculations for fuses, circuit breakers and protective relay settings for the 13.8 kV, 4.16 kV and 480 V systems;

6. system grounding requirements; and

7. lighting energy calculations.

C. The following activities shall be reported to the CPM in the monthly compliance report:

1. Receipt or delay of major electrical equipment;

2. Testing or energization of major electrical equipment; and

3. A signed statement by the registered electrical engineer certifying that the proposed final design plans and specifications conform to requirements set forth in the Energy Commission decision.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of each increment of electrical construction, the project owner shall submit to the CBO for design review and approval the above listed documents. The project owner shall include in this submittal a copy of the signed and stamped statement from the responsible electrical engineer attesting compliance with the applicable LORS, and shall send the CPM a copy of the transmittal letter in the next monthly compliance report.

D.1.13 CONCLUSIONS

1. The laws, ordinances, regulations and standards (LORS) identified in the AFC and supporting documents directly apply to the project.

2. Staff has evaluated the proposed engineering LORS, design criteria, and design methods in the record, and concludes that the design, construction, and eventual closure of the project will likely comply with applicable engineering LORS.

3. The proposed conditions of certification will ensure that the Calico Solar Project is designed and constructed in accordance with applicable engineering LORS. This will be accomplished through design review, plan checking, and field inspections that will

be performed by the CBO or other Energy Commission delegate. Staff will audit the CBO to ensure satisfactory performance.

4. Though future conditions that could affect decommissioning are largely unknown at this time, it can reasonably be concluded that if, the project owner submits a decommissioning plan as required in the **GENERAL CONDITIONS** portion of this document prior to decommissioning, decommissioning procedures will comply with all applicable engineering LORS.

Energy Commission staff recommends that:

1. The proposed conditions of certification be adopted to ensure that the project is designed and constructed in a manner that protects the public health and safety and complies with all applicable engineering LORS;

2. The project be designed and built to the 2007 CBSC (or successor standards, if in effect when initial project engineering designs are submitted for review); and

3. The CBO reviews the final designs, checks plans, and performs field inspections during construction. Energy Commission staff shall audit and monitor the CBO to ensure satisfactory performance.

D.1.14 REFERENCES

SES Solar One 2008a – Application for Certification for the Stirling Energy Systems (SES) Solar One Project, Volumes 1 and 2 (tn: 49181). Submitted to the California Energy Commission on December 1, 2008.

D.2 – GEOLOGIC STABILITY

Testimony of Dal Hunter, Ph.D., C.E.G.

D.2.1 SUMMARY OF CONCLUSIONS

(NOTE: The GEOLOGIC STABILITY issue area has been addressed as part of Section C.4 GEOLOGY, SOILS, AND PALEONTOLOGICAL RESOURCES. The summary below is from that environmental analysis. Please refer to that section for the full analysis.)

The proposed Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) site is located in an active geologic area of the north-central Mojave Desert Geomorphic Province in central San Bernardino County in south-central California. Because of its geologic setting, the site could be subject to intense levels of earthquake-related ground shaking. The effects of strong ground shaking would need to be mitigated, to the extent practical, through structural designs required by the California Building Code (CBC 2007) and the project geotechnical report. The CBC (2007) requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction. A geotechnical investigation has been performed and presents standard engineering design recommendations for mitigation of seismic shaking and site soil conditions.

There are no known viable geologic or mineralogical resources at the proposed Calico Solar Project site. Locally, paleontological resources have been documented within older Quaternary alluvium which underlies the younger Quaternary alluvium of the site surface. Potential impacts to paleontological resources would be mitigated through worker training and monitoring by qualified paleontologists, as required by Conditions of Certification, **PAL-1** through **PAL-7**.

Based on its independent research and review, California Energy Commission and U.S. Bureau of Land Management staff believes that the potential is low for significant adverse impacts to the proposed project from geologic hazards during its design life and to potential geologic, mineralogic, and paleontological resources from the construction, operation, and closure of the proposed project. It is staff's opinion that the Calico Solar Project could be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards and in a manner that both protects environmental quality and assures public safety, to the extent practical. Implementation and enforcement of the proposed conditions of certification should result in less than significant impacts to geology and paleontology.

D.3 – POWER PLANT EFFICIENCY

Testimony of Shahab Khoshmashrab

D.3.1 SUMMARY OF CONCLUSIONS

The Calico Solar Project, if constructed and operated as proposed, would generate 850 megawatts (MW) (nominal net output) of electricity. The Calico Solar Project would be a solar thermal power plant to be built on an approximately 8,230-acre site in San Bernardino County, California. The project would use a Stirling engine-based solar thermal technology to produce electrical power using 34,000 Stirling Energy Systems SunCatcher units. The Calico Solar Project would use solar energy to generate all of its capacity; no fossil fuel (natural gas) would be used for power production.

The project would decrease reliance on fossil fuel, and would increase reliance on renewable energy resources. It would not create significant adverse effects on fossil fuel energy supplies or resources, would not require additional sources of energy supply, and would not consume fossil fuel energy in a wasteful or inefficient manner. No efficiency standards apply to this project. Staff therefore concludes that this project would present no significant adverse impacts on fossil fuel energy resources.

Employing a less land-intensive solar technology, such as the linear parabolic trough technology, would increase the solar land use efficiency of Calico Solar. Staff believes Calico Solar represents one of the least land use-efficient solar technologies proposed by the projects currently in the Energy Commission's licensing process.

D.3.2 INTRODUCTION

Fossil Fuel Use Efficiency

One of the responsibilities of the California Energy Commission (Energy Commission) and the Bureau of Land Management (BLM) is to make findings on whether the energy use by a power plant, including the proposed Calico Solar Project, would result in significant adverse impacts on the environment, as defined in the California Environmental Quality Act (CEQA), and also characterize any adverse impacts under the National Environmental Policy Act (NEPA). If the Energy Commission finds that the Calico Solar Project's energy consumption creates a significant adverse impact under CEQA, it must further determine if feasible mitigation measures could eliminate or minimize that impact. In this analysis, staff addresses the inefficient and unnecessary consumption of energy.

In order to support the SA/DEIS's findings, this analysis will:

- examine whether the facility would likely present any adverse impacts upon energy resources;
- examine whether these adverse impacts are significant; and if so,
- examine whether feasible mitigation measures or alternatives could eliminate those adverse impacts or reduce them to a level of insignificance.

Solar Land Use Efficiency

Solar thermal power plants typically consume much less fossil fuel (usually in the form of natural gas) than other types of thermal power plants. Therefore, common measures of power plant efficiency such as those described above are less meaningful. Solar power plants do occupy vast tracts of land, so, the focus for these types of facilities shifts from fuel efficiency to land use efficiency. To analyze the land use efficiency of a solar facility staff utilizes the following approach.

Solar thermal power plants convert the sun's energy into electricity in three basic steps:

- Mirrors and/or collectors capture the sun's rays.
- This solar energy is converted into heat.
- This heat is converted into electricity, typically in a heat engine such as a steam turbine generator or a Stirling Engine-powered generator.

The effectiveness of each of these steps depends on the specific technology employed; the product of these three steps determines the power plant's overall solar efficiency. The greater the project's solar efficiency, the less land the plant must occupy to produce a given power output.

The most significant environmental impacts caused by solar power plants result from occupying large expanses of land. The extent of these impacts is directly related to the number of acres affected. For this reason, staff will evaluate the land use efficiency of proposed solar power plant projects. This efficiency will be expressed in terms of power produced, or MW per acre, and in terms of energy produced, or MW-hours per acre-year. Specifically:

- Power-based solar land use efficiency is calculated by dividing the maximum net power output in MW by the total number of acres impacted by the power plant, including roads and electrical switchyards and substations.
- Energy-based solar land use efficiency is calculated by dividing the annual net electrical energy production in MW-hours per year by the total number of acres impacted by the power plant. Since different solar technologies consume differing quantities of natural gas for morning warm-up, cloudy weather output leveling and heat transfer fluid freeze protection (and some consume no gas at all), this effect will be accounted for. Specifically, gas consumption will be backed out by reducing the plant's net energy output by the amount of energy that could have been produced by consuming the project's annual gas consumption in a modern combined cycle power plant. This reduced energy output will then be divided by acres impacted. Since Calico Solar would consume no natural gas, this correction is unnecessary for this analysis.

D.3.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The Calico Solar Project would consume no natural gas or other fossil fuel for power generation. However, some electricity would be consumed in operating the plant. Each of the 34,000 Stirling engines is filled with hydrogen gas, which acts as a working fluid that allows the engine to operate. During operation, hydrogen leaks from the engines and must be continuously replenished from pressure bottles located at each SunCatcher, or by means of a centralized hydrogen system connected to each SunCatcher.

Hydrogen is typically produced either from natural gas, or by electrolysis of water using electricity. The applicant explained that approximately 7.2 million standard cubic feet of hydrogen gas per year would be produced to supply the necessary replenishment hydrogen (SES 2009e, Data Response 58). Hydrogen would be created on-site by electrolysis of water using electricity from the grid, consuming approximately 37 MWh of electrical energy annually (SES 2009e, Data Response 59). In addition, compressing the hydrogen gas to operating pressure would consume approximately 178 MWh of electricity per year (SES 2009e, Data Response 60) for a total of 215 MW-hours per year. Compared to any power plant of equal capacity, this rate is insignificant. Energy Commission staff, however, will include this consumption in calculating the plant's efficiency, below.

There are currently no legal or industry standards for measuring the efficiency of solar thermal power plants (CEC 2008c). Stirling Energy Systems claims that the SunCatcher exhibits a conversion efficiency of 31.25% (SES 2008a, AFC § 1.3).

Since the project will not consume any natural gas, staff considers the impact of the project's fuel consumption on energy supplies and energy efficiency to be less than significant.

Adverse Effects on Energy Supplies and Resources

The applicant would produce hydrogen gas onsite through electrolysis of water (SES 2009e, Data Responses 57-60). Staff deems it unlikely that this could cause any measurable impact on energy supplies.

Additional Energy Supply Requirements

Since supplying the project with hydrogen gas would consume such an insignificant amount of energy, there is no likelihood that additional energy supplies would be required.

Compliance With Energy Standards

No standards apply to the efficiency of Calico Solar or other non-cogeneration projects.

Alternatives To Reduce Wasteful, Inefficient, and Unnecessary Energy Consumption

Staff evaluates the project alternatives to determine if alternatives exist that could reduce the project's fuel use. The evaluation of alternatives to the project (that could reduce wasteful, inefficient, or unnecessary energy consumption) requires the examination of the project's energy consumption. The project's fuel consumption would be negligible, therefore staff need not evaluate alternatives that could reduce or eliminate the use of natural gas.

Efficiency of Alternatives to the Project

The Calico Solar Project's objectives include the generation of electricity using the Stirling Energy Systems SunCatcher solar thermal technology via a 20-year power purchase agreement with SCE for renewable power (SES 2008a, AFC §§ 2.0, 2.1, 2.2).

Alternative Generating Technologies

Alternative generating technologies for the proposed project are considered in the AFC (SES 2008a, AFC §§ 4.4.1, 4.4.2, 4.4.3). For purposes of this analysis, natural gas, oil, coal, nuclear, geothermal, biomass, hydroelectric, wind and solar photovoltaic technologies are all considered. Given the project objectives, location, air pollution control requirements, and the commercial availability of the above technologies, staff agrees with the applicant that the selected solar thermal technology is a reasonable selection.

Staff, therefore, believes that the Calico Solar Project would not constitute a significant adverse impact on fossil fuel energy resources compared to feasible alternatives.

D.3.4 PROPOSED PROJECT

D.3.4.1 SETTING AND EXISTING CONDITIONS

The applicant proposes to build and operate the Calico Solar Project, a solar thermal power plant producing a total of 850 MW (nominal net output) and employing Stirling Energy Systems SunCatcher technology. The project would occupy approximately 8,230 acres of land and would consist of 34,000 SunCatchers (SES 2008a, AFC §§ 1.1, 1.3, 2.2, 3.1, 3.3).

Each SunCatcher is composed of a pedestal, a mirrored dish that tracks the sun, and a power conversion unit (PCU) consisting of a solar receiver, a closed-cycle Stirling engine, and a generator that capture the solar energy and convert it to electricity. Each SunCatcher is capable of generating 25 kW of power. Power would be routed from the SunCatchers to electrical transformers, then to a switchyard located near the center of the project (SES 2008a, AFC §§ 3.1, 3.1.1, 3.4.1, 3.4.3, 3.4.4.1, 3.4.4.2).

The project would not use fossil fuel to generate electricity. However, some electricity consumption would result due to the necessity of replacing hydrogen gas that leaks from the Stirling engines; see below.

D.3.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Project Energy Requirements and Energy Use Efficiency

The Calico Solar Project would consume no natural gas or other fossil fuel for power generation. However, some electricity would be consumed in operating the plant. Each of the 34,000 Stirling engines is filled with hydrogen gas, which acts as a working fluid that allows the engine to operate. During operation, hydrogen leaks from the engines and must be continuously replenished from pressure bottles located at each SunCatcher, or from a centralized hydrogen distribution system.

The applicant explained that hydrogen would be created on-site by electrolysis of water using electricity from the grid, consuming approximately 37 MWh of electrical energy annually. In addition, compressing the hydrogen gas to operating pressure would consume an additional 178 MWh per year (SES 2009e, Data Responses 58-60), for a total of 215 MW-hours per year. Compared to a typical natural gas-fired power plant of equal capacity, this rate is insignificant. Energy Commission staff, however, will include this consumption in calculating the plant's efficiency, below.

There are currently no legal or industry standards for measuring the efficiency of solar thermal power plants (CEC 2008c). Stirling Energy Systems claims that the SunCatcher exhibits a conversion efficiency of 31.25% (SES 2008a, AFC § 1.3).

Due to the project's negligible consumption of natural gas, staff considers the impact of the project's fuel consumption on energy supplies and energy efficiency to be less than significant.

Adverse Effects on Energy Supplies and Resources

The applicant would produce hydrogen gas onsite through electrolysis of water, consuming 215 MW-hours of electrical energy per year (SES 2009e, Data Responses 57-60). Staff deems it unlikely that this insignificant level of consumption could cause any measurable impact on energy supplies.

Additional Energy Supply Requirements

Since supplying the project with hydrogen gas would consume such an insignificant amount of energy, there is no likelihood that additional energy supplies would be required.

Compliance With Energy Standards

No standards apply to the efficiency of Calico Solar or other non-cogeneration projects.

Alternatives to Reduce Wasteful, Inefficient, And Unnecessary Energy Consumption

Staff evaluates the project alternatives to determine if alternatives exist that could reduce the project's fuel use. The evaluation of alternatives to the project (that could reduce wasteful, inefficient, or unnecessary energy consumption) requires the examination of the project's energy consumption. The project's fuel consumption would be negligible, therefore staff need not evaluate alternatives that could reduce or eliminate the use of natural gas.

Efficiency of Alternatives to the Project

The Calico Solar Project's objectives include the generation of electricity using the Stirling Energy Systems SunCatcher solar thermal technology via a 20-year power purchase agreement with SCE for renewable power (SES 2008a, AFC §§ 2.0, 2.1, 2.2).

Alternative Generating Technologies

Alternative generating technologies for the Calico Solar Project are considered in the AFC (SES 2008a, AFC §§ 4.4.1, 4.4.2, 4.4.3). For purposes of this analysis, natural gas, oil, coal, nuclear, geothermal, biomass, hydroelectric, wind and solar photovoltaic technologies are all considered. Given the project objectives, location, air pollution control requirements, and the commercial availability of the above technologies, staff agrees with the applicant that the selected solar thermal technology is a reasonable selection.

Staff, therefore, believes that the Calico Solar Project would not constitute a significant adverse impact on fossil fuel energy resources compared to feasible alternatives.

The solar insolation falling on the earth's surface can be regarded as an energy resource. Since this energy is inexhaustible, its consumption does not present the concerns inherent in fossil fuel consumption. What is of concern, however, is the extent of land area required to capture this solar energy and convert it to electricity. Setting aside hundreds or thousands of acres of land for solar power generation removes it from alternative uses.

To assess the proposed project's land use efficiency, staff compares the land use efficiency of the solar projects currently before the Commission to the Calico Solar Project. This comparison helps determine a range of viable efficiencies and where the Calico Solar Project falls.

Method and Threshold for Determining the Significance of Solar Land Use Energy Resources

Energy Commission staff proposes to compare the land use of a solar power plant project to that of other solar projects in the Energy Commission's siting process. Staff proposes to compare several solar projects currently in the process. As this is written, several solar power plant projects have progressed significantly through the Energy Commission siting process. These projects' power and energy output, and the extent of the land occupied by them, are summarized in **Efficiency Table 1**, below. The solar land use efficiency for a typical natural gas-fired combined cycle power plant is shown only for comparison.

Adverse Effects on Project Land Use

The Calico Solar Project would produce power at the rate of 850 MW net, and would generate energy at the rate of 1,840,000 MW-hours net per year, while occupying 8,230 acres (SES 2008a, AFC §§ 1.1, 1.3, 2.2, 3.1, 3.11.1). Staff calculates power-based land use efficiency thus:

Power-based efficiency: 850 MW ÷ 8,230 acres = **0.103 MW/acre** or **9.7 acres/MW**

Staff calculates energy-based land use efficiency thus:

Energy-based efficiency: First, back out the electrical energy consumed in hydrogen replenishment:

> 1,840,000 MWh/year – 215 MWh/year = 1,839,785 MWh/year
>
> 1,839,785 MWh/year ÷ 8,230 acres = **224 MWh/acre-year**

As seen in **Efficiency Table 1**, the Calico Solar Project, employing the Stirling Energy Systems SunCatcher technology, is less efficient in use of land than the Beacon Solar, Ridgecrest Solar, Palen Solar, and Blythe Solar projects, which would employ linear parabolic trough technology. Calico Solar is roughly as efficient in use of land as the Ivanpah Solar Electric Generating System project, which would employ BrightSource power tower technology.

Efficiency Table 1
Solar Land Use Efficiency

Project	Generating Capacity (MW net)	Annual Energy Production (MWh net)	Annual Fuel Consumption (MMBtu LHV)	Foot-print (Acres)	Land Use Efficiency (Power-Based) (MW/acre)	Land Use Efficiency (Energy – Based) (MWh/acre-year)	
						Total	Solar Only[1]
Calico Solar (08-AFC-13)	**850**	**1,840,000**	**0**	**8,230**	**0.103**	**224**	**224**
Beacon Solar (08-AFC-2)	250	600,000	36,000	1,240	0.20	484	480
Ivanpah SEGS (07-AFC-5)	400	960,000	432,432	3,744	0.11	256	238
Abengoa Solar (09-AFC-5)	250	630,000	94,280	1420	0.18	444	434
Blythe Solar (09-AFC-6)	1,000	2,100,000	207,839	5,950	0.17	353	348
Palen Solar (09-AFC-7)	500	1,000,000	103,919	2,970	0.17	337	332
Genesis Solar (09-AFC-8)	250	600,000	60,000	1,800	0.14	333	329
Ridgecrest Solar (09-AFC-9)	250	500,000	51,960	1,440	0.17	347	342
San Joaquin Solar Hybrid (08-AFC-12)	106	774,000	5,899,500	640	0.17	1,209	415
Avenal Energy (08-AFC-1)[2]	600	3,023,388	24,792,786	25	24.0	120,936	N/A

[1] Net energy output is reduced by natural gas-fired combined cycle proxy energy output; see **Efficiency Appendix A**.
[2] Example is a natural gas-fired combined cycle plant.

Alternatives to Reduce Solar Land Use Impacts

Building and operating a natural gas-fired combined cycle power plant would yield much greater land use efficiency than any solar power plant; see **Efficiency Table 1**. However, this would not achieve the basic project objective, to generate electricity from the renewable energy of the sun.

Building a solar power plant employing a different technology, such as the linear parabolic trough technology of the Ridgecrest Solar, Blythe Solar, or Palen Solar projects, would increase the solar land use efficiency of the Calico Solar Project. Staff believes the Calico Solar Project represents one of the least land use-efficient solar technologies proposed among the projects currently in the Energy Commission's licensing process.

Alternative Heat Rejection System

The Stirling engine that is the heart of the SunCatcher technology is cooled by an automotive-style cooling system. Waste engine heat is conducted via an enclosed cooling loop to a radiator that dumps the waste heat to the atmosphere. This is a dry cooling system; its only water consumption is that required to make up any unintended leakage from the system. Thus, staff believes the cooling technology selected for this project is the optimum possible.

Project Closure

According to Section 3.12 of the applicant's project description, the solar generating facility is expected to have a lifespan of up to 40 years. At any point during this time, temporary or permanent closure of the solar facility could occur. Temporary closure would be a result of necessary maintenance, hazardous weather conditions, or damage due to a natural disaster. Permanent closure would be result of damage that is beyond repair, adverse economic conditions, or other significant reasons.

Both temporary and permanent closures would require the applicant to submit to the CEC a contingency plan or a decommissioning plan, respectively. A contingency plan would be implemented to ensure compliance with applicable LORS, and appropriate shutdown procedures depending on the length of the cessation. A decommissioning plan would be implemented to ensure compliance with applicable LORS, removal of equipment and shutdown procedures, site restoration, potential decommissioning alternatives, and the costs and source of funds associated with decommissioning activities.

D.3.4.3 CEQA LEVEL OF SIGNIFICANCE

CEQA guidelines state that the environmental analysis "…shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy" (Title 14 CCR §15126.4[a][1]). Appendix F of the guidelines further suggests consideration of such factors as the project's energy requirements and energy use efficiency; its effects on local and regional energy supplies and energy resources; its requirements for additional energy supply capacity; its compliance with existing energy standards; and any alternatives that could reduce the wasteful, inefficient, and unnecessary consumption of energy (Title 14, CCR §15000 et seq., Appendix F).

The inefficient and unnecessary consumption of energy, in the form of non-renewable fuels such as natural gas and oil, constitutes an adverse environmental impact. An adverse impact can be considered significant if it results in:

- adverse effects on local and regional energy supplies and energy resources;
- a requirement for additional energy supply capacity;
- noncompliance with existing energy standards; or
- the wasteful, inefficient, and unnecessary consumption of fuel or energy.

D.3.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the boundaries of Phase 2 of the proposed 850 MW project. This alternative and alternative locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

D.3.5.1 SETTING AND EXISTING CONDITIONS

The Reduced Acreage alternative would be a 275 MW solar facility within the Phase 2 boundaries of the proposed project.

D.3.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Since the Reduced Acreage plant output would produce only 275 MW (32% of the proposed project's 850 MW), its impacts on the SCE grid would be proportionately less. Since the Reduced Acreage plant would produce 275 MW while occupying 2,300 acres (28% of the proposed project's 8,230 acres), its power-based land use efficiency would be 0.12 MW/acre, slightly higher than the proposed project, but still only about half as efficient as other solar thermal technologies.

D.3.5.3 CEQA LEVEL OF SIGNIFICANCE

If the Reduced Acreage alternative were constructed, the CEQA Level of Significance, as measured by land use (occupied acreage), would amount to approximately 28% of the levels described for the proposed project. No conditions of certification would apply.

D.3.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed 850 MW project. This alternative, the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 2**.

D.3.6.1 SETTING AND EXISTING CONDITIONS

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed 850 MW project.

D.3.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Since the Avoidance of Donated and Acquired Lands Alternative plant output would produce 720 MW (85% of the proposed project's 850 MW) its impacts on the SCE grid would be only slightly less. Since the Avoidance of Donated and Acquired Lands Alternative plant would produce 720 MW while occupying 7,050 acres (86% of the proposed project's 8,230 acres), its power-based land use efficiency would be 0.102 MW/acre, about the same as the proposed project, but still only about half as efficient as other solar thermal technologies.

D.3.6.3 CEQA LEVEL OF SIGNIFICANCE

The CEQA Level of Significance would not change from the levels described for the proposed project if this alternative were constructed. No condition of certification would apply.

D.3.7 NO PROJECT / NO ACTION ALTERNATIVE

D.3.7.1 NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no ground disturbance. The decreased reliance on fossil fuel and increased reliance on renewable energy resources that would occur with the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations

D.3.7.2 NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site will be developed with another solar technology. Construction and operation requirements for solar technologies vary; however, they would all decrease reliance on fossil fuel, and would increase reliance on renewable energy resources as with the proposed project.

D.3.7.3 NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended so no solar projects can be approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no construction of a solar facility. Therefore, there would be no decreased reliance on fossil fuel and increased reliance on renewable energy resources as with the proposed project. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

D.3.8 PROJECT-RELATED FUTURE ACTIONS

Proposed upgrades to the SCE transmission system, known as the 275 MW Early Interconnection option and the 850 MW Full Build-Out option are considered to be reasonably foreseeable actions that would be contingent on construction of the proposed Calico Solar Project. The SCE upgrades would not impact the power plant efficiency of the proposed Calico Solar Project.

D.3.9 CUMULATIVE IMPACT ANALYSIS

There are no nearby power plant projects or other projects consuming large amounts of fossil fuel that hold the potential for cumulative energy consumption impacts when aggregated with the project.

Staff believes that the construction and operation of the project would not create indirect impacts (in the form of additional fuel consumption) that would not have otherwise occurred without this project. Because Calico Solar would consume no fossil fuel, it should compete favorably in the California power market and replace fossil fuel burning power plants. The project would therefore cause a positive impact on the cumulative amount of fossil fuel consumed for power generation.

D.3.10 COMPLIANCE WITH LORS

No federal, state, or local/county laws, ordinances, regulations, and standards (LORS) apply to the efficiency of this project.

D.3.11 NOTEWORTHY PUBLIC BENEFITS

The Calico Solar Project would employ an advanced solar thermal technology. Solar energy is renewable and unlimited. The project would have a less than significant adverse impact on nonrenewable energy resources (natural gas). Consequently, the project would help in reducing California's dependence on fossil fuel-fired power plants.

D.3.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

No conditions of certification are proposed.

D.3.13 CONCLUSIONS

Fossil Fuel Energy Use

The Calico Solar Project, if constructed and operated as proposed, would use solar energy to generate all of its capacity, consuming no natural gas for power production. The project would decrease reliance on fossil fuel, and would increase reliance on renewable energy resources. It would not create significant adverse effects on energy supplies or resources, would not require additional sources of energy supply, and would not consume energy in a wasteful or inefficient manner. No energy standards apply to this project. Staff therefore concludes that this project would present no significant adverse impacts on energy resources.

No cumulative impacts on energy resources are likely. Facility closure would not likely present significant impacts on electric system efficiency.

Land Use

The Calico Solar Project, if constructed and operated as proposed, would occupy nearly 10 acres per MW of power output, a figure higher than that of some other solar power technologies. Employing a less land-intensive solar technology, such as the linear parabolic trough technology of the Ridgecrest Solar, Blythe Solar, or Palen Solar projects, would increase the solar land use efficiency of the proposed project. The Calico Solar Project is roughly as efficient in use of land as the Ivanpah Solar Electric Generating System project, which would employ BrightSource power tower technology.

Staff believes the Calico Solar Project represents one of the least land use-efficient solar technologies proposed among the projects currently in the Energy Commission's licensing process.

D.3.14 REFERENCES

CEC 2008c – Report of Conversation between Steve Baker and Golam Kibrya – CEC staff. February 22, 2008.

SES 2008a – Stirling Energy Systems/R. Liden (tn 49181). Application for Certification, dated December 1, 2008. Submitted to CEC/Docket Unit on December 1, 2008.

SES 2009e – Tessera Solar/ C. Champion (tn: 52466). Applicant's Responses to CEC and BLM Data Requests Set 1 Part 1. Dated 7/17/09. Submitted to CEC/Docket Unit on 7/20/09.

EFFICIENCY APPENDIX A

Solar Power Plant Efficiency Calculation
Gas-Fired Proxy

In calculating the efficiency of a solar power plant, it is desired to subtract the effect of natural gas burned for morning startup, cloudy weather augmentation and Therminol freeze protection. As a proxy, we will use an average efficiency based on several recent baseload combined cycle power plant projects in the Energy Commission siting process. Baseload combined cycles were chosen because their intended dispatch most nearly mirrors the intended dispatch of solar plants, that is, operate at full load in a position high on the dispatch authority's loading order.

The most recent such projects are:

Colusa Generating Station (06-AFC-9)

Nominal 660 MW 2-on-1 Combined Cycle with GE Frame 7FA CGTs
Air cooled condenser, evaporative inlet air cooling

Efficiency with duct burners on:	666.3 MW @ 52.5% LHV
Efficiency with duct burners off:	519.4 MW @ 55.3% LHV
Efficiency (average of these two):	**53.9% LHV**

San Gabriel Generating Station (07-AFC-2)

Nominal 696 MW 2-on-1 Combined Cycle with Siemens 5000F CGTs
Air cooled condenser, evaporative inlet air cooling

Efficiency with duct burners on:	695.8 MW @ 52.1% LHV
Efficiency with duct burners off:	556.9 MW @ 55.1% LHV
Efficiency (average of these two):	**53.6% LHV**

KRCD Community Power Plant (07-AFC-7)

Nominal 565 MW 2-on-1 Combined Cycle with GE or Siemens F-class CGTs
Evaporative cooling, evaporative or fogging inlet air cooling

Efficiency with GE CGTs:	497 MW @ 54.6% LHV
Efficiency with Siemens CGTs:	565 MW @ 56.1% LHV
Efficiency (average of these two):	**55.4% LHV**

Avenal Energy (08-AFC-1)

Nominal 600 MW 2-on-1 Combined Cycle with GE Frame 7FA CGTs
Air cooled condenser, inlet air chillers

Efficiency with duct burners on:	600.0 MW @ 50.5% LHV
Efficiency with duct burners off:	506.5 MW @ 53.4% LHV
Efficiency (average of these two):	**52.0% LHV**

Average of these four power plants: **53.7% LHV**

D.4 – POWER PLANT RELIABILITY

Testimony of Shahab Khoshmashrab

D.4.1 SUMMARY OF CONCLUSIONS

The applicant predicts an availability factor of 99%. Staff cannot determine whether this is achievable and cannot predict what the actual availability might be, given the demonstration status of this Stirling engine and limited data on large-scaled deployments of Stirling engines. (The availability factor of a power plant is the percentage of time it is available to generate power; both planned and unplanned outages subtract from this availability.) Staff believes it possible that the project may face challenges from considerable maintenance demands, reducing its availability.

Power Plant Reliability is not intended to address environmental impacts under either CEQA or NEPA.

D.4.2 INTRODUCTION

In this analysis, California Energy Commission (Energy Commission) staff addresses the reliability issues of the Calico Solar Project to determine if the power plant is likely to be built in accordance with typical industry norms for reliable power generation. Staff uses this norm as a benchmark because it ensures that the resulting project would not be likely to degrade the overall reliability of the electric system it serves (see the “Setting” subsection, below).

The scope of this power plant reliability analysis covers:

- equipment availability;
- plant maintainability;
- fuel and water availability; and
- power plant reliability in relation to natural hazards.

Staff examined the project design criteria to determine if the project is likely to be built in accordance with typical industry norms for reliable power generation. While the applicant has predicted an availability factor of 99% for the Calico Solar Project (see below), staff commonly uses typical industry norms as the benchmark, rather than the applicant’s projection, to evaluate the project’s reliability.

D.4.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

METHOD FOR DETERMINING RELIABILITY

The Energy Commission must make findings as to how a project is designed, sited, and operated in order to ensure its safe and reliable operation (Title 20, CCR §1752[c]). Staff takes the approach that a project is acceptable if it does not degrade the reliability of the utility system to which it is connected. This is likely the case if a project is at least as reliable as other power plants on that system.

The availability factor of a power plant is the percentage of time it is available to generate power; both planned and unplanned outages subtract from this availability. Measures of power plant reliability are based upon both the plant's actual ability to generate power when it is considered to be available and upon starting failures and unplanned (or forced) outages. For practical purposes, reliability can be considered a combination of these two industry measures, making a reliable power plant one that is available when called upon to operate. Power plant systems must be able to operate for extended periods without shutting down for maintenance or repairs. Achieving this reliability requires adequate levels of equipment availability, plant maintainability with scheduled maintenance outages, fuel and water availability, and resistance to natural hazards. Staff examines these factors for the project and compares them to industry norms. If the factors compare favorably for the project, staff may then conclude that the project would be as reliable as other power plants on the electric system and would not degrade system reliability.

D.4.4 PROPOSED PROJECT

D.4.4.1 SETTING AND EXISTING CONDITIONS

In the restructured competitive electric power industry, the responsibility for maintaining system reliability falls largely to the state's control area operators, such as the California Independent System Operator (California ISO), that purchase, dispatch, and sell electric power throughout the state. Determining how the California ISO and other control area operators would ensure system reliability has been an ongoing effort. Protocols have been developed and put in place that allow sufficient reliability to be maintained under the competitive market system. "Must-run" power purchase agreements and "participating generator" agreements are two mechanisms that have been employed to ensure an adequate supply of reliable power.

The California ISO's mechanisms to ensure adequate power plant reliability apparently were devised under the assumption that the individual power plants that compete to sell power into the system will each exhibit a level of reliability similar to that of power plants of past decades. Accordingly, staff has recommended that power plant owners continue to build and operate their projects to the level of reliability to which all in the industry are accustomed.

As part of its plan to provide needed reliability, the applicant proposes to operate the 850-megawatt (MW) (net power output) Calico Solar Project, a solar thermal power plant facility employing advanced solar power technology. This project, using renewable solar energy, is intended to provide dependable power to the grid, generally during the hours of peak power consumption by Southern California Edison (SCE), the interconnecting utility. This project would help serve the need for renewable energy in California, as all its generated electricity would be produced by a reliable source of energy that is available during hot summer afternoons, when power is needed most.

The project applicant has indicated it expects the proposed project to achieve an availability factor of 99%. The project is anticipated to operate at an annual capacity factor of approximately 25% (SES 2008a, AFC §§ 1.3, 3.1, 3.9.14, 3.11.1).

D.4.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Equipment Availability

Equipment availability would be ensured by adoption of appropriate quality assurance/quality control (QA/QC) programs during the design, procurement, construction, and operation of the plant and by providing for adequate maintenance and repair of the equipment and systems discussed below.

Quality Control Program

The applicant describes a QA/QC program (SES 2008a, AFC § 3.11.4) that is typical of the power industry. Equipment would be purchased from qualified suppliers based on technical and commercial evaluations. Suppliers' personnel, production capability, past performance, QA programs, and quality history would be evaluated. The project owner would perform receipt inspections, test components, and administer independent testing contracts. Staff expects that implementation of this program would result in typical reliability of design and construction. To ensure this implementation, staff has proposed appropriate conditions of certification in the section of this document entitled **FACILITY DESIGN**.

Plant Maintainability

Equipment Redundancy

The project, as proposed in the AFC, would be able to operate only when the sun is shining. Maintenance or repairs could be done when the plant is shut down at night. This would help to enhance the project's reliability. Also, the project would incorporate redundant pieces of those components that are most likely to require service or repair. In this case, this redundancy is inherent in the incorporation of 34,000 individual SunCatcher units. This would allow service or repair to be done either at night when the plant is shut down, or during the day, when the plant is in operation, since only those SunCatchers actually being serviced or repaired would be unavailable to generate power.

In addition to the inherent redundancy of many independent units, the applicant plans to provide an appropriate redundancy of function for the remainder of project, including electrical transformers (SES 2008a). Major plant systems are designed with adequate redundancy to ensure their continued operation if equipment fails. Staff believes that this project's proposed equipment redundancy could be sufficient for its reliable operation.

Maintenance Program

Equipment manufacturers provide maintenance recommendations for their products, and the applicant would base the project's maintenance program on those recommendations (SES 2008a, AFC § 3.11.1). Because the plant would operate only during the sunlight hours, planned maintenance outages could be performed during other hours, when the plant would not need to be in operation.

The applicant predicts that each machine will leak its entire inventory of hydrogen once a year, thus requiring constant replenishment of hydrogen. For this reason, the applicant proposes a hydrogen electrolyzer and piping system that uses electricity from the grid to convert water into hydrogen and oxygen, then compresses the hydrogen and pipes it to each of the 34,000 SunCatchers (SES 2009h from SES Solar Two Project proceedings).

An expert familiar with the machines claims that the SunCatcher exhibits a Mean Time Between Failures (MTBF) of only 40 hours (Butler 2007). This means each machine, if operating continuously on long summer days, would need to be shut down and repaired approximately every 3 to 5 days, depending on expected average 8 to 12 hours operation in winter and summer, respectively. Shutting down and repairing several thousand SunCatchers each day would likely result in enormous maintenance demands and the project would likely face challenges in achieving the predicted 99% availability factor. It is believed by one expert that a MTBF of 2,000 to 10,000 hours must be proven before a technology is ready for incorporation into a utility grid (Butler 2007, Public 2009a; Conklin 2009 from SES Solar Two Project proceedings).

Staff conducted an online research to gather more information on the demonstration status of this Stirling engine on a large-scaled format, but no useful information was found. Due to the lack of sufficient information supporting the applicant's claim of an availability factor of 99% for the project, staff cannot determine whether the project would yield this availability factor.

Fuel and Water Availability

The long-term availability of fuel and water for cooling or process use may be necessary to ensure the reliability of any power plant, depending on the technology deployed.

Fuel Availability

The Calico Solar Project would consume no natural gas or other fossil fuel. Therefore, there is no likelihood that availability of natural gas would cause concern.

Water Supply Reliability

The Calico Solar Project would use water from a Cadiz groundwater well for mirror washing, for potable and fire protection water, and in an electrolysis process to produce hydrogen gas to replenish the hydrogen that leaks from the Stirling engines (SES 2008a, AFC §§ 1.3, 1.4, 3.1.2, 3.5.6, 3.5.10, 3.7). Since the Stirling engines are air-cooled, no water would be required for power plant cooling. At the project site, the water will be conveyed to a groundwater storage tank located at the Water Treatment Facility within the Main Services Complex.

Soil and Water Resources staff is currently evaluating the feasibility of this source. Thus, at this time, staff cannot conclude that the proposed source of water would represent a reliable supply of water for the project. For further discussion of water supply, see the **Soil and Water Resources** section of this document.

Power Plant Reliability in Relation to Natural Hazards

Natural forces can threaten the reliable operation of a power plant. Tsunamis (tidal waves) and seiches (waves in inland bodies of water) are not likely to present hazards for this project, but seismic shaking (earthquakes), flooding and high winds could present credible threats to the project's reliable operation (SES 2008a, AFC § 3.10.1).

Seismic Shaking

The site lies within a seismically active region; see the "Faulting and Seismicity" portion of the **GEOLOGY AND PALEONTOLOGY** section of this document. The project will be designed and constructed to the latest applicable LORS (SES 2008a, AFC § 3.10.1.1). Compliance with current seismic design LORS represents an upgrading of performance during seismic shaking compared to older facilities since these LORS have been continually upgraded. Because it would be built to the latest seismic design LORS, this project would likely perform at least as well as, and perhaps better than, existing plants in the electric power system. Staff has proposed conditions of certification to ensure this; see the section of this document entitled **FACILITY DESIGN**. In light of the general historical performance of California power plants and the electrical system in seismic events, staff has no special concerns with the power plant's functional reliability during earthquakes.

Flooding

Portions of the site lie within the 100-year flood plain (SES 2008a, AFC §§ 3.10.1.4). Project features would be designed and built to provide adequate levels of flood resistance. Staff believes there are no special concerns with power plant functional reliability due to flooding. For further discussion, see **SOIL AND WATER RESOURCES** and **GEOLOGY AND PALEONTOLOGY**.

High Winds

High winds are common in the region of the site; project features would be built to withstand winds over 90 miles per hour. Design would be in accordance with applicable LORS, including the 2007 California Building Code (SES 2008a, AFC § 3.10.1.2). Staff believes there are no special concerns with power plant functional reliability due to wind.

Comparison with Existing Facilities

The North American Electric Reliability Corporation (NERC) maintains industry statistics for availability factors (as well as other related reliability data). The NERC regularly polls North American utility companies on their project reliability through its Generating Availability Data System and periodically summarizes and publishes those statistics on the Internet at <http://www.nerc.com>. Energy Commission staff typically compares the applicant's claims for reliability to the statistical reliability of similar power plants. Because solar technology is relatively new and the technologies employed so varied, no NERC statistics are available for solar power plants. Staff's typical comparison with other existing facilities thus cannot be accomplished.

D.4.4.3 CEQA LEVEL OF SIGNIFICANCE

This does not apply to power plant reliability.

D.4.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the central portion of the proposed 850 MW project. It was developed because it can be constructed. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

D.4.5.1 SETTING AND EXISTING CONDITIONS

The Reduced Acreage alternative would be a 275 MW solar facility within the Phase 2 boundaries of the proposed project.

D.4.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Since the Reduced Acreage plant output would produce only 275 MW (32% of the proposed project's 850 MW), its impacts on the SCE grid would be proportionately less.

D.4.5.3 CEQA LEVEL OF SIGNIFICANCE

This does not apply to power plant reliability.

D.4.6 Avoidance of Donated and Acquired Lands Alternative

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed 850 MW project. This alternative, the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 2**.

D.4.6.1 SETTING AND EXISTING CONDITIONS

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed 850 MW project.

D.4.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Since the Avoidance of Donated and Acquired Lands Alternative plant output would produce 720 MW (85% of the proposed project's 850 MW), its impacts on the SCE grid would be only slightly less.

D.4.6.3 CEQA LEVEL OF SIGNIFICANCE

This does not apply to power plant reliability.

D.4.7 NO PROJECT / NO ACTION ALTERNATIVE

D.4.7.1 NO PROJECT/NO ACTION ALTERNATIVE #1

No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no ground disturbance. As a result, the power generation benefits of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates. However, if the current Stirling engine technology as proposed for the Calico Solar Project is proposed, reliability uncertainties similar to those described above, due to the lack of sufficient information supporting a high availability factor may result.

D.4.7.2 NO PROJECT/NO ACTION ALTERNATIVE #2

No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site will be developed with another solar technology. It is expected that the solar technology would be built in accordance with typical industry norms for reliable power generation. However, if the current Stirling engine technology as proposed for the Calico Solar Project is proposed, reliability uncertainties similar to those described above, due to the lack of sufficient information supporting a high availability factor may result.

D.4.7.3 NO PROJECT/NO ACTION ALTERNATIVE #3

No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended so no solar projects can be approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no construction of a solar facility. Therefore, no benefits resulting from additional power generation would occur with this alternative. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates. But, if the current Stirling engine technology as proposed for the Calico Solar Project is proposed, reliability uncertainties similar to those described above, due to the lack of sufficient information supporting a high availability factor may result.

D.4.8 PROJECT-RELATED FUTURE ACTIONS

Proposed upgrades to the SCE transmission system, known as the 275 MW Early Interconnection option and the 850 MW Full Build-Out option are considered to be reasonably foreseeable actions that would be contingent on construction of the proposed Calico Solar Project. The SCE upgrades would not impact the reliability of the proposed Calico Solar Project, and therefore, no additional analysis of reliability is required.

D.4.9 COMPLIANCE WITH LORS

No federal, state, or local/county laws, ordinances, regulations, or standards (LORS) apply to the reliability of this project.

D.4.10 NOTEWORTHY PUBLIC BENEFITS

This project, if successful, would help serve the need for renewable energy in California, as all of the electricity generated would be produced by a reliable source of energy that is available during the hot summer afternoons, when power is needed most.

D.4.11 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

No conditions of certification are proposed.

D.4.12 CONCLUSIONS

The applicant predicts an availability factor of 99%. Staff cannot determine whether this is achievable and cannot predict what the actual availability might be, given the demonstration status of this Stirling engine and limited data on large-scaled deployments of Stirling engines. Staff believes it possible that the project may face challenges from considerable maintenance demands, reducing its availability.

D.4.13 REFERENCES

Ayers, C. 2009 – Letter to Christopher Meyer, CEC staff, from Charlene Ayers, January 2, 2009.

CEC 2007 – California Energy Demand 2008-2018 Staff Revised Forecast, CEC-200-2007-015-SF2, November 2007; p. 122, Table 22.

CEM 2008 – California Energy Markets, No. 963, February 15, 2008, pp. 1, 11-12.

Conklin 2009 – Letter to Christopher Meyer, CEC staff, from Diane Conklin, Mussey Grade Road Alliance, January 2, 2009.

McGraw-Hill 1994 – McGraw-Hill Energy Information Services Group. 1994. Operational Experience in Competitive Electric Generation. Executive Report.

SES 2008a – Stirling Energy Systems/R. Liden (tn 49181). Application for Certification, dated December 1, 2008. Submitted to CEC/Docket Unit on December 1, 2008.

D.5 – TRANSMISSION SYSTEM ENGINEERING

Testimony of Sudath Edirisuriya and Mark Hesters

D.5.1 SUMMARY OF CONCLUSIONS

The proposed Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) outlet lines and termination are acceptable and would comply with all applicable laws, ordinances, regulations, and standards. The analysis of project transmission lines and equipment, both from the power plant up to the point of interconnection with the existing transmission network as well as upgrades beyond the interconnection that are attributable to the project have been evaluated by California Energy Commission and U.S. Bureau of Land Management staff and are included in the environmental sections of this Staff Assessment/Draft Environmental Impact Statement.

Staff concludes that mitigation of thermal overloads caused by the Calico Solar Project under the Base case and N-1 conditions would require the following facilities:

- Expand Southern California Edison's existing Pisgah 230kV interconnection facility and install a new 2,240 MVA, 500/230 kV substation with two 1,120 MVA transformer banks. The expansion of the existing Pisgah 230kV substation requires California CEQA/NEPA analysis.
- Loop the existing Eldorado-Lugo 500kV transmission line into the expanded Pisgah substation forming the Eldorado-Pisgah and Lugo-Pisgah number 1 500kV transmission lines.
- Install a new Lugo-Pisgah Number 2 500kV transmission line by removing the existing Lugo-Pisgah number 2 230kV transmission line, widening the existing Right-of-Way (ROW) where needed and constructing the new 500kV structures within the vacated ROW. The widening the existing ROW would require CEQA/NEPA analysis.
- Additionally, a Special Protection System (SPS) will be required to trip the proposed project to mitigate the thermal overloads caused by the N-1 emergency condition.
- The proposed Calico Solar Project should be designed and constructed with adequate reactive power resources to compensate the consumption of Var by the generator step-up transformers, distribution feeders and generator tie-lines.

D.5.2 INTRODUCTION

D.5.2.1 STAFF ANALYSIS

This transmission system engineering (TSE) analysis examines whether this project's proposed interconnection conforms to all laws, ordinances, regulations, and standards (LORS) required for safe and reliable electric power transmission. Additionally, under CEQA, the Energy Commission must conduct an environmental review of the "whole of the action," which may include facilities not licensed by the Energy Commission (Title 14, California Code of Regulations Section 15378). The Energy Commission must, therefore, identify the system impacts and necessary new or modified transmission facilities downstream of the proposed interconnection that are required for interconnection and that, when included with the other project features, represent the whole of the action.

Commission staff relies on the responsible interconnecting authority for analysis of impacts on the transmission grid, as well as for the identification and approval of new or modified facilities required downstream from a proposed interconnection for mitigation purposes. The proposed Calico Solar Project would connect to Southern California Edison's (SCE's) existing 230-kV transmission network and would require both analysis by SCE and the approval of the California Independent System Operator (California ISO).

D.5.2.2 SCE'S ROLE

SCE is responsible for ensuring electric system reliability in its service territory for proposed transmission modifications. For the proposed Calico Solar Project, SCE performed a System Impact Study (SIS) used to determine whether or not the proposed transmission modifications needed for the proposed Calico Solar Project conform to reliability standards. Because the project would be connected to the California ISO controlled transmission grid, the California ISO's role is to review and approve the SIS and its conclusions.

D.5.2.3 CALIFORNIA ISO'S ROLE

The California ISO is responsible for ensuring electric system reliability for all participating transmission owners and for developing the standards to achieve system reliability. The power generated by the proposed Calico Solar Project will be dispatched to the California ISO grid via SCE's existing Pisgah 230-kV Substation. Therefore, the California ISO will review the studies of the SCE system to ensure adequacy of the proposed transmission interconnection. The California ISO determines the reliability impacts of proposed transmission modifications on the SCE transmission system in accordance with all applicable reliability criteria. According to the California ISO tariffs, the California ISO will determine the need for transmission additions or upgrades downstream from the interconnection point to insure reliability of the transmission grid.

The California ISO reviewed the SIS prepared by SCE for the proposed Calico Solar Project and issued a preliminary approval to SCE. On completion of the SCE Facility Study, the California ISO will review the study results and provide its conclusions and recommendations. The California ISO may provide written and verbal testimony on its findings at the Energy Commission hearings.

D.5.2.4 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The LORS that apply to the transmission facilities associated with the proposed Calico Solar Project are:

- California Public Utilities Commission (CPUC) General Order 95 (GO-95), *Rules for Overhead Electric Line Construction*, sets forth uniform requirements for the construction of overhead lines. Compliance with this Order ensures adequate service and the safety of the public and the people who build, maintain, and operate overhead electric lines.

- CPUC General Order 128 (GO-128), *Rules for Construction of Underground Electric Supply and Communications Systems*, sets forth uniform requirements and minimum standards for underground supply systems to ensure adequate service and the safety of the public and the people who build, maintain, and operate underground electric lines.
- The National Electric Safety Code, 1999, provides electrical, mechanical, civil, and structural requirements for overhead electric line construction and operation.
- The combined North American Electric Reliability Corporation/Western Electricity Coordinating Council (NERC/WECC) planning standards provide system performance standards for assessing the reliability of the interconnected transmission system. These standards require continuity of service and the preservation of interconnected operation as the first and second priorities, respectively. Some aspects of NERC/WECC standards are either more stringent or more specific than the either agency's standards alone. These standards are designed to ensure that transmission systems can withstand both forced and maintenance outage system contingencies while operating reliably within equipment and electric system thermal, voltage, and stability limits. These standards include reliability criteria for system adequacy and security, system modeling data requirements, system protection and control, and system restoration. Analysis of the WECC system is based to a large degree on Section I.A of WECC standards, *NERC and WECC Planning Standards with Table I and WECC Disturbance-Performance Table,* and on Section I.D, *NERC and WECC Standards for Voltage Support and Reactive Power.* These standards require that power flows and stability simulations verify defined performance levels. Performance levels are defined by specifying allowable variations in thermal loading, voltage and frequency, and loss of load that may occur during various disturbances. Performance levels range from no substantial adverse effects inside and outside a system area during a minor disturbance (such as the loss of load from a single transmission element) to a catastrophic loss level designed to prevent system cascading and the subsequent blackout of islanded areas and millions of consumers during a major transmission disturbance (such as the loss of multiple 500-kV lines along a common right-of- way, and/or of multiple large generators). While the controlled loss of generation or system separation is permitted under certain specific circumstances, a major uncontrolled loss is not permitted (WECC, 2002).
- NERC's reliability standards for North America's electric transmission system spell out the national policies, standards, principles, and guidelines that ensure the adequacy and security of the nation's transmission system. These reliability standards provide for system performance levels under both normal and contingency conditions. While these standards are similar to the combined NERC/WECC standards, certain aspects of the combined standards are either more stringent or more specific than the NERC performance standards alone. NERC's reliability standards apply to both interconnected system operations and to individual service areas (NERC, 2006).
- California ISO planning standards provide the standards and guidelines that ensure the adequacy, security, and reliability of the state's member grid facilities. These standards incorporate the combined NERC/WECC and NERC standards. These standards are also similar to the NERC/WECC or NERC standards for transmission

system contingency performance. However, the California ISO standards provide additional requirements not included in the WECC/NERC or NERC standards. The California ISO standards apply to all participating transmission owners interconnecting to the California ISO-controlled grid. They also apply to non-member facilities that impact the California ISO grid through their interconnections with adjacent control grids (California ISO, 2002a).

- California ISO/Federal Energy Regulatory Commission (FERC) electricity tariffs contain guidelines for building all transmission additions/upgrades within the California ISO-controlled grid. (California ISO, 2003a).

D.5.3 PROPOSED PROJECT

D.5.3.1 SETTING AND EXISTING CONDITIONS

The applicant proposes to interconnect the proposed 850 megawatt (MW) Calico Solar Project to SCE's existing Pisgah 230 kV Substation which is located in San Bernardino County approximately 35 miles east of Barstow, California. The proposed project would be developed in two phases, one 275 MW phase (Calico Solar Project Phase 1), and one 575 MW phase (Calico Solar Project Phase 2), with a net output of 850MW.

The Calico Solar Project is a solar concentrating thermal power plant, based on the proprietary SunCatcher technology of Sterling Energy System, Inc. Each SunCatcher consists of a 25-kilowatt (kW) solar power generating system. The system is designed to track the sun automatically and to focus solar energy onto a power conversion unit (PCU), which generates electricity. Each SunCatcher consists of a 38-foot high by 40-foot wide solar concentrator in a dish structure that supports an array of curved glass mirror facets. These mirrors collect and concentrate solar energy onto the solar receiver of the PCU. Both phases of the project will consist of a total of approximately 34,000 SunCatchers. Each SunCatcher will produce 575 volts alternating current. The project will be electrically designed to 575V, 1.5 MW, three phase, 60Hz solar groups. Each complete solar group will consist of 60 SunCatchers, which correlates to a 1.5 MW power block with a corresponding GSU transformer. The 1750 KVA GSU transformer will step up the 575 volt (V) collector feeder voltage to 34.5 kV. The 1.5 MW solar groups will be connected by underground electrical cables to create the 3, 6 and 9 MW solar groups. Five 9 MW groups and one 3 MW group will be coupled through underground 4/0 aluminum electrical cables and ascend through a pole riser to create an overhead 48MW distribution collector line. Five 9 MW groups and one 6 MW group will be coupled through underground 4/0 aluminum electrical cables and ascend through a pole riser to create an overhead 51MW distribution collector line. The overhead collector groups will deliver the solar electric generated power to a new 850MW substation constructed on the site as part of the project. (SES Solar One, 2007c, Section 3.4, pages 3-27 to 3-32 and Figure 3-1 to 3-45

Switchyard and Interconnection Facilities

The applicant will build a 34.5 kV to 230 kV 850 MW substation on the project site. The substation will consist of six segments of 34.5 kV open air bus with each bus segment consist of five 1200A **,** 35 kV collection feeder circuit breakers. One 48 MW and two 51

MW overhead collection lines will be connected to the each six 34.5 kV bus segments via circuit breakers. Additionally, two 35 kV circuit breakers in each segment will connect to power factor correction 45 MVar capacitor banks in the substation yard. For Phase 1 of the project, the first interconnection substation will initially consist of four power transformers rated at 100/133/167 MVA each to convert the generation collection voltage from 34.5 kV to the transmission tie voltage of 230kV. The substation will ultimately contain six 100/133/167 MVA, 34.5 kV to 230kV step up transformers. Each power transformer will serve 3 of the 15 overhead collection lines. The high side of each step up transformer will be connected to the 230kV bus segments via 2000A, 230kV circuit breakers. One common bus for each phase will be formed by connecting the 230 kV bus segments through 2000A disconnect switches.

An approximately, 2 mile long 230kV single circuit will be used to interconnect the 850 MW Calico Solar Project substation to the Pisgah Substation. The single circuit of the overhead 230kV transmission line will be constructed with one 1590 kcmil per phase, aluminum conductor steel-reinforced (ACSR) conductor per line; each thermally rated to carry full project output in emergency conditions. Each circuit of the overhead line begins at a dead-end structure in the Calico Solar Project substation, continues east and parallel to the BNSF railroad ROW, and south crossing the BNSF railroad to a point where the line turns east leaving the site and undercrossing three SCE transmission lines before it finally enters the SCE Pisgah substation from the south. The transmission lines will start within the project site boundary but a 0.14 mile long segment from the project site to the Pisgah Substation will be outside the project site boundary. The off-site portion of the 230kV interconnect transmission line will be routed under existing SCE transmission lines. Construction of that line will include dead-end structures in the substation and 12 to 15 230 kV lattice steel towers and/ or tubular steel poles and new 1590 kcmil ACSR conductors for each phase of the circuit.

Furthermore, SCE has proposed expanding and upgrading the existing 230kV SCE Pisgah substation to a 230/500kV substation, increasing the voltage to 500kV, looping the Eldorado-Lugo 500kV line into the SCE Pisgah substation and upgrading 65 miles of the existing Lugo-Pisgah number two 230kV transmission line to 500kV. The SCE Pisgah substation work includes installation of a new double Breaker 230kV line position to terminate the new Calico Solar Project 230kV Gen Tie Line, install Motorized disconnect switches at each one of the existing Lugo No.1 and No.2 230kV line positions, and install SPS relays. (SES Solar One, LGIP Optional Interconnection Study, Section 3.6 pages 3.27 to 3.30, and Figures 3-5, 3-6, and 3-7)

D.5.3.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

For the interconnection of this proposed project to the grid, the interconnecting utility (SCE) and the control area operator (California ISO) are responsible for ensuring grid reliability. These two entities will assess the potential impacts of the proposed Calico Solar Project on the transmission system and any mitigation measures needed to ensure system conformance with the applicable utility reliability criteria, NERC planning standards, WECC reliability criteria, and California ISO reliability criteria. System impact and facilities studies are used to determine the impacts of the proposed Calico Solar Project on the transmission grid. Staff relies on these studies and any review conducted by the California ISO to determine the potential effects of the proposed Calico Solar Project on the transmission grid and to identify any necessary downstream facilities or indirect project impacts required to bring the transmission network into compliance with applicable reliability standards. System impact and facilities studies analyze the grid with and without the proposed Calico Solar Project, under conditions specified in the planning standards and reliability criteria. The standards and criteria define the assumptions used in the study and establish the thresholds through which grid reliability is determined. The studies analyze the potential impact of the proposed Calico Solar Project for the anticipated first year of operation, and are based on a forecast of loads, generation, and transmission. Load forecasts are developed by the interconnected utility. Generation and transmission forecasts are established by an interconnection queue. The studies focus on thermal overloads, voltage deviations, system stability (excessive oscillations in generators and transmission system, voltage collapse, loss of loads, or cascading outages), and short circuit current. If the studies show that the interconnection of the project causes the grid to be out of compliance with the reliability standards, then the study will identify mitigation measures or ways in which the grid could be brought into compliance with the reliability standards.

When a project connects to the California ISO-controlled grid, both the studies and mitigation measures must be reviewed and approved by the California ISO. If either the California ISO or interconnecting utility determines that the only feasible mitigation includes transmission modifications or additions requiring CEQA review, the Energy Commission must analyze those modifications or additions according to CEQA requirements.

D.5.3.3 SCOPE OF SYSTEM IMPACT STUDIES

The System Impact Studies (SIS) were performed by SCE at the request of the applicant to identify the potential impacts of the proposed Calico Solar Project on SCE's 69/115/230kV transmission system. The SIS included power flow, sensitivity, and short circuit studies and transient and post-transient analyses (SES Solar One, Phase 1 and Phase 2-2006a SIS). The SIS modeled the proposed project for a net output of 850 MW. The base cases included all California ISO approved major SCE transmission projects, and major path flow limits of Southern California Import Transmission (SCIT), East-Of-River, West-of-River and upgraded 115kV phase shifting transformer at Inyo substation. The SIS considered light load conditions with generation patterns and SCIT imports maximized to identify the extent of potential congestion and to fully stress the SCE system in the area where the project phases of the proposed Calico Solar Project would be interconnected. The study assumptions are described in further detail in the SIS. The power flow studies were conducted with and without Calico Solar connected to SCE's grid at the existing Pisgah Substation, using 2009 heavy summer and 2009 light spring base cases. The power flow study assessed the potential impacts of the proposed Calico Solar Project on thermal loading of the transmission lines and equipment. Transient and post-transient studies were conducted for Phases 1 and 2 of the proposed Calico Solar Project using the 2009 heavy summer base case to determine whether the project would create instability in the system following certain selected outages. Short circuit studies were conducted to determine if Phases 1 and 2 of the proposed Calico Solar Project would overstress existing substation facilities.

Pre-Project Upgrade Requirements

The upgrades included below are those facilities that are required to mitigate reliability violations caused by higher-queued projects, placed ahead of the project in the generator interconnection queue, and are expected to be implemented by those higher-queued projects. However, in the event that any of these higher-queued projects withdraw their application, the Calico Solar Project may become responsible for any or all of these additional facilities.

- Upgrade of the Inyo 115kV Phase-Shift transformer: The upgrade involves replacement of the phase-shift transformer at Inyo with a new one that has greater phase-shift capability.
- Inyokern substation conversion to 230kV: The facility upgrades involve a new Inyokern 230kV substation and utilization of existing 230kV transmission facilities.
- New Lugo-Kramer Transmission Line project: The facility involves the construction of a new Kramer-Lugo 230kV transmission line.
- Construction of a third Lugo 500/230kV Transformer Bank.
- Mountain Pass-El Dorado 115kV line reconductor.
- El Dorado 230/115kV transformer Bank – The facility involves replacing existing 230/115kV transformer bank with a larger size.

Power Flow Study Results with Pre-Project Upgrades

Normal (N-0) Overloads

With the addition of the Calico Solar Project, the study identified two 230kV transmission lines and two 500/230kV transformer banks with base case overloads during heavy summer and Light spring load conditions. Sensitivity studies were conducted to identify the Calico Solar Project level that would mitigate thermal overloads on the Lugo-Pisgah 230kV transmission lines. The study found that if Calico Solar Project output was reduced to 687MW and 750MW for heavy summer and light spring load conditions there would be no thermal overloads on the Lugo-Pisgah 230kV lines. However, the reduction in generation does not mitigate the thermal overloads identified on the Lugo number 1 and Lugo number 2 500/230kV transformer banks. To mitigate the thermal overloads on the transformer banks the Calico Solar Project generation output should be reduced to 300MW and 150MW for heavy summer and light spring load conditions.

Overloads:

- Lugo-Pisgah No.2 230kV transmission line was 112% overloaded under the heavy summer and light spring Base case conditions.
- Lugo-Pisgah No.1 230kV transmission line was 111% overloaded under the heavy summer and light spring Base case conditions.
- Lugo Number 1 500/230 kV transformer bank was 103% overloaded under the heavy summer and light spring Base case conditions.

- Lugo Number 2 500/230 kV transformer bank was 104% overloaded under the heavy summer and light spring Base case conditions.

  Mitigation:

  - The recommended mitigation strategy is to expand the existing Pisgah 230kV interconnection facility and install a new 2240MVA 500/230kV substation with two 1120MVA transformer banks.
  - Loop the existing Eldorado-Lugo 500kV transmission line into the expanded Pisgah substation and form the two new Eldorado-Pisgah and Lugo-Pisgah number 1 500kV transmission lines.
  - Install a new Lugo-Pisgah Number 2 500kV transmission line by removing the existing Lugo-Pisgah number 2 230kV transmission line, widening the existing Right-of-Way where needed and constructing the new 500kV structures within the vacated ROW

Single Outage Contingency (N-1 or T-1)

With the addition of the Calico Solar Project, the study identified one 230kV transmission line and one 500/230kV transformer bank overload under the N-1 or T-1 contingency analysis during the heavy summer and light spring load conditions.

Overload:

- One Lugo-Pisgah 230kV transmission line was overloaded approximately 147% above the pre-project ratings, during the outage of the other Lugo-Pisgah 230kV transmission line under the heavy summer and light spring N-1 conditions.
- One Lugo 500/230kV transformer was overloaded approximately 56% above the pre-project ratings, during the outage of the other Lugo 500/230kV transformer bank, under the heavy summer and light spring N-1 conditions.

  Mitigation:

  - With the output of the Calico Solar Project reduced to 300MW and 150MW for heavy summer and light spring load conditions, there are no thermal overloads of the Lugo 500/230kV transformer banks. Additionally, a Special Protection System (SPS) will be required to trip off the Calico Solar Project to mitigate the thermal overloads caused by the N-1 condition.
  - To support the required SPS the replacement of a portion of existing Eldorado-Lugo 500kV Over Head Ground Wire (OHGW) with new Optical Ground Wire) OPGW between the Lugo and Pisgah substations.
  - Replacement of a portion of existing OHGW with OPGW on the existing Eldorado-Lugo 500kV transmission line between the Lugo and Pisgah substations.
  - Installment of new Fiber Cable coupled with use of existing Microwave.

Double Outage Contingency (N-2 or N-1 and T-1)

The study identified that power flows do not converge under loss of both Lugo-Pisgah 230kV or loss of both Pisgah-El Dorado 230kV lines. These study results are indicative of a potential voltage collapse. Since the existing system cannot support the entire project output with all facilities in service, the results under loss of two transmission lines were not closely evaluated for the existing system arrangement.

Power Flow Study Results with 230kV to 500kV Lugo to Pisgah Conversion

The study results obtained from the power flow study with pre-project upgrades modeled to mitigate base case overload problems triggered by queued ahead projects are insufficient to accommodate the Calico Solar Project. As a result, facility upgrades will be needed to interconnect and deliver the full output of the Calico Solar Project. The following presents the power flow study results with the upgrades:

Normal Condition (N-0):

With all pre-project upgrades and the first set of Calico Solar Project upgrades included into the study cases, the base case overloads identified on both Lugo-Pisgah 230kV transmission lines and both Lugo 500/230kV transformer banks were eliminated.

Single Outage Contingency (N-1 and T-1):

With the first set of facility upgrades modeled, the study identified two single outage contingencies that resulted in a case non-convergence due to insufficient Var support of the system. Loss of the new Lugo Pisgah 500kV transmission line or loss of the single Pisgah 500/230kV transformer bank results in a possible voltage collapse problem. Under the two outage conditions, there is insufficient capacity to transfer the entire Calico Solar Project output, even if the voltage problem were resolved as the two remaining 230kV lines in service from Pisgah can only carry approximately 575MVA. With the final set of facility upgrades modeled, no single outage contingency problems were identified.

Transient Study Results

The Transient Study was conducted for the critical single and double contingencies affecting the area on the page 18, table 1-8 and 1-9 in the Calico Solar Project (Phases 1 and 2) SIS. The three-phase faults with normal clearing are studied for single contingencies; single-line-to-ground faults with delayed clearing are studied for double contingencies. All outage cases were evaluated with the assumption that existing SPS or Remedial Action Schemes (RAS) would operate as designed where required. The Transient Studies concluded that the existing Kramer RAS and High Desert Power Project (HDPP) RAS operating as designed where required and the new SPS proposed for this project there are no additional upgrades to the SCE system required. However, the project will need to provide 300MVAR of dynamic reactive support. (Final Interconnection Facilities Study Report, Page 5, June 13, 2008)

Post-Transient Study Results

The NERC/WECC planning standards require that the system maintain post-transient voltage stability when either critical path transfers or area loads increase by 5 percent for Category B contingencies, and 2.5 percent for Category C contingencies. Post-transient studies conducted for similar or larger generators in the area concluded that voltage remains stable under both N-1 and N-2 contingencies. All outage cases were evaluated with the assumption that existing SPS or RAS would operate as designed where required. The studies determined that the system remained stable with the proposed upgrades in place under both single and double contingency outage conditions and the addition of Phases 1 and 2 of the proposed Calico Solar Project would not trigger any new post-transient criteria violations. (Final Interconnection Facilities Study Report, Page 5, June 13, 2008)

Short-Circuit Duty Study Results

Short circuit studies were performed to determine the degree to which the addition of the power generated by the Calico Solar Project increases fault duties at SCE substations, and other 69kV, 115 kV, 230 kV, and 500 kV busses in the study area. The busses at which faults were simulated, the maximum three-phase and single-line-to-ground fault currents at these busses both with and without the project, and information on the breaker duties at each location are summarized in the Short Circuit Study results tables in the SIS (SES Solar One, Table 2-6,Page 30 –SIS and Final Interconnection Facilities Study Report -Page 5).

The results of the three-phase-to-ground and single-phase-to-ground short-circuit duty studies identified six 500kV, nineteen 230kV, and three 66kV substation locations where the project causes the Three Phase and or the Single Phase to Ground short circuit duties to increase by 0.1kA or more and required further evaluation. The Circuit Breaker evaluations concluded that the project does not trigger any Circuit Breaker replacements or upgrades but aggravates pre-project conditions that require fifteen replacements and seventeen upgrades of 230kV Circuit breakers at the Etiwanda generation station 230kV switchyard and Mira Loma substation. The increased Short Circuit Duty at Mira Loma substation also requires that the 230kV switchyard be upgraded to 80kA ratings. (Final interconnection Facilities Study Report, Page 5, November 6, 2008)

Reactive Power Deficiency Analysis Results

The addition of the Calico Solar Project adversely impacts SCE’s ability to maintain schedule voltages if power factor correction is not placed at strategic locations. For generation levels ranging up to 400MW, the amount of Calico Solar Project uncompensated reactive demands vary between 0 and 350MVar. Of the 350MVar reactive demands, approximately 260 MVar are associated with the reactive loads at 0.84 Power Factor and the remaining 90 MVar are associated with transformation and local distribution collector losses. Without Power Factor correction, the reactive requirements are transmitted from other generation resources. Such transmission of reactive power can potentially result in voltage collapse conditions. This condition was identified for the Calico Solar Project when generation levels exceed 400MW under normal operating conditions, 325 MW under loss of one transmission line, and 200 MW under loss of two transmission lines. Power Factor correction devices such as shunt capacitor banks, substation capacitor banks or other reactive resource devices should be located where they are needed, within the Calico Solar Project.

Optional Interconnection Study (275MW)

On January, 2008 the applicant requested that SCE determine the impacts of a 275 MW on the SCE system. The study revealed that a maximum of 275MW generation could be interconnected to the existing Pisgah 230kV Bus and related 230kV system contingent on the installation of a new Special Protection Scheme (SPS) that would trip-off the generation under certain contingencies. The 275MW interconnection would be a temporary Interconnection until the 500kV System Upgrades are on line and the full 850MW generation is connected to the upgraded system.

Power Flow Study Results:

Although the project does not trigger any Base case overloads it requires a new SPS to eliminate single contingency (N-1) overloads as follows:

Overload:

- Lugo-Pisgah No.1 230kV transmission line was 115% overloaded under the outage of the Lugo-Pisgah No. 2 230kV transmission line.
- Lugo-Pisgah No.2 230kV transmission line was 115% overloaded under the outage of the Lugo-Pisgah No.1 230kV transmission line.

  Mitigation:

  - The recommended mitigation strategy is to install a new SPS to trip the project under either one of the outages described above.

Additionally, the Calico Solar Project has aggravated two pre-project transformer overloads under the N-1 contingency analysis.

Overload:

- Lugo No. 1 AA 500/230kV transformer bank pre-project overload has been aggravated by the project under the outage of the Lugo No. 2AA 500/220kV transformer bank.
- Lugo No. 2 AA 500/220kV transformer bank pre-project overload has been aggravated by the project under the outage of the Lugo No. 1AA 500/220kV transformer bank.

  Mitigation:

  - The recommended mitigation strategy is to install a new SPS to trip the project under either one of the N-1 outages described above.

Short Circuit Study Results:

The study identified two 500kV, five 230kV, and one 115kV substation locations where the Calico Solar Project causes the Three Phase and /or the Single Phase to Ground Short Circuit Duties to increase by 0.1kA or more. The Circuit Breaker evaluation concluded that the project does not trigger any CB replacements or upgrades but aggravated pre-project conditions that require the replacement of twelve 230kV CB's at Mira Loma Substation. (Table 2.1 and 2.2, Page 11, LGIP Optional Interconnection Study).

D.5.3.4 COMPLIANCE WITH LORS

The findings of the studies conducted for the proposed Calico Solar Project and summarized above indicate that Phases 1 and 2 of the project would comply with the NERC/WECC planning standards and California ISO reliability criteria. The project will be designed and constructed to include the 230 kV substation on the project site and a new 2 mile long, 230kV single circuit transmission facility from the project site to the Pisgah Substation. Staff concludes that, assuming the proposed conditions of certification are met, the project would meet the requirements and standards of all applicable LORS for TSE.

D.5.4 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the central portion of the proposed 850 MW project. It was developed because it can be constructed without upgrading the SCE Lugo-Pisgah transmission line. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

D.5.4.1 SETTING AND EXISTING CONDITIONS

Like the proposed project, this alternative would include numerous groups of 60 SunCatchers, connected by underground electrical cables. When aggregated at the project substation, the power generated would interconnect to SCE's existing Pisgah 230 kV substation which is located in San Bernardino County approximately 35 miles east of Barstow, California. There would be fewer SunCatcher groups in this alternative, but the system of aggregation and method of power transmission would be the same as for the proposed project.

D.5.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This alternative would require fewer SunCatcher groups to generate 275 MW. Therefore, it would require fewer distribution facilities and a smaller substation to be built within the project site.

D.5.4.3 CEQA LEVEL OF SIGNIFICANCE

This alternative would require fewer distribution and transmission facilities to be built in the project site. Therefore, installation of fewer transformers, fewer collector distribution feeders and other electrical components would contribute lesser environmental impacts and trigger lesser CEQA analysis.

D.5.5 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The Avoidance of Donated and Acquired Lands Alternative would be an approximately 720 MW solar facility located within the boundaries of the proposed 850 MW project. This alternative, the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 2**.

D.5.5.1 SETTING AND EXISTING CONDITIONS

Like the proposed project, this alternative would include numerous groups of 60 SunCatchers, connected by underground electrical cables. When aggregated at the project substation, the power generated would interconnect to SCE's existing Pisgah 230 kV substation which is located in San Bernardino County approximately 35 miles east of Barstow, California. There would be fewer SunCatcher groups in this alternative, but the system of aggregation and method of power transmission would be the same as for the proposed project.

D.5.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Avoidance of Donated and Acquired Lands Alternative would consist of 28,800 SunCatchers with a net generating capacity of approximately 720 MW occupying the entire proposed project footprint but avoiding use of any lands that were donated to BLM or acquired by BLM through the Land and Water Conservation Fund program. Like the proposed project, this alternative would transmit power to the grid through the SCE Pisgah Substation and would require infrastructure similar to the entire proposed 850 MW project, including water storage tanks, transmission line, road access, main services complex, and substation. Additionally, like the proposed project, the Avoidance of Donated and Acquired Lands Alternative would require the 65-mile upgrade to the SCE Lugo-Pisgah transmission line.

The Avoidance of Donated and Acquired Lands Alternative would use approximately 85 percent of the SunCatchers, provide 85 percent of the power generating potential, and would affect approximately 86 percent of the land (7,050 acres) of the proposed 850MW project. This alternative would require fewer SunCatcher groups to generate 275 MW. Therefore, it would require fewer distribution facilities and a smaller substation to be built within the project site.

If the Avoidance of Donated and Acquired Lands Alternative were approved, other renewable projects may be developed on other sites in the in San Bernardino County, the Mojave Desert, or in adjacent states to fill the 130 MW gap not supplied by the proposed project as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

D.5.5.3 CEQA LEVEL OF SIGNIFICANCE

The level of significance under CEQA for the Avoidance of Donated and Acquired Lands Alternative would be the same as for the proposed project. This alternative would require fewer distribution and transmission facilities to be built in the project site. Therefore, installation of fewer transformers, fewer collector distribution feeders and other electrical components would contribute lesser environmental impacts and trigger lesser CEQA analysis.

D.5.6 NO PROJECT / NO ACTION ALTERNATIVE

There are three No Project / No Action Alternatives evaluated as follows:

No Project / No Action Alternative #1: No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another renewable energy project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If the proposed project is not approved, renewable projects would likely be developed on other sites in San Bernardino County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District.

No Project / No Action Alternative #2: No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. As a result, GHG emissions would result from the construction and operation of the solar technology and would likely be similar to the GHG emissions from the proposed project. Different solar technologies require different amounts of construction and operations maintenance; however, it is expected that all the technologies would provide the more significant benefit, like the proposed project, of displacing fossil fuel fired generation and reducing associated GHG emissions. As such, this No Project/No Action Alternative could result in GHG benefits similar to those of the proposed project.

No Project / No Action Alternative #3: No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the CEC and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the greenhouse gas emissions from the site, including carbon uptake, is not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in the GHG benefits from the proposed project. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

D.5.7 PROJECT-RELATED FUTURE ACTIONS

Proposed upgrades to the Southern California Edison (SCE) transmission system, known as the 275 MW Early Interconnection option and the 850 MW Full Build-Out option are considered to be reasonably foreseeable actions that would be contingent on construction of the proposed Calico Solar Project. The SCE upgrades are required for the reliable interconnection and transmission of power generated by the proposed Calico Solar Project. The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS.

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the transmissions interconnection (gen-tie) from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE Right of Ways (ROWs).
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at

a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

D.5.7.1 MITIGATION

The proposed upgrades to the SCE system required for the reliable interconnection of the Early Interconnection Option and the Full Build-Out Option are the mitigation for impacts of the proposed project on the SCE transmission system.

D.5.7.2 CONCLUSION

The transmission upgrades identified in this TSE analysis are required for the reliable interconnection of the Calico Solar project. Without these transmission facilities the SCE transmission system would not comply with reliability LORS with the Calico Solar Project operating.

D.5.8 CUMULATIVE IMPACT ANALYSIS

Staff has reviewed the lists of existing and foreseeable projects as presented in the **CUMULATIVE SCENARIO** section of this document. Staff's review considers whether the interconnection of the Calico Solar Project to SCE's transmission system along with other existing and foreseeable generation projects would conform to all LORS required for safe and reliable electric power transmission. The analysis described above under the heading Proposed Project – Scope of System Impact Studies is conducted in coordination with, and the approval of, California ISO to consider existing and proposed generator interconnections to the transmission grid and their potential safety and reliability impacts under a number of conservative contingency conditions.

The impacts to the safe and reliable operation of the transmission system due to the Calico Solar Project, as identified in the SIS, would be mitigated with the Energy Commission's and BLM's incorporation of the mitigation measures and COCs set forth in this section to minimize the project's contribution to the cumulative impacts**.** Staff also believes that there would be some positive impacts because the Calico Solar Project would supplement local solar generation and import of power to the SCE system, meet the increasing load demand in the San Bernardino County, Riverside County.

Geographic Extent

The geographic scope for considering cumulative impacts on the electric system from this project is the Southern California Edison (SCE) grid.

Existing Cumulative Conditions

The SCE grid includes many natural gas-fired power plants, several hydroelectric power plants, and a growing number of solar and wind power plants are being proposed. The existing transmission system in the project area lacks additional capacity and would require upgrades for any projects not currently interconnected to the grid.

Future Foreseeable Projects

Future projects on the SCE grid will likely include numerous solar and wind power plants, as well as more natural gas-fired peaking plants. The ratio of gas-fired to renewable energy power plants is likely to drop as SCE acquires more solar and wind power energy in response to government mandates to increase the portion of energy produced from renewable sources.

Foreseeable Projects in the Barstow Area

The BLM field office in Barstow has received several applications for solar and wind energy projects. Although some of the smaller projects may be closer to the Barstow load center and would not require upgrades to the same transmission lines as the proposed project, the requirements of other larger proposed projects could lead to cumulative impacts to transmission system engineering. However, due to the lack of additional capacity on the SCE transmission system in the project area, any one of these projects could require upgrades to the SCE system with or without the proposed project.

Foreseeable Renewable Projects in the California and Arizona Desert

Numerous solar, wind power and geothermal projects are foreseeable in the deserts of California and Arizona. The BLM Desert District has received many applications for solar and wind energy projects. Although some of the smaller projects may be closer to the load centers and would not require upgrades to the same SCE transmission lines as the proposed project, the requirements of other larger proposed projects could lead to cumulative impacts to transmission system engineering. However, due to the lack of additional capacity on some of the transmission lines in the area, any one of these projects could require upgrades to the system with or without the proposed project.

D.5.9 COMPLIANCE WITH LORS

The findings of the studies conducted for the proposed Calico Solar Project and summarized in D.5.4.3 above indicate that Phases 1 and 2 of the project would comply with the NERC/WECC planning standards and California ISO reliability criteria. The project will be designed and constructed to include the 230 kV substation on the project site and a new 2 mile long, 230kV single circuit transmission facility from the project site to the Pisgah Substation. Staff concludes that, assuming the proposed conditions of certification are met, the project would meet the requirements and standards of all applicable LORS for TSE.

D.5.10 NOTEWORTHY PUBLIC BENEFITS

Staff has not identified and noteworthy public benefits to TSE from the proposed Calico Solar Project.

D.5.11 FACILITY CLOSURE

In the future, upon closure of Calico Solar Project, the reduction of electrical generation from the Calico Solar Project would not have an adverse impact on the capacity of the electrical transmission grid, and could potentially open up capacity for newer and more efficient renewable energy projects. The upgrades necessary to the SCE system to transmit the power from the Calico Solar Project to the load centers will remain after the decommissioning of the proposed project.

D.5.12 PROPOSED CONDITIONS OF CERTIFICATION

The following conditions of certification/mitigation measures are incorporated in the proposed Calico Solar Project to address potential project impacts related to the transmission system.

TSE-1 The project owner shall furnish to the Compliance Project Manager (CPM) and to the Chief Building Official (CBO) a schedule of transmission facility design submittals, a Master Drawing List, a Master Specifications List, and a Major Equipment and Structure List. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment. To facilitate audits by Energy Commission staff, the project owner shall provide designated packages to the CPM when requested

Verification: At least 60 days prior to the start of construction (or a lesser number of days mutually agreed to by the project owner and the CBO), the project owner shall submit the schedule, a Master Drawing List, and a Master Specifications List to the CBO and to the CPM. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment (see a list of major equipment in **Transmission System Engineering Table 1**, Major Equipment List below). Additions and deletions shall be made to the table only with CPM and CBO approval. The project owner shall provide schedule updates in the Monthly Compliance Report.

Transmission System Engineering Table 1
Major Equipment List

Breakers	Take Off Facilities
Step-Up Transformer	Electrical Control Building
Switchyard	Switchyard Control Building
Busses	Transmission Pole/Tower
Surge Arrestors	Grounding System
Disconnects	

TSE-2 Prior to the start of construction, the project owner shall assign an electrical engineer and at least one of each of the following to the project: A) a civil engineer; B) a geotechnical engineer or a civil engineer experienced and knowledgeable in the practice of soils engineering; C) a design engineer who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; or D) a mechanical engineer. (Business and Professions Code Sections 6704 et seq. require state registration to practice as a civil engineer or structural engineer in California).

The tasks performed by the civil, mechanical, electrical, or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (e.g., proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California-registered electrical engineer. The civil, geotechnical or civil, and design engineer assigned in conformance with Facility Design condition GEN-5, may be responsible for design and review of the TSE facilities.

The project owner shall submit to the CBO for review and approval, the names, qualifications, and registration numbers of all engineers assigned to the project. If any one of the designated engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval.

The project owner shall notify the CPM of the CBO's approval of the new engineer. This engineer shall be authorized to halt earthwork and to require changes if site conditions are unsafe or do not conform to predicted conditions used as a basis for design of earthwork or foundations.

The electrical engineer shall:

1. Be responsible for the electrical design of the power plant switchyard, outlet and termination facilities; and
2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: At least 30 days prior to the start of rough grading (or a lesser number of days mutually agreed to by the project owner and the CBO), the project owner shall submit to the CBO for review and approval, the names, qualifications, and registration numbers of all the responsible engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the engineers within 5 days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner shall have 5 days in which to submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within 5 days of that approval.

TSE-3 If any discrepancy in design and/or construction is discovered in any engineering work that has previously undergone CBO design review and approval, the project owner shall document the discrepancy and recommend corrective action (California Building Code, 1998, Chapter 1, Section 108.4, Approval Required; Chapter 17, Section 1701.3, Duties and Responsibilities of the Special Inspector; Appendix Chapter 33, Section 3317.7, Notification of Noncompliance). The discrepancy documentation shall become a controlled document and shall be submitted to the CBO for review and approval and shall reference this condition of certification.

Verification: The project owner shall submit a copy of the CBO's approval or disapproval of any corrective action taken to resolve a discrepancy to the CPM within 15 days of receipt. If disapproved, the project owner shall advise the CPM, within 5 days, the reason for disapproval, and the revised corrective action required obtaining the CBO's approval.

TSE-4 For the power plant switchyard, outlet line, and termination, the project owner shall not begin any increment of construction until plans for that increment have been approved by the CBO. These plans, together with design changes and design change notices, shall remain on the site for one year after completion of construction. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS. The following activities shall be reported in the Monthly Compliance Report:

1. Receipt or delay of major electrical equipment;
2. Testing or energization of major electrical equipment; and
3. The number of electrical drawings approved, submitted for approval, and still to be submitted.

Verification: At least 30 days prior to the start of each increment of construction (or a lesser number of days mutually agreed to by the project owner and the CBO), the project owner shall submit to the CBO for review and approval the final design plans, specifications, and calculations for equipment and systems of the power plant switchyard, outlet line, and termination, including a copy of the signed and stamped statement from the responsible electrical engineer attesting to compliance with the applicable LORS, and shall include a copy of the transmittal letter in the next Monthly Compliance Report.

TSE-5 The project owner shall ensure that the design, construction, and operation of the proposed transmission facilities conform to all applicable LORS, including the requirements listed below. The project owner shall submit the required number of copies of the design drawings and calculations as determined by the CBO.

1. The Calico Solar Project shall be interconnected to the SCE grid via a segment of 230kV, 1590 kcmil-ACSR, approximately 2 mile long single circuit extending from the new substation on the project site to the Pisgah SCE Substation.

2. The Calico Solar Project substation on the project site shall use 34.5kV, 1200A, 25 breakers and six, three phase, 100/133/167.7 MVA, 34.5kV/230 kV transformers.

3. The power plant outlet line shall meet or exceed the electrical, mechanical, civil, and structural requirements of CPUC General Order 95 and General Order 98 or National Electric Safety Code (NESC), Title 8 of the California Code and Regulations (Title 8), Articles 35, 36, and 37 of the "High Voltage Electric Safety Orders", California ISO standards, National Electric Code (NEC), and related industry standards.

4. Breakers and busses in the power plant switchyard and other switchyards, where applicable, shall be sized to comply with a short-circuit analysis.

5. Outlet line crossings and line parallels with transmission and distribution facilities shall be coordinated with the transmission line owner and comply with that owner's standards.

6. The project conductors shall be sized to accommodate the full output from the project.

7. Termination facilities shall comply with applicable SCE interconnection standards.

8. The project owner shall provide to the CPM:

    a. The final Detailed Facility Study (DFS) including a description of facility upgrades, operational mitigation measures, and/or Special Protection System (SPS) sequencing and timing if applicable,

    b. Executed project owner and California ISO Large Generator Interconnection Agreement.

<u>Verification:</u> At least 60 days prior to the start of construction of transmission facilities (or a lesser number of days mutually agreed to by the project owner and CBO), the project owner shall submit to the CBO for approval:

1. Design drawings, specifications, and calculations conforming with CPUC General Order 95 and General Order 98 or NESC; Title 8, California Code of Regulations, Articles 35, 36, and 37 of the "High Voltage Electric Safety Orders"; NEC; applicable interconnection standards, and related industry standards for the poles/towers, foundations, anchor bolts, conductors, grounding systems, and major switchyard equipment.

2. For each element of the transmission facilities identified above, the submittal package to the CBO shall contain the design criteria, a discussion of the calculation method(s), a sample calculation based on worst-case conditions,[1] and a statement signed and sealed by the registered engineer in responsible charge**,** or other acceptable alternative verification, that the transmission element(s) will conform with CPUC General Order 95 or NESC; Title 8, California Code of Regulations, Articles 35, 36 and 37 of the "High Voltage Electric Safety Orders"; NEC; applicable interconnection standards, and related industry standards.

[1] Worst-case conditions for the foundations would include for instance, a dead-end or angle pole.

3. Electrical one-line diagrams signed and sealed by the registered professional electrical engineer in responsible charge, a route map, and an engineering description of equipment and the configurations covered by requirements **TSE-1 through 5** above.
4. The final Detailed Facility Study and the Large Generator Interconnection Agreement, including a description of facility upgrades, operational mitigation measures, and/or SPS sequencing and timing if applicable, shall be provided concurrently to the CPM.

TSE-6 The project owner shall provide the following Notice to the California Independent System Operator (California ISO) prior to synchronizing the facility with the California transmission system:

1. At least one week prior to synchronizing the facility with the grid for testing, provide the California ISO a letter stating the proposed date of synchronization; and

2. At least one business day prior to synchronizing the facility with the grid for testing, provide telephone notification to the California ISO Outage Coordination Department.

Verification: The project owner shall provide copies of the California ISO letter to the CPM when it is sent to the California ISO one week prior to initial synchronization with the grid. A report of the conversation with the California ISO shall be provided electronically to the CPM one day before synchronizing the facility with the California transmission system for the first time.

TSE-7 The project owner shall be responsible for the inspection of the transmission facilities during and after project construction, and any subsequent CPM and CBO approved changes thereto, to ensure conformance with CPUC GO-95 or NESC; Title 8, CCR, Articles 35, 36 and 37 of the “High Voltage Electric Safety Orders”; applicable interconnection standards; NEC; and related industry standards. In case of non-conformance, the project owner shall inform the CPM and CBO in writing, within 10 days of discovering such non-conformance and describe the corrective actions to be taken.

Verification: Within 60 days after first synchronization of the project, the project owner shall transmit to the CPM and CBO:

1. As-built engineering description(s) and one-line drawings of the electrical portion of the facilities signed and sealed by the registered electrical engineer in responsible charge. A statement attesting to conformance with CPUC GO-95 or NESC; Title 8, California Code of Regulations, Articles 35, 36 and 37 of the “High Voltage Electric Safety Orders”; applicable interconnection standards; NEC; and related industry standards, and these conditions shall be provided concurrently with the submittal of the as-built plans.
2. An as-built engineering description of the mechanical, structural, and civil portions of the transmission facilities signed and sealed by the registered engineer in responsible charge or acceptable alternative verification. As-built drawings of the

electrical, mechanical, structural, and civil portions of the transmission facilities shall be maintained at the power plant and made available, if requested, for CPM audit as set forth in the "Compliance Monitoring Plan."

3. A summary of inspections of the completed transmission facilities, and identification of any nonconforming work and corrective actions taken, signed and sealed by the registered engineer in charge.

D.5.13 CONCLUSIONS

The outlet lines and termination of Phases 1 and 2 of the proposed Calico Solar Project are acceptable and would comply with all applicable LORS. The analysis of project transmission lines and equipment, both from the power plant up to the point of interconnection with the existing transmission network as well as upgrades beyond that interconnection that are attributable to the project, have been evaluated by staff and are included in the environmental sections of this SA/DEIS.

Staff's analysis with respect to Transmission System Engineering concludes that the Calico Solar Project (850MW) needs to meet the following mitigation measures:

- Expand the existing Pisgah 230kV interconnection facility and install a new 2,240 MVA, 500/230 kV substation with two 1,120 MVA transformer banks. The expansion of the existing Pisgah 230kV substation requires California CEQA/NEPA analysis.
- Loop the existing Eldorado-Lugo 500kV transmission line into the expanded Pisgah substation forming the Eldorado-Pisgah and Lugo-Pisgah number 1 500kV transmission lines.
- Install a new Lugo-Pisgah Number 2 500kV transmission line by removing the existing Lugo-Pisgah number 2 230kV transmission line, widening the existing Right-of-Way (ROW) where needed and constructing the new 500kV structures within the vacated ROW. The widening the existing ROW would require CEQA/NEPA analysis.
- Additionally, a Special Protection System (SPS) will be required to trip the Calico Solar Project to mitigate the thermal overloads caused by the N-1 emergency condition.
- The proposed Calico Solar Project should be designed and constructed with adequate reactive power resources to compensate the consumption of Var by the generator step-up transformers, distribution feeders and generator tie-lines.

RECOMMENDATIONS

If the BLM and Energy Commission approve the proposed Calico Solar Project, staff recommends that the applicant be required to satisfy the conditions of certification/ mitigation measures set forth in this section to ensure both system reliability and conformance with LORS.

D.5.14 REFERENCES

California ISO (California Independent System Operator). 1998a. Cal-ISO Tariff Scheduling Protocol. Posted April 1998, Amendments 1,4,5,6, and 7 incorporated.

California ISO (California Independent System Operator). 1998b. Cal-ISO Dispatch Protocol. Posted April 1998.

California ISO (California Independent System Operator). 2002a. Cal-ISO Grid Planning Standards. February 2002.

SES Solar One phase 1 and 2 (SES Solar One). 2006a. Stirling Energy System, Inc, (System Impact Study) submitted to the California Energy Commission.

SES Solar One LGIP Optional Interconnection Study Report (SES Solar One project). 2008b. California ISO, LGIP Study submitted to the California Energy Commission.

SES Solar One phase 1 and 2 (SES Solar 1). 2008c, SES Solar One, LLC, Application for Certification. Submitted to the California Energy Commission.

NERC/WECC (North American Reliability Council/Western Electricity Coordinating Council). 2002. NERC/WECC Planning Standards. August 2002.

DEFINITION OF TERMS

AAC – All aluminum conductor

ACSR – Aluminum conductor steel-reinforced

ACSS – Aluminum conductor steel-supported

Ampacity – Current-carrying capacity, expressed in amperes, of a conductor at specified ambient conditions, at which damage to the conductor is nonexistent or deemed acceptable based on economic, safety, and reliability considerations.

Ampere – The unit of current flowing in a conductor.

Bundled – Two wires, 18 inches apart.

Bus – Conductors that serve as a common connection for two or more circuits.

Conductor – The part of the transmission line (the wire) that carries the current.

Congestion management – A scheduling protocol, which provides that dispatched generation and transmission loading (imports) will not violate criteria.

Emergency overload – See "Single Contingency." This is also called an N-1.

Kcmil– Thousand circular mil. A unit of the conductor's cross sectional area When divided by 1,273, the area in square inches is obtained

Kilovolt (kV) – A unit of potential difference, or voltage, between two conductors of a circuit, or between a conductor and the ground.

Megavars – Mega-volt-Ampere-Reactive. One million Volt-Ampere-Reactive. Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system.

Megavolt ampere (MVA) – A unit of apparent power. It equals the product of the line voltage in kilovolts, current in amperes, and the square root of 3, divided by 1,000.

Megawatt (MW) – A unit of power equivalent to 1,341 horsepower.

Normal operation/normal overload – The condition arrived at when all customers receive the power they are entitled to, without interruption and at steady voltage, and with no element of the transmission system loaded beyond its continuous rating.

Outlet – Transmission facilities (circuit, transformer, circuit breaker, etc.) linking generation facilities to the main grid.

Power flow analysis – A forward-looking computer simulation of essentially all generation and transmission system facilities that identifies overloaded circuits, transformers, and other equipment and system voltage levels.

Reactive power – Generally associated with the reactive nature of motor loads that must be fed by generation units in the system. An adequate supply of reactive power is required to maintain voltage levels in the system.

Remedial action scheme (RAS) – An automatic control provision, which, for instance, will trip a selected generating unit upon a circuit overload.

Single contingency – Also known as “emergency” or “N-1 condition,” the occurrence when one major transmission element (circuit, transformer, circuit breaker, etc.) or one generator is out of service.

Solid dielectric cable – Copper or aluminum conductors that are insulated by solid polyethylene type insulation and covered by a metallic shield and outer polyethylene jacket.

Switchyard – An integral part of a power plant and used as an outlet for one or more electric generators.

TSE – Transmission system engineering.

Undercrossing – A transmission configuration where a transmission line crosses below the conductors of another transmission line, generally at 90 degrees.

Underbuild – A transmission or distribution configuration where a transmission or distribution circuit is attached to a transmission tower or pole below (under) the principle transmission line conductors.

GENERAL CONDITIONS

E – JOINT AGENCY GENERAL CONDITIONS INCLUDING COMPLIANCE MONITORING AND CLOSURE PLAN

Prepared by Mary Dyas

E.1 INTRODUCTION

The project's General Compliance Conditions of Certification, including Compliance Monitoring and Closure Plan (Compliance Plan) have been established as required by Public Resources Code section 25532. The plan provides a means for assuring that the facility is constructed, operated and closed in compliance with public health and safety, environmental and other applicable regulations, guidelines, and conditions adopted or established by the California Energy Commission and specified in the written decision on the Application for Certification or otherwise required by law. The Compliance Plan will be integrated with a U.S. Bureau of Land Management (BLM) Compliance Monitoring Plan (hereafter referred to as the Compliance Plan) to assure compliance with the terms and conditions of any approved Right-of-Way (ROW) grant including the approved Plan of Development (POD)

The Compliance Plan is composed of elements that:

- set forth the duties and responsibilities of BLM's Authorized Officer, the Compliance Project Manager (CPM), the project owner, delegate agencies, and others;
- set forth the requirements for handling confidential records and maintaining the compliance record;
- state procedures for settling disputes and making post-certification changes;
- state procedures for requesting and approving ROW Grant or POD changes;
- state the requirements for periodic compliance reports and other administrative procedures that are necessary to verify the compliance status for all BLM and Energy Commission approved conditions of certification/mitigation measures;
- establish requirements for modifications or amendments to facility Closure, Revegetation, and Restoration Plans; and
- specify conditions of certification for each technical area containing the measures required to mitigate any and all potential adverse project impacts associated with construction, operation and closure below a level of significance. Each specific condition of certification also includes a verification provision that describes the method of assuring that the condition has been satisfied.

Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act (CEQA) and BLM's Mitigation Measures for purposes of the National Environmental Policy Act (NEPA).

E.2 DEFINITIONS

The following terms and definitions are used to establish when Conditions of Certification are implemented.

BLM AUTHORIZED OFFICER:

The BLM Authorized Officer for the Project is the BLM Needles Field Manager or his designated Compliance Inspector that is responsible for oversight and inspection of all construction and operational related activities on public land.

PRE-CONSTRUCTION SITE MOBILIZATION

Site mobilization is limited preconstruction activities at the site to allow for the installation of fencing, construction trailers, construction trailer utilities, and construction trailer parking at the site. Limited ground disturbance, grading, and trenching associated with the above mentioned pre-construction activities is considered part of site mobilization. Walking, driving or parking a passenger vehicle, pickup truck and light vehicles is allowable during site mobilization.

CONSTRUCTION

Onsite work to install permanent equipment or structures for any facility.

Ground Disturbance

Construction-related ground disturbance refers to activities that result in the removal of top soil or vegetation at the site beyond site mobilization needs, and for access roads and linear facilities.

Grading, Boring, and Trenching

Construction-related grading, boring, and trenching refers to activities that result in subsurface soil work at the site and for access roads and linear facilities, e.g., alteration of the topographical features such as leveling, removal of hills or high spots, moving of soil from one area to another, and removal of soil.

Notwithstanding the definitions of ground disturbance, grading, boring and trenching above, construction does not include the following:

1. the installation of environmental monitoring equipment;
2. a soil or geological investigation;
3. a topographical survey;
4. any other study or investigation to determine the environmental acceptability or feasibility of the use of the site for any particular facility; and
5. any work to provide access to the site for any of the purposes specified in “Construction” 1, 2, 3, or 4 above.

START OF COMMERCIAL OPERATION

For compliance monitoring purposes, “commercial operation” begins after the completion of start-up and commissioning, when each of the power plants has reached reliable steady-state production of electricity at the rated capacity. At the start of commercial operation, plant control is usually transferred from the construction manager to the plant operations manager.

E.3 BLM’S AUTHORIZED OFFICER AND COMPLIANCE PROJECT MANAGER RESPONSIBILITIES

BLM’s Authorized Officer (AO) and the Compliance Project Manager (CPM) shall oversee the compliance monitoring and is responsible for:

1. Ensuring that the design, construction, operation, and closure of the project facilities are in compliance with the terms and conditions of BLM’s ROW Grant and the Energy Commission Decision
2. Resolving complaints
3. Processing post-certification changes to the conditions of certification, project description (petition to amend), and ownership or operational control (petition for change of ownership) (See instructions for filing petitions)
4. Documenting and tracking compliance filings
5. Ensuring that compliance files are maintained and accessible

BLM’s AO is the contact person for BLM and will consult with appropriate responsible agencies, Energy Commission, and Energy Commission staff when handling disputes, complaints, and amendments. The CPM is the contact person for the Energy Commission and will consult with appropriate responsible agencies, BLM, Energy Commission, and Energy Commission staff when handling disputes, complaints, and amendments.

All project compliance submittals are submitted to BLM’s AO and the CPM for processing. Where a submittal required by a condition of certification requires BLM’s AO and/or CPM approval, the approval will involve all appropriate BLM personnel, Energy Commission staff and management. All submittals must include searchable electronic versions (pdf or word files).

E.4 CHIEF BUILDING OFFICIAL RESPONSIBILITIES

The Chief Building Official (CBO) shall serve as BLM's and the Energy Commission's delegate to assure the project is designed and constructed in accordance with BLM's Right-of-Way Grant, the Energy Commission's Decision including Conditions of Certification, California Building Standards Code, local building codes and applicable laws, ordinances, regulations and standards to ensure health and safety. The CBO is typically made-up of a team of specialists covering civil, structural, mechanical and electrical disciplines whose duties include the following:

1. Performing design review and plan checks of all drawings, specifications and procedures;
2. Conducting construction inspection;
3. Functioning as BLM's and the Energy Commission's delegate including reporting noncompliance issues or violations to the BLM Authorized Officer for action and taking any action allowed under the California Code of Regulations, including issuing a Stop Work Order, to ensure compliance;
4. Exercising access as needed to all project owner construction records, construction and inspection procedures, test equipment and test results; and
5. Providing weekly reports on the status of construction to BLM's Authorized Officer and the CPM.

PRE-CONSTRUCTION AND PRE-OPERATION COMPLIANCE MEETING

BLM’s AO and the CPM shall schedule pre-construction and pre-operation compliance meetings prior to the projected start-dates of construction, plant operation, or both. The purpose of these meetings is to assemble BLM’s, the Energy Commission’s and project owner’s technical staff and construction contractor to review the status of all pre-construction or pre-operation requirements, contained in BLM’s and the Energy Commission’s conditions of certification. This is to confirm that all applicable conditions of certification have been met, or if they have not been met, to ensure that the proper action is taken. In addition, these meetings ensure, to the extent possible, that BLM and Energy Commission conditions will not delay the construction and operation of the plant due to oversight and to preclude any last minute, unforeseen issues from arising. Pre-construction meetings held during the certification process must be publicly noticed unless they are confined to administrative issues and processes.

BLM AND ENERGY COMMISSION RECORD

BLM and the Energy Commission shall maintain the following documents and information as a public record, in either the Energy Commission’s Compliance file or Dockets file, for the life of the project (or other period as required):

- All documents demonstrating compliance with any legal requirements relating to the construction and operation of the facility;
- All monthly and annual compliance reports filed by the project owner;
- All complaints of noncompliance filed with BLM and the Energy Commission; and
- All petitions/requests for project or condition of certification changes and the resulting BLM, Energy Commission staff or Energy Commission action.

E.5 PROJECT OWNER RESPONSIBILITIES

The project owner is responsible for ensuring that the compliance conditions of certification and all other conditions of certification that appear in BLM’s ROW Grant and the Energy Commission Decision are satisfied. The compliance conditions regarding post-certification changes specify measures that the project owner must take when requesting changes in the project design, conditions of certification, or ownership.

Failure to comply with any of the conditions of certification or the compliance conditions may result in reopening of the case and revocation of the Energy Commission certification; an administrative fine; or other action as appropriate. A summary of the Compliance Conditions of Certification is included as Compliance Table 1 at the conclusion of this section. The BLM ROW grant holder will comply with the terms, conditions, and special stipulations of the ROW grant. Failure to comply with applicable laws or regulations or any of the terms and conditions of a BLM ROW grant may result in the suspension or termination of the ROW grant (43 CFR 2807.17). Prior to suspending or terminating a ROW grant, BLM will provide written notice to the holder stating it intends to suspend or terminate and will provide reasonable opportunity to correct any noncompliance.

E.6 COMPLIANCE MITIGATION MEASURES/CONDITIONS OF CERTIFICATION

UNRESTRICTED ACCESS (COMPLIANCE-1)

BLM’s AO, responsible BLM staff, the CPM, responsible Energy Commission staff, and delegated agencies or consultants shall be guaranteed and granted unrestricted access to the power plant site, related facilities, project-related staff, and the records maintained on-site, for the purpose of conducting audits, surveys, inspections, or general site visits. Although BLM’s AO and the CPM will normally schedule site visits on dates and times agreeable to the project owner, BLM’s AO and the CPM reserve the right to make unannounced visits at any time.

COMPLIANCE RECORD (COMPLIANCE-2)

The project owner shall maintain project files on-site or at an alternative site approved by BLM’s AO and the CPM for the life of the project, unless a lesser period of time is specified by the conditions of certification. The files shall contain copies of all “as-built” drawings, documents submitted as verification for conditions, and other project-related documents. As-built drawings of all facilities including linear facilities shall be provided to the BLM AO for inclusion in the BLM administrative record within 90-days of completion of that portion of the facility or project.

BLM and Energy Commission staff and delegate agencies shall, upon request to the project owner, be given unrestricted access to the files maintained pursuant to this condition.

COMPLIANCE VERIFICATION SUBMITTALS (COMPLIANCE-3)

Each condition of certification is followed by a means of verification. The verification describes the Energy Commission’s procedure(s) to ensure post-certification compliance with adopted conditions. The verification procedures, unlike the conditions, may be modified as necessary by BLM’s AO and the CPM.

Verification of compliance with the conditions of certification can be accomplished by the following:

1. Monthly and/or annual compliance reports, filed by the project owner or authorized agent, reporting on work done and providing pertinent documentation, as required by the specific conditions of certification;
2. Appropriate letters from delegate agencies verifying compliance;
3. BLM and Energy Commission staff audits of project records; and/or
4. BLM and Energy Commission staff inspections of work, or other evidence that the requirements are satisfied.

Verification lead times associated with start of construction may require the project owner to file submittals during the certification process, particularly if construction is planned to commence shortly after certification.

A cover letter from the project owner or authorized agent is required for all compliance submittals and correspondence pertaining to compliance matters. The cover letter subject line shall identify the project by AFC number, the appropriate condition(s) of certification by condition number(s), and a brief description of the subject of the submittal. The project owner shall also identify those submittals not required by a condition of certification with a statement such as: “This submittal is for information only and is not required by a specific condition of certification.” When submitting supplementary or corrected information, the project owner shall reference the date of the previous submittal and BLM/CEC submittal number.

The project owner is responsible for the delivery and content of all verification submittals to the BLM’s AO and CPM, whether such condition was satisfied by work performed by the project owner or an agent of the project owner.

All hardcopy submittals shall be addressed to each of the following:

BLM’s Authorized Officer	**Mary Dyas**
(CACA-049537 and CACA-049539)	**(08-AFC-13C)**
U.S. Bureau of Land Management	**California Energy Commission**
2601 Barstow Road	**1516 Ninth Street, MS-2000**
Barstow, CA 92311	**Sacramento, CA 95814**

Those submittals shall be accompanied by a searchable electronic copy, on a CD or by e-mail, as agreed upon by BLM’s AO and the CPM.

If the project owner desires BLM and/or Energy Commission staff action by a specific date, that request shall be made in the submittal cover letter and shall include a detailed explanation of the effects on the project if that date is not met.

PRE-CONSTRUCTION MATRIX AND TASKS PRIOR TO START OF CONSTRUCTION (COMPLIANCE-4)

Prior to commencing construction, a compliance matrix addressing only those conditions that must be fulfilled before the start of construction shall be submitted by the project owner to BLM’s AO and the CPM. This matrix will be included with the project owner's first compliance submittal or prior to the first pre-construction meeting, whichever comes first. It will be submitted in the same format as the compliance matrix described below. In order to begin any on-site mobilization or surface disturbing activities on public land, the BLM AO must approve a written Notice to Proceed (NTP). NTPs will be phased as appropriate to facilitate timely implementation of construction.

Construction shall not commence until the pre-construction matrix is submitted, all pre-construction conditions have been complied with, and BLM's AO and the CPM has issued a letter and BLM has issues a NTP to the project owner authorizing construction. Various lead times for submittal of compliance verification documents to BLM's AO and the CPM for conditions of certification are established to allow sufficient BLM and Energy Commission staff time to review and comment and, if necessary, allow the project owner to revise the submittal in a timely manner. This will ensure that project construction may proceed according to schedule.

Failure to submit compliance documents within the specified lead-time may result in delays in authorization to commence various stages of project development.

If the project owner anticipates commencing project construction as soon as the project is certified, it may be necessary for the project owner to file compliance submittals prior to project certification. Compliance submittals should be completed in advance where the necessary lead time for a required compliance event extends beyond the date anticipated for start of construction. The project owner must understand that the submittal of compliance documents prior to project certification is at the owner's own risk. Any approval by Energy Commission staff is subject to change, based upon BLM's ROW Grant and the Energy Commission Decision.

Compliance Reporting

There are two different compliance reports that the project owner must submit to assist BLM's AO and the CPM in tracking activities and monitoring compliance with the terms and conditions of BLM's ROW Grant and the Energy Commission Decision. During construction, the project owner or authorized agent will submit Monthly Compliance Reports. During operation, an Annual Compliance Report must be submitted. These reports, and the requirement for an accompanying compliance matrix, are described below. The majority of the conditions of certification require that compliance submittals be submitted to BLM's AO and the CPM in the monthly or annual compliance reports.

POSTING OF A SURETY BOND (COMPLIANCE-5)

Prior to site disturbance and each increment of construction, the project owner shall post a surety bond adequate to cover the cost of decommissioning and restoration, including the removal of the project features that have been constructed for that that portion of the site and restoring the native topography and vegetation. An "increment of construction" shall mean a significant feature of construction, such as site grading, a building, a fluid storage tank, a water treatment facility, a hydrogen production facility, a switchyard, or a group of solar collectors connected to an electrical transformer (including that transformer). This Surety bond will apply to all site disturbance features.

The project owner shall provide the surety bond to the BLM AO for approval and to the CPM for review with written evidence indicating that the surety bond is adequate to cover the cost of decommissioning and removing the project features constructed, allowing for site restoration. The written evidence shall include a valid estimate showing that the amount of the bond is adequate to accomplish such work. The timing for the submittal of the surety bond and approval of this document shall be coordinated with the BLM AO and CPM. Over the life of the project, the surety bond will be updated as necessary to account for any changes to the project description and/or decommissioning costs.

COMPLIANCE MATRIX (COMPLIANCE-6)

A compliance matrix shall be submitted by the project owner to BLM's AO and the CPM along with each monthly and annual compliance report. The compliance matrix is intended to provide BLM's AO and the CPM with the current status of all conditions of certification in a spreadsheet format. The compliance matrix must identify:

1. the technical area;
2. the condition number;
3. a brief description of the verification action or submittal required by the condition;
4. the date the submittal is required (e.g., 60 days prior to construction, after final inspection, etc.);
5. the expected or actual submittal date;
6. the date a submittal or action was approved by the Chief Building Official (CBO), BLM's AO, CPM, or delegate agency, if applicable; and
7. the compliance status of each condition, e.g., "not started," "in progress" or "completed" (include the date).
8. if the condition was amended, the date of the amendment.

Satisfied conditions shall be placed at the end of the matrix.

MONTHLY COMPLIANCE REPORT (COMPLIANCE-7)

The first Monthly Compliance Report is due one month following the Energy Commission business meeting date upon which the project was approved, unless otherwise agreed to by BLM's AO and the CPM. The first Monthly Compliance Report shall include the AFC number and an initial list of dates for each of the events identified on the Key Events List. The Key Events List Form is found at the end of this section.

During pre-construction and construction of each power plant, the project owner or authorized agent shall submit an original and an electronic searchable version of the Monthly Compliance Report within 10 working days after the end of each reporting month. Monthly Compliance Reports shall be clearly identified for the month being reported. The reports shall contain, at a minimum:

1. A summary of the current project construction status, a revised/updated schedule if there are significant delays, and an explanation of any significant changes to the schedule;

2. Documents required by specific conditions to be submitted along with the Monthly Compliance Report. Each of these items must be identified in the transmittal letter, as well as the conditions they satisfy and submitted as attachments to the Monthly Compliance Report;
3. An initial, and thereafter updated, compliance matrix showing the status of all conditions of certification (fully satisfied conditions do not need to be included in the matrix after they have been reported as completed);
4. A list of conditions that have been satisfied during the reporting period, and a description or reference to the actions that satisfied the condition;
5. A list of any submittal deadlines that were missed, accompanied by an explanation and an estimate of when the information will be provided;
6. A cumulative listing of any approved changes to conditions of certification;
7. A listing of any filings submitted to, or permits issued by, other governmental agencies during the month;
8. A projection of project compliance activities scheduled during the next two months. The project owner shall notify BLM's AO and the CPM as soon as any changes are made to the project construction schedule that would affect compliance with conditions of certification;
9. A listing of the month's additions to the on-site compliance file; and
10. A listing of complaints, notices of violation, official warnings, and citations received during the month, a description of the resolution of the resolved actions, and the status of any unresolved actions.

All sections, exhibits, or addendums shall be separated by tabbed dividers or as acceptable by BLM's AO and the CPM.

ANNUAL COMPLIANCE REPORT (COMPLIANCE-8)

After construction of each power plant is complete or when a power plant goes into commercial operations, the project owner shall submit Annual Compliance Reports instead of Monthly Compliance Reports. The reports are for each year of commercial operation and are due to BLM's AO and the CPM each year at a date agreed to by BLM's AO and the CPM. Annual Compliance Reports shall be submitted over the life of the project unless otherwise specified by BLM's AO and the CPM. Each Annual Compliance Report shall include the AFC number, identify the reporting period and shall contain the following:

1. An updated compliance matrix showing the status of all conditions of certification (fully satisfied conditions do not need to be included in the matrix after they have been reported as completed);
2. A summary of the current project operating status and an explanation of any significant changes to facility operations during the year;
3. Documents required by specific conditions to be submitted along with the Annual Compliance Report. Each of these items must be identified in the transmittal letter,

with the condition it satisfies, and submitted as attachments to the Annual Compliance Report;

4. A cumulative listing of all post-certification changes by the Energy Commission or changes to the BLM ROW grant or approved POD by BLM , or cleared by BLM's AO and the CPM;
5. An explanation for any submittal deadlines that were missed, accompanied by an estimate of when the information will be provided;
6. A listing of filings submitted to, or permits issued by, other governmental agencies during the year;
7. A projection of project compliance activities scheduled during the next year;
8. A listing of the year's additions to the on-site compliance file;
9. An evaluation of the on-site contingency plan for unplanned facility closure, including any suggestions necessary for bringing the plan up to date [see Compliance Conditions for Facility Closure addressed later in this section]; and
10. A listing of complaints, notices of violation, official warnings, and citations received during the year, a description of the resolution of any resolved matters, and the status of any unresolved matters.

CONFIDENTIAL INFORMATION (COMPLIANCE-9)

Any information that the project owner deems confidential shall be submitted to the Energy Commission's Executive Director with an application for confidentiality pursuant to Title 20, California Code of Regulations, section 2505(a). Any information that is determined to be confidential shall be kept confidential as provided for in Title 20, California Code of Regulations, section 2501 et. seq.

Any information the ROW holder deems confidential shall be submitted to the BLM AO with a written request for said confidentiality along with a justification for the request. All confidential submissions to BLM should be clearly stamped "proprietary information" by the holder when submitted.

ANNUAL ENERGY FACILITY COMPLIANCE FEE (COMPLIANCE-10)

Pursuant to the provisions of Section 25806(b) of the Public Resources Code, the project owner is required to pay an annual compliance fee, which is adjusted annually. Current Compliance fee information is available on the Energy Commission's website http://www.energy.ca.gov/siting/filing_fees.html. You may also contact the CPM for the current fee information. The initial payment is due on the date the Energy Commission adopts the final decision. All subsequent payments are due by July 1 of each year in which the facility retains its certification. The payment instrument shall be made payable to the California Energy Commission and mailed to: Accounting Office MS-02, California Energy Commission, 1516 9th St., Sacramento, CA 95814.

REPORTING OF COMPLAINTS, NOTICES, AND CITATIONS (COMPLIANCE-11)

Prior to the start of construction, the project owner must send a letter to property owners living within one mile of the project notifying them of a telephone number to contact project representatives with questions, complaints or concerns. If the telephone is not staffed 24 hours per day, it shall include automatic answering with date and time stamp recording. All recorded complaints shall be responded to within 24 hours. The telephone number shall be posted at the project site and made easily visible to passersby during construction and operation. The telephone number shall be provided to BLM's AO and the CPM who will post it on the Energy Commission's web page at:

http://www.energy.ca.gov/sitingcases/power_plants_contacts.html.

Any changes to the telephone number shall be submitted immediately to BLM's AO and the CPM, who will update the web page.

In addition to the monthly and annual compliance reporting requirements described above, the project owner shall report and provide copies to BLM's AO and the CPM of all complaint forms, including noise and lighting complaints, notices of violation, notices of fines, official warnings, and citations, within 10 days of receipt. Complaints shall be logged and numbered. Noise complaints shall be recorded on the form provided in the **NOISE** conditions of certification. All other complaints shall be recorded on the complaint form (Attachment A).

E.7 FACILITY CLOSURE

At some point in the future, the project will cease operation and close down. At that time, it will be necessary to implement the Closure, Revegetation and Restoration Plan to ensure that the closure occurs in such a way that public health and safety and the environment are protected from adverse impacts. Although the project setting for this project does not appear, at this time, to present any special or unusual closure problems, it is impossible to foresee what the situation will be in 30 years or more when the project ceases operation. Therefore, provisions must be made that provide the flexibility to deal with the specific situation and project setting that exist at the time of closure. Laws, Ordinances, Regulations and Standards (LORS) pertaining to facility closure are identified in the sections dealing with each technical area. Facility closure will be consistent with LORS in effect at the time of closure. Closure would be conducted in accordance with Condition of Certification **BIO-14** that requires the project owner to develop and implement a Closure, Revegetation and Rehabilitation Plan.

There are at least three circumstances in which a facility closure can take place: planned closure, unplanned temporary closure and unplanned permanent closure.

CLOSURE DEFINITIONS

<u>Planned Closure</u>

A planned closure occurs when the facility is closed in an anticipated, orderly manner, at the end of its useful economic or mechanical life, or due to gradual obsolescence.

Unplanned Temporary Closure

An unplanned temporary closure occurs when the facility is closed suddenly and/or unexpectedly, on a short-term basis, due to unforeseen circumstances such as a natural disaster or an emergency. Short-term is defined as cessation of construction activities or operations of a power plant for a period less than 6-months long. Cessation of construction of operations for a period longer than 6 months in considered a permanent closure.

Unplanned Permanent Closure

An unplanned permanent closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. This includes unplanned closure where the owner implements the on-site contingency plan. It can also include unplanned closure where the project owner fails to implement the contingency plan, and the project is essentially abandoned.

E.8 COMPLIANCE CONDITIONS FOR FACILITY CLOSURE

PLANNED CLOSURE (COMPLIANCE-11)

In order to ensure that a planned facility closure does not create adverse impacts, a closure process that provides for careful consideration of available options and applicable laws, ordinances, regulations, standards, and local/regional plans in existence at the time of closure, will be undertaken. To ensure adequate review of a planned project closure, the project owner shall submit a revision or update to the approved Closure, Revegetation and Rehabilitation Plan to BLM and the Energy Commission for review and approval at least 12 months (or other period of time agreed to by BLM's AO and the CPM) prior to commencement of closure activities. The project owner shall file 50 copies and 50 CDs with the Energy Commission and 10 copies and 10 CDs with BLM (or other number of copies agreed upon by BLM's AO and the CPM) of a proposed facility closure plan/Closure, Revegetation and Rehabilitation Plan.

The plan shall:

1. identify and discuss any impacts and mitigation to address significant adverse impacts associated with proposed closure activities and to address facilities, equipment, or other project related materials that must be removed from the site;
2. identify a schedule of activities for closure of the power plant site, transmission line corridor, and all other appurtenant facilities constructed as part of the project;
3. address conformance of the plan with all applicable laws, ordinances, regulations, standards, and local/regional plans in existence at the time of facility closure, and applicable conditions of certification; and.
4. Address any changes to the site revegetation, rehabilitation, monitoring and long-term maintenance specified in the existing plan that are needed for site revegetation and rehabilitation to be successful.

Prior to submittal of an amended or revised Closure, Revegetation and Restoration Plan, a meeting shall be held between the project owner, BLM's AO and the Energy Commission CPM for the purpose of discussing the specific contents of the plan.

In the event that there are significant issues associated with the proposed facility Closure, Revegetation and Restoration plan's approval, or the desires of local officials or interested parties are inconsistent with the plan, BLM's AO the CPM shall hold one or more workshops and/or BLM and the Energy Commission may hold public hearings as part of its approval procedure.

As necessary, prior to or during the closure plan process, the project owner shall take appropriate steps to eliminate any immediate threats to public health and safety and the environment, but shall not commence any other closure activities until BLM and the Energy Commission approves the facility Closure, Revegetation and Restoration plan.

UNPLANNED TEMPORARY CLOSURE/ON-SITE CONTINGENCY PLAN (COMPLIANCE-12)

In order to ensure that public health and safety and the environment are protected in the event of an unplanned temporary facility closure, it is essential to have an On-Site Contingency Plan in place. The On-Site Contingency Plan will help to ensure that all necessary steps to mitigate public health and safety impacts and environmental impacts are taken in a timely manner.

The project owner shall submit an On-Site Contingency Plan for BLM's AO and CPM review and approval. The plan shall be submitted no less than 60 days (or other time agreed to by BLM's AO and the CPM) after approval of any NTP or letter granting approval to commence construction for each phase of construction. A copy of the approved plan must be in place during commercial operation of the facility and shall be kept at the site at all times.

The project owner, in consultation with BLM's AO and the CPM, will update the On-Site Contingency Plan as necessary. BLM's AO and the CPM may require revisions to the On-Site Contingency Plan over the life of the project. In the annual compliance reports submitted to the Energy Commission, the project owner will review the On-Site Contingency Plan, and recommend changes to bring the plan up to date. Any changes to the plan must be approved by BLM's AO and the CPM.

The On-Site Contingency Plan shall provide for taking immediate steps to secure the facility from trespassing or encroachment. In addition, for closures of more than 90 days, unless other arrangements are agreed to by BLM's AO and the CPM, the plan shall provide for removal of hazardous materials and hazardous wastes, draining of all chemicals from storage tanks and other equipment, and the safe shutdown of all equipment. (Also see specific conditions of certification for the technical areas of Hazardous Materials Management and Waste Management.)

In addition, consistent with requirements under unplanned permanent closure addressed below, the nature and extent of insurance coverage, and major equipment warranties must also be included in the On-Site Contingency Plan. In addition, the status of the insurance coverage and major equipment warranties must be updated in the annual compliance reports.

In the event of an unplanned temporary closure, the project owner shall notify BLM's AO and the CPM, as well as other responsible agencies, by telephone, fax, or e-mail, within 24 hours and shall take all necessary steps to implement the On-Site Contingency Plan. The project owner shall keep BLM's AO and the CPM informed of the circumstances and expected duration of the closure.

If BLM's AO and the CPM determine that an unplanned temporary closure is likely to be permanent, or for a duration of more than 6 months, a Closure Plan consistent with the requirements for a planned closure shall be developed and submitted to BLM's AO and the CPM within 90 days of BLM's AO and the CPM's determination (or other period of time agreed to by BLM's AO and the CPM).

UNPLANNED PERMANENT CLOSURE/ON-SITE CONTINGENCY PLAN (COMPLIANCE-13)

The On-Site Contingency Plan required for unplanned temporary closure shall also cover unplanned permanent facility closure. All of the requirements specified for unplanned temporary closure shall also apply to unplanned permanent closure.

In addition, the On-Site Contingency Plan shall address how the project owner will ensure that all required closure steps will be successfully undertaken in the event of abandonment.

In the event of an unplanned permanent closure, the project owner shall notify BLM's AO and the CPM, as well as other responsible agencies, by telephone, fax, or e-mail, within 24 hours and shall take all necessary steps to implement the On-Site Contingency Plan. The project owner shall keep BLM's AO and the CPM informed of the status of all closure activities.

To ensure that public health and safety and the environment are protected in the event of an unplanned permanent closure, the project owner shall submit an On-Site Contingency Plan no less than 60 days after a NTP is issued for each phase of development.

POST CERTIFICATION CHANGES TO BLM'S ROW GRANT AND/OR THE ENERGY COMMISSION DECISION: AMENDMENTS, OWNERSHIP CHANGES, STAFF APPROVED PROJECT MODIFICATIONS AND VERIFICATION CHANGES (COMPLIANCE-14)

The project owner must petition the Energy Commission pursuant to Title 20, California Code of Regulations, section 1769, in order to modify the project (including linear facilities) design, operation or performance requirements, and to transfer ownership or operational control of the facility. The BLM ROW holder must file a written request in the form of an application to the BLM AO in order to change the terms and conditions of their ROW grant or POD. Written requests will be in a manner prescribed by the BLM AO.

It is the responsibility of the project owner to contact BLM's AO and the CPM to determine if a proposed project change should be considered a project modification pursuant to section 1769. Implementation of a project modification without first securing BLM and either Energy Commission or Energy Commission staff approval, may result in enforcement action that could result in civil penalties in accordance with section 25534 of the Public Resources Code.

A petition is required for amendments and for staff approved project modifications as specified below. Both shall be filed as a "Petition to Amend." Staff will determine if the change is significant or insignificant. For verification changes, a letter from the project owner is sufficient. In all cases, the petition or letter requesting a change should be submitted to BLM's AO and the CPM, who will file it with the Energy Commission's Dockets Unit in accordance with Title 20, California Code of Regulations, section 1209.

The criteria that determine which type of approval and the process that applies are explained below. They reflect the provisions of Section 1769 at the time this condition was drafted. If the Commission's rules regarding amendments are amended, the rules in effect at the time an amendment is requested shall apply.

Amendment

The project owner shall petition the Energy Commission, pursuant to Title 20, California Code of Regulations, Section 1769(a), when proposing modifications to the project (including linear facilities) design, operation, or performance requirements. If a proposed modification results in deletion or change of a condition of certification, or makes changes that would cause the project not to comply with any applicable laws, ordinances, regulations or standards, the petition will be processed as a formal amendment to the Energy Commission's final decision, which requires public notice and review of the BLM-Energy Commission staff analysis, and approval by the full Energy Commission. The petition shall be in the form of a legal brief and fulfill the requirements of Section 1769(a). Upon request, the CPM will provide you with a sample petition to use as a template.

The ROW holder shall file an application to amend the BLM ROW grant for any substantial deviation or change in use. The requirements to amend a ROW grant are the same as when filing a new application including paying processing and monitoring fees and rent.

Staff Approved Project Modification

Modifications that do not result in deletions or changes to conditions of certification, and that are compliant with laws, ordinances, regulations and standards may be authorized by BLM's AO and the CPM as a staff approved project modification (SAPM) pursuant to section 1769(a) (2). Once staff files an intention to approve the proposed project modifications, any person may file an objection to staff's determination within 14 days of service on the grounds that the modification does not meet the criteria of section 1769 (a)(2). If a person objects to staff's determination, the petition must be processed as a formal amendment to the decision and must be approved by the full commission at a noticed business meeting or hearing. BLM and the Energy Commission intend to integrate a process to jointly approve SAPMs to avoid duplication of approval processes and ensure appropriate documentation for the public record.

Change of Ownership

Change of ownership or operational control also requires that the project owner file a petition pursuant to section 1769(b). This process requires public notice and approval by the full Commission and BLM. The petition shall be in the form of a legal brief and fulfill the requirements of Section 1769(b). Upon request, the CPM will provide you with a sample petition to use as a template. The transfer of ownership of a BLM ROW grant must be through the filing of an application for assignment of the grant.

Verification Change

A verification may be modified by BLM's AO and the CPM without requesting an amendment to the ROW Grant or Energy Commission decision if the change does not conflict with the conditions of certification and provides an effective alternate means of verification.

E.9 CBO DELEGATION AND AGENCY COOPERATION

In performing construction and operation monitoring of the project, BLM and Energy Commission staff act as, and have the authority of, the Chief Building Official (CBO). BLM and Energy Commission staff may delegate CBO responsibility to either an independent third party contractor or the local building official. BLM and the Energy Commission intend to avoid duplication by integrating the responsibilities of the CBO with those of a BLM compliance inspector and will work jointly in the selection of a CBO. BLM and Energy Commission staff retain CBO authority when selecting a delegate CBO, including enforcing and interpreting federal, state and local codes, and use of discretion, as necessary, in implementing the various codes and standards.

BLM and Energy Commission staff may also seek the cooperation of state, regional and local agencies that have an interest in environmental protection when conducting project monitoring.

E.10 ENFORCEMENT

BLM's legal authority to enforce the terms and conditions of its ROW Grant is specified in 43 CFR 2807.16 to 2807.19. BLM may issue an immediate temporary suspension of activities it they determine a holder has violated one or more of the terms, conditions, or stipulation of the grant. BLM may also suspend or terminate a ROW grant if a holder does not comply with applicable laws and regulation or any terns, conditions, or special stipulations contained in the grant. Prior to suspending or terminating a ROW grant, BLM will provide written notice to the holder stating it intends to suspend or terminate and will provide reasonable opportunity to correct any noncompliance.

The Energy Commission's legal authority to enforce the terms and conditions of its Decision is specified in Public Resources Code sections 25534 and 25900. The Energy Commission may amend or revoke the certification for any facility, and may impose a civil penalty for any significant failure to comply with the terms or conditions of the

Energy Commission Decision. The specific action and amount of any fines the Energy Commission may impose would take into account the specific circumstances of the incident(s). This would include such factors as the previous compliance history, whether the cause of the incident involves willful disregard of LORS, oversight, unforeseeable events, and other factors the Energy Commission may consider.

ENERGY COMMISSION NONCOMPLIANCE COMPLAINT PROCEDURES

Any person or agency may file a complaint alleging noncompliance with the conditions of certification. Such a complaint will be subject to review by the Energy Commission pursuant to Title 20, California Code of Regulations, section 1237, but in many instances the noncompliance can be resolved by using the informal dispute resolution process. Both the informal and formal complaint procedure, as described in current State law and regulations, are described below. They shall be followed unless superseded by future law or regulations.

The Energy Commission has established a toll free compliance telephone number of 1-800-858-0784 for the public to contact the Energy Commission about power plant construction or operation-related questions, complaints or concerns.

Informal Dispute Resolution Process

The following procedure is designed to informally resolve disputes concerning the interpretation of compliance with the requirements of this compliance plan. The project owner, the Energy Commission, or any other party, including members of the public, may initiate an informal dispute resolution process. Disputes may pertain to actions or decisions made by any party, including the Energy Commission's delegate agents.

This process may precede the more formal complaint and investigation procedure specified in Title 20, California Code of Regulations, section 1237, but is not intended to be a substitute for, or prerequisite to it. This informal procedure may not be used to change the terms and conditions of certification as approved by the Energy Commission, although the agreed upon resolution may result in a project owner, or in some cases the Energy Commission staff, proposing an amendment.

The process encourages all parties involved in a dispute to discuss the matter and to reach an agreement resolving the dispute. If a dispute cannot be resolved, then the matter must be brought before the full Energy Commission for consideration via the complaint and investigation procedure.

Request for Informal Investigation

Any individual, group, or agency may request the Energy Commission to conduct an informal investigation of alleged noncompliance with the Energy Commission's terms and conditions of certification. All requests for informal investigations shall be made to the designated CPM.

Upon receipt of a request for informal investigation, the CPM shall promptly notify the project owner of the allegation by telephone and letter. All known and relevant information of the alleged noncompliance shall be provided to the project owner, BLM and to the Energy Commission staff. The CPM will evaluate the request and the information to determine if further investigation is necessary. If the CPM find that further investigation is necessary, the project owner will be asked to promptly investigate the matter. Within seven working days of the CPM's request, provide a written report to the CPM of the results of the investigation, including corrective measures proposed or undertaken. Depending on the urgency of the noncompliance matter, the CPM may conduct a site visit and/or request the project owner to also provide an initial verbal report, within 48 hours.

Request for Informal Meeting

In the event that either the party requesting an investigation or the Energy Commission staff is not satisfied with the project owner's report, investigation of the event, or corrective measures proposed or undertaken, either party may submit a written request to the CPM for a meeting with the project owner. Such request shall be made within 14 days of the project owner's filing of its written report. Upon receipt of such a request, the CPM shall:

1. immediately schedule a meeting with the requesting party and the project owner, to be held at a mutually convenient time and place;
2. secure the attendance of appropriate Energy Commission staff and staff of any other agencies with expertise in the subject area of concern, as necessary;
3. conduct such meeting in an informal and objective manner so as to encourage the voluntary settlement of the dispute in a fair and equitable manner;
4. After the conclusion of such a meeting, promptly prepare and distribute copies to all in attendance and to the project file, a summary memorandum that fairly and accurately identifies the positions of all parties and any understandings reached. If an agreement has not been reached, the CPM shall inform the complainant of the formal complaint process and requirements provided under Title 20, California Code of Regulations, section 1230 et seq.

Formal Dispute Resolution Procedure-Complaints and Investigations

Any person may file a complaint with the Energy Commission's Dockets Unit alleging noncompliance with a Commission decision adopted pursuant to Public Resources Code section 25500. Requirements for complaint filings and a description of how complaints are processed are in Title 20, California Code of Regulations, section 1237.

KEY EVENTS LIST

PROJECT:

DOCKET #:

COMPLIANCE PROJECT MANAGER:

BLM AUTHORIZED OFFICER:

EVENT DESCRIPTION	DATE
Certification Date	
Obtain Site Control	
Online Date	
POWER PLANT SITE ACTIVITIES	
Start Site Mobilization	
Start Ground Disturbance	
Start Grading	
Start Construction	
Begin Pouring Major Foundation Concrete	
Begin Installation of Major Equipment	
Completion of Installation of Major Equipment	
First Combustion of Gas Turbine	
Obtain Building Occupation Permit	
Start Commercial Operation	
Complete All Construction	
TRANSMISSION LINE ACTIVITIES	
Start T/L Construction	
Synchronization with Grid and Interconnection	
Complete T/L Construction	
FUEL SUPPLY LINE ACTIVITIES	
Start Gas Pipeline Construction and Interconnection	
Complete Gas Pipeline Construction	
WATER SUPPLY LINE ACTIVITIES	
Start Water Supply Line Construction	
Complete Water Supply Line Construction	

COMPLIANCE TABLE 1
SUMMARY of COMPLIANCE CONDITIONS OF CERTIFICATION

CONDITION NUMBER	SUBJECT	DESCRIPTION
COMPLIANCE-1	**Unrestricted Access**	The project owner shall grant BLM and Energy Commission staff and delegate agencies or consultants unrestricted access to the power plant site.
COMPLIANCE-2	**Compliance Record**	The project owner shall maintain project files on-site. BLM and Energy Commission staff and delegate agencies shall be given unrestricted access to the files.
COMPLIANCE-3	**Compliance Verification Submittals**	The project owner is responsible for the delivery and content of all verification submittals to BLM's Authorized Officer and the CPM, whether such condition was satisfied by work performed or the project owner or his agent.
COMPLIANCE-4	**Pre-construction Matrix and Tasks Prior to Start of Construction**	• Construction shall not commence until the all of the following activities/submittals have been completed: property owners living within one mile of the project have been notified of a telephone number to contact for questions, complaints or concerns, a pre-construction matrix has been submitted identifying only those conditions that must be fulfilled before the start of construction, all pre-construction conditions have been complied with, BLM's Authorized Officer and the CPM have issued a letter to the project owner authorizing construction.
COMPLIANCE-5	**Posting of A Surety Bond**	The project owner shall post a surety bond adequate to cover the cost of decommissioning and restoration including the removal of the project features that have been constructed for that that portion of the site and restoring the native topography and vegetation.

COMPLIANCE TABLE 1
SUMMARY of COMPLIANCE CONDITIONS OF CERTIFICATION

CONDITION NUMBER	SUBJECT	DESCRIPTION
COMPLIANCE-6	**Compliance Matrix**	The project owner shall submit a compliance matrix (in a spreadsheet format) with each monthly and annual compliance report which includes the status of all compliance conditions of certification.
COMPLIANCE-7	**Monthly Compliance Report including a Key Events List**	During construction, the project owner shall submit Monthly Compliance Reports (MCRs) which include specific information. The first MCR is due the month following the Energy Commission business meeting date on which the project was approved and shall include an initial list of dates for each of the events identified on the Key Events List.
COMPLIANCE-8	**Annual Compliance Reports**	After construction ends and throughout the life of the project, the project owner shall submit Annual Compliance Reports instead of Monthly Compliance Reports.
COMPLIANCE-9	**Confidential Information**	Any information the project owner deems confidential shall be submitted to BLM and the Energy Commission's Dockets Unit with a request for confidentiality.
COMPLIANCE-10	**Annual Fees**	Payment of Annual Energy Facility Compliance Fee to the Energy Commission;
COMPLIANCE-11	**Reporting of Complaints, Notices and Citations**	Within 10 days of receipt, the project owner shall report to BLM's Authorized Officer and the CPM, all notices, complaints, and citations.
COMPLIANCE-12	**Planned Facility Closure**	The project owner shall submit any revisions or changes to the Closure, Revegetation and Restoration Plan to BLM's Authorized Officer and the CPM at least 12 months prior to commencement of a planned closure.
COMPLIANCE-13	**Unplanned Temporary Facility Closure**	To ensure that public health and safety and the environment are protected in the event of an unplanned temporary closure, the project owner shall submit an On-Site Contingency Plan no less than 60 days after a NTP is issued for each power plant.

COMPLIANCE TABLE 1
SUMMARY of COMPLIANCE CONDITIONS OF CERTIFICATION

CONDITION NUMBER	SUBJECT	DESCRIPTION
COMPLIANCE-14	**Unplanned Permanent Facility Closure**	To ensure that public health and safety and the environment are protected in the event of an unplanned temporary closure, the project owner shall submit an On-Site Contingency Plan no less than 60 days after a NTP is issued for each power plant.
COMPLIANCE-15	**Post-certification changes to the ROW Grant and/or Decision**	The project owner must petition the Energy Commission and file an application to amend the ROW grant to delete or change a condition of certification, modify the project design or operational requirements and/or transfer ownership of operational control of the facility.

ATTACHMENT 1
COMPLAINT REPORT / RESOLUTION FORM

Complaint Log Number:__________________________ Docket Number:_____

Project Name:_____

COMPLAINANT INFORMATION

Name:____ Phone Number:_____

Address:____

COMPLAINT

DATE COMPLAINT RECEIVED:_______________________ TIME COMPLAINT RECEIVED:_____

COMPLAINT RECEIVED BY: ☐ TELEPHONE ☐ IN WRITING (COPY ATTACHED)

DATE OF FIRST OCCURRENCE:_____

DESCRIPTION OF COMPLAINT (INCLUDING DATES, FREQUENCY, AND DURATION):_____

FINDINGS OF INVESTIGATION BY PLANT PERSONNEL:_____

DOES COMPLAINT RELATE TO VIOLATION OF BLM ROW GRANT? ☐ YES ☐ NO

DOES COMPLAINT RELATE TO VIOLATION OF A CEC REQUIREMENT? ☐ YES ☐ NO

DATE COMPLAINANT CONTACTED TO DISCUSS FINDINGS:_____

DESCRIPTION OF CORECTIVE MEASURES TAKEN OR OTHER COMPLAINT RESOLUTION:_____

DOES COMPLAINANT AGREE WITH PROPOSED RESOLUTION?☐ YES ☐ NO

IF NOT, EXPLAIN:_____

____

CORRECTIVE ACTION

IF CORRECTIVE ACTION NECESSARY, DATE COMPLETED:_____

DATE FIRST LETTER SENT TO COMPLAINANT (COPY ATTACHED):_____

DATE FINAL LETTER SENT TO COMPLAINANT (COPY ATTACHED):_____

OTHER RELEVANT INFORMATION:_____

____

"This information is certified to be correct."

PLANT MANAGER SIGNATURE:______________________________ DATE:

(ATTACH ADDITIONAL PAGES AND ALL SUPPORTING DOCUMENTATION, AS REQUIRED)

LIST OF PREPARERS

CALICO SOLAR PROJECT
08-AFC-13
LIST OF PREPARERS

Executive Summary	Christopher Meyer
Introduction	Christopher Meyer
Proposed Project	Christopher Meyer
Alternatives	Susan Lee and Emily Capello
Cumulative Scenario	Susan Lee and Emily Capello
Air Quality	William Walters
Biological Resources	Chris Huntley and Scott White
Cultural Resources and Native American Values	BLM Staff
Geology & Paleontology	Dal Hunter
Hazardous Materials Management	Rick Tyler and Alvin Greenberg
Public Health and Safety	Alvin Greenberg
Hydrology, Water Use, and Water Quality	Casey Weaver
Land Use, Recreation, and Wilderness	Negar Vahidi and Susanne Huerta
Noise and Vibration	Erin Bright
Socioeconomics and Environmental Justice	Kristin Ford
Traffic and Transportation	Marie McLean
Transmission Line Safety and Nuisance	Obed Odoemelam
Visual Resources	William Kanemoto and James Jewell
Waste Management	Ellie Townsed-Hough
Worker Safety and Fire Protection	Rick Tyler and Alvin Greenberg
Facility Design	Shahab Khoshmashrab
Geologic Stability	Dal Hunter
Power Plant Efficiency	Shahab Khoshmashrab
Power Plant Reliability	Shahab Khoshmashrab
Transmission System Engineering	Sudath A. Edirisuriya and Mark Hesters
General Conditions	Mary Dyas
Project Assistant	April Albright

WITNESS QUALIFICATIONS AND DECLARATIONS

DECLARATION OF
Christopher Meyer

I**, Christopher Meyer,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission, Siting, Transmission and Environmental Protection Division, as a **Project Manager**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Executive Summary, Introduction, and Project Description** for the **Calico Solar Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 29, 2010 Signed: Original signed by C. Meyer

At: Sacramento, California

CHRISTOPHER MEYER

Senior Associate,
Energy and Infrastructure/Cultural Resources

ACADEMIC BACKGROUND

B.A., Biological Anthropology/Archaeology
California State University, Hayward, 1993

PROFESSIONAL EXPERIENCE

Mr. Meyer's has over eleven years with Aspen in support of CEQA/NEPA projects including EIR/EIS, IS/MND, and EA. His background combines strong experience in environmental inspection, compliance management, and project management on large-scale construction projects with a solid background in archaeological field investigations. With over 15 years experience as an archaeologist, Mr. Meyer is familiar with the cultural settings of California and Oregon and the regulatory requirements for cultural resource management under CEQA/NEPA. He has worked closely with construction contractors, agency representatives, and Native American tribal governments to ensure projects are built on time, within budget, and in compliance with all environmental requirements. In addition to field experience, he has worked as a project manager, produced reports, document, and permit applications, and has reviewed mitigation measures for federal, State, and local government agencies as well as corporations.

Aspen Environmental Group — 1997 to present

California Energy Commission (CEC), Technical Assistance in Application for Certification Review, Siting Project Manager. In response to California's power shortage, Aspen is assisting the CEC in evaluating the environmental and engineering aspects of new power plant applications throughout the State. As part of this effort, Mr. Meyer serves as a Project Manager and supervises technical staff members, preparing the CEC's CEQA-equivalent Preliminary Staff Assessments and Final Staff Assessments in response to applications for the construction of new power plants across the State. Responsibilities include: review of applications for new power plants; identifying potential issues with proposed power plants; preparation of conditions of certification for proposed power plants; review and editing of CEC technical staff's analysis, scheduling and coordinating public workshops; tracking status of permitting process; coordinating with affected agencies to resolve potential concerns; detailed reporting; conflict resolution; and preparing briefings for the CEC Siting Committee.

California Energy Commission (CEC), Technical Assistance in Application for Certification Review, Compliance Project Manager. In response to California's power shortage, Aspen is assisting the CEC in evaluating the environmental and engineering aspects of new power plant applications throughout the State. As part of this effort, Mr. Meyer served as a Compliance Project Manager and supervised technical staff members, preparing the CEC's Conditions of Certification for construction of power plants across the State as well as managing on-going operational issues with power plants currently under license with the CEC. Responsibilities included: preparation of amendments to conditions of certification for existing power plants; review of applications for new power plants; drafting of Memoranda of Understanding with Chief Building Officials; coordinating with affected agencies to resolve concerns with potential impacts to cultural resources or threatened or endangered species; maintaining contractor construction milestones, detailed reporting; development of mitigation measures; conflict resolution; and inspection for compliance with the Conditions of Certification.

SDG&E Miguel-Mission 230 kV #2 Project Construction Monitoring and Supplemental Environmental Review Program, Lead Environmental Monitor. Under contract to the California Public Utilities Commission (CPUC), Mr. Meyer served as Lead Environmental Monitor and supervised one environmental monitor in the field, monitoring the implementation of the CPUC environmental impact report's conditions of approval for construction of the overhead 230 kV electric transmission line and substations upgrades. The project included installing a new 230 kV circuit on existing towers along the 35-mile right-of-way, as well as relocating 69 kV and 138 kV circuits on approximately 80 steel pole structures. In addition, the Miguel Substation and Mission Substation was modified to accommodate the new 230 kV transmission circuit. Responsibilities included: supervision, guidance and development of environmental monitors in field monitoring as well as the compliance review of pre-construction plans and mitigation compliance documentation, review of variance requests and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; and coordination with SDG&E, construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

SCE Viejo Systems Project Construction Monitoring and Supplemental Environmental Review Program, Lead Environmental Monitor. Under contract to the California Public Utilities Commission (CPUC), Mr. Meyer served as Lead Environmental Monitor and supervises one environmental monitor in the field, monitoring the implementation of the CPUC negative declaration's conditions of approval for construction of the overhead 66 kV and 220 kV electric transmission lines and substation upgrades and construction. This Southern California Edison (SCE) project involves the installation of a 220/66/12 kV substation and 3.1-mile 66 kV transmission line in southern Orange County, California. The transmission line will traverse residential and recreational areas in the City of Mission Viejo and the substation is located in a business park adjacent to a wilderness area in the City of Lake Forest. Responsibilities include: supervision, guidance and development of environmental monitors in field monitoring as well as the compliance review of pre-construction plans and mitigation compliance documentation, review of variance requests and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; and coordination with SDG&E, construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

PG&E Tri-Valley 2002 Capacity Increase Project Construction Monitoring and Supplemental Environmental Review Program, Lead Environmental Monitor. Under contract to the California Public Utilities Commission (CPUC), Mr. Meyer serves as Lead Environmental Monitor and supervises two environmental monitors in the field, monitoring the implementation of the CPUC environmental impact report's conditions of approval for construction of this combination overhead and underground 230 kV electric transmission lines and substations. Construction involves underground installation of the double-circuit 230 kV transmission line conduit and construction of a substation and several transition stations as three separate phases. Responsibilities include: supervision, guidance and development of environmental monitors in field monitoring as well as the compliance review of pre-construction plans and mitigation compliance documentation, variance requests and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; and coordination with PG&E, construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

PG&E Jefferson-Martin 230 kV Transmission Line Project, Lead Environmental Monitor. Under contract to CPUC, Mr. Meyer served as Lead Environmental Monitor and supervised two environmental monitors in the field, monitoring the implementation of the CPUC compliance, and reporting program for the PG&E Jefferson-Martin Project. This project involved the installation of a 27-mile 230 kV transmission line through scenic San Mateo County in the Highway 280 corridor, urban Colma and Daly City, and across San Bruno Mountain. Responsibilities included: supervision, guidance and development of environmental monitors in field monitoring as well as the compliance review of pre-construction plans and mitigation compliance documentation, variance requests and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; and coordination with PG&E, construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

California Energy Commission Emergency Siting Team, Power Plant Development, Compliance Project Manager. Under contract to the California Energy Commission (CEC), Mr. Meyer served as a Compliance Project Manager and supervised technical staff members, preparing the CEC's Conditions of Certification for construction of emergency power plants across the State. Responsibilities included: review of applications for new emergency power plants; drafting of Memoranda of Understanding with Chief Building Officials; coordinating with affected agencies to resolve concerns with potential impacts to cultural resources or threatened or endangered species; maintaining contractor construction milestones, detailed reporting; development of mitigation measures; conflict resolution; and inspection for compliance with the Conditions of Certification.

California Energy Commission Coastal Power Plant Study, Archaeologist. This research study undertaken by the California Energy Commission (CEC) examined the engineering and environmental issues associated with 24 coastal power plants. The purpose of the study was to identify, describe, and analyze issues with the potential to substantially delay or complicate the certification process for future applications to the Energy Commission for expansion or modernization of existing coastal power plants. For this study, Mr. Meyer was responsible for performing site surveys and reviewing documentation for cultural resources for all 24 Coastal Power Plants.

CEC Hydroelectric Power Plant Inventory Study, Natural Resources Analyst. Mr. Meyer assisted in the collection of power and environmental data on over 200 hydroelectric power plants located in California. Physical power data included electrical output, system upgrades, water storage capacity and peaking availability. Environmental information included developing a data base addressing sensitive species issues, fish screens and ladders, monitoring parameters and a map of known hydroelectric facilities and barriers to anadromous fish passage.

Devers-Palo Verde 500 kV Transmission Line Project EIS/EIR, southern California/western Arizona. For this EIR/EIS prepared by US Bureau of Land Management and CPUC, Mr. Meyer assisted in the review and development of construction mitigation measures for SCE's proposed 250-mile long transmission line project from the Palo Verde Nuclear power plant in Arizona to the northern Palm Springs area in California. Major issues of concern include EMF and visual impacts on property values, impacts on the area's vast recreational resources and tribal lands, and the development and evaluation of several route alternatives, including the Devers-Valley No. 2 Route Alternative, which eventually was approved by the CPUC.

Antelope-Pardee 500 kV Transmission Line Project EIS/EIR, Los Angeles County, CA. For this EIR/EIS prepared by USFS, Angeles National Forest and CPUC, Mr. Meyer assisted in the review and development of construction mitigation measures for SCE's proposed 25-mile long transmission line project from the Antelope Substation in the City of Lancaster, through the ANF, and terminating at SCE's Pardee Substation in Santa Clarita. Major issues of concern included impacts to biological, recreational, and cultural resources within Forest lands, EMF and visual impacts on property values, impacts on residences in the urbanized southern regions of the route, and the development and evaluation of several route alternatives.

Tehachapi Renewable Transmission Project (TRTP) EIR/EIS, Kern, Los Angeles, and San Bernardino Counties, CA. For this EIR/EIS prepared by USFS, Angeles National Forest and CPUC, Mr. Meyer assisted in the review and development of construction mitigation measures for

SCE's proposal to construct, use, and maintain a series of new and upgraded high-voltage electric transmission lines and substations to deliver electricity generated from new wind energy projects in eastern Kern County. Approximately 46 miles of the project would be located in a 200- to 400-foot right-of-way on National Forest System land (managed by the Angeles National Forest) and approximately three miles would require expanded right-of-way within the Angeles National Forest. The proposed transmission system upgrades of TRTP are separated into eight distinct segments: Segments 4 through 11. Segments 1 (Antelope-Pardee) and Segments 2 and 3 (Antelope Transmission Project) were evaluated in separated CEQA and NEPA documents as described above.

PG&E Northeast San Jose Transmission Reinforcement Project Construction Monitoring and Supplemental Environmental Review Program, Lead Environmental Monitor. Under contract to the California Public Utilities Commission (CPUC), Mr. Meyer served as Lead Environmental Monitor and supervised two environmental monitors in the field, monitoring the implementation of the CPUC environmental impact report's conditions of approval for construction of this combination overhead and underground 230 kV electric transmission lines and substations in the Cities of San Jose, Milpitas, and Fremont. Construction of the dual 230kV circuit involved underground construction, single-pole tower installation, and construction of the Los Esteros Substation. Given the proximity of the project to the Bay, sensitive biological resources were present, including the burrowing owl and wetland mitigation sites. Responsibilities included: supervision, guidance and development of environmental monitors in field monitoring as well as the compliance review of pre-construction plans and mitigation compliance documentation, variance requests and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; and coordination with PG&E, construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

Pacific Pipeline Project EIR/EIS for the U.S. Forest Service, Angeles National Forest, and the California Public Utilities Commission, Environmental Monitor. Served as an Environmental Monitor and supervised mitigation monitoring for all sensitive resources for a construction segment along a 132-mile crude oil pipeline within southern California. Coordinated construction activities with the applicant's inspection team, archaeological specialists and Native American monitors through areas with sensitive cultural, biological, and visual resources. Monitored for hazardous materials management, storm water pollution prevention, and biological and cultural resources. Maintained daily written documentation of compliance activities.

ESSEX ENVIRONMENTAL **1995 TO 1997**

Sierra Pacific Power Co., Alturas 345 kV Electric Transmission Project, Associate. Assisted in the development of the environmental management program implementation plan for a 164-mile electric transmission line. Wrote the Storm Water Pollution Protection Plan (SWPPP) for the California and Nevada segments.

DECLARATION OF
Susan V. Lee

I**,** Susan V. Lee**,** declare as follows:

1. I am presently employed by Aspen Environmental Group, consultant to the California Energy Commission's Facilities Siting Office of the Systems Assessments and Facilities Siting Division as a Senior Associate/Vice President.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on Alternatives and the Cumulative Scenario for the Calico Solar Project based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 29, 2010 Signed: Original signed by S. Lee

At: San Francisco, California

SUSAN V. LEE

Vice President, San Francisco Operations

ACADEMIC BACKGROUND

M.S., Applied Earth Science, Stanford University, 1984
B.A., Geology, Oberlin College, 1977

PROFESSIONAL EXPERIENCE

Ms. Lee has over 25 years of technical and managerial experience in environmental assessment, and she currently manages Aspen's San Francisco Office. Her expertise is in management of environmental assessment for infrastructure and energy projects (renewable energy projects, electric transmission lines, pipelines, and gas-fired power plants) under both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Ms. Lee has managed preparation of several major controversial transmission line and pipeline siting EIR/EISs, including the Sunrise Powerlink, Path 15, Jefferson-Martin, Tri-Valley, and Devers–Palo Verde No. 2. Prior to employment at Aspen, Ms. Lee worked for 10 years with the Federal government [the U.S. Minerals Management Service (MMS) and the U.S. Geological Survey (USGS)].

Ms. Lee has worked for Aspen Environmental Group since 1993. She has contributed to both technical and project management aspects of Aspen's environmental projects, including the following:

- **California Energy Commission**. Ms. Lee has supported CEC staff since the fall of 2000. To date, she has prepared analyses for 14 power plants throughout the State, and she has also contributed to several special project reports. She has participated in numerous public workshops and hearings around the state, and completed the CEC's Expert Witness Training. Her major efforts for the CEC include the following:
  - Ms. Lee is managing the Alternatives and Cumulative impact analyses for several solar thermal projects on public lands, coordinating NEPA issues with BLM staff and CEQA issues with the Energy Commission's Project Manager. Projects include the Ivanpah Solar Electric Generating Station, Stirling (SES) Solar Two, SES Solar One (Calico), Solar Millennium Blythe and Palen projects, and the NextEra Genesis project.
  - Ms. Lee has prepared staff assessment **Alternatives Analyses** (consistent with CEQA and the CEC's procedures) for the CEC's staff reports considering proposed new or re-powered gas-fired power plants at South Bay (San Diego), Blythe (BEP II), Morro Bay, El Segundo, Avenal, San Joaquin Valley, Potrero Unit 7 (San Francisco), Tracy, East Altamont, Henrietta, and the San Francisco Electric Reliability Project. She also prepared the alternatives analysis for the CEC's Blythe Transmission Modifications Project. In addition to preparing staff assessment sections documenting comparative impacts of alternatives, this work includes making presentations at PSA Workshops and testifying at Evidentiary Hearings.
  - Ms. Lee managed preparation of the CEC's first comprehensive dry cooling analysis for a coastal power plant using once-through cooling, the **Morro Bay Power Plant Modernization Project**. She managed a team of authors who developed a preliminary cooling design, and provided impact analysis.
  - Ms. Lee managed a three-year transmission corridor modeling project, **Planning Alternative Corridors for Transmission (PACT)**, in conjunction with the CEC PIER Environmental Program. The model uses Geographic Information Systems and decision modeling to assist in comparing potential alternative transmission corridors. Aspen's work included overall contract management, as well as development and management of a Project Steering Committee and six Technical Advisory Groups.
  - Ms. Lee prepared a detailed Background Report and made a presentation at an Energy Commission workshop on "**Comparative Alternatives to Transmission**" as part of the Integrated Energy Policy Report (IEPR)

2004 Update process. This project evaluated non-wires alternatives to transmission lines; ongoing work is related to development of a methodology for consideration of these alternatives as part of the transmission planning process.

- Ms. Lee served as the CEC's **Project Manager** for the Small Power Plant Exemption (SPPE) environmental review process for the Woodland Generation Station 2, an 80-megawatt power plant proposed by the Modesto Irrigation District.
- Ms. Lee managed preparation of **Power Plant Cooling Options Reports** for the Potrero Unit 7 Project, Morro Bay, SMUD Cosumnes, and El Segundo power plants. These analyses include conceptual design of dry cooling systems, hybrid cooling systems, and water supply options including use of reclaimed water in both once through and hybrid cooling systems.
- Ms. Lee has provided management and technical support to Aspen's preparation of several reports for the CEC: the Environmental Performance Report, the Coastal Power Plant Study, and the Alternative Generation Technology study.

- **California Valley Solar Ranch EIR.** Under contract to San Luis Obispo County, Ms. Lee is managing preparation of an EIR to evaluate development of a 250 MW solar photovoltaic power facility on nearly 4,000 acres in the Carrizo Plain.
- **SDG&E Sunrise Powerlink Transmission Project EIR/EIS**. Under a $14 million contract to the CPUC, and under a Memorandum of Understanding with the Bureau of Land Management (BLM), Ms. Lee managed preparation of an EIR/EIS for a highly controversial 150-mile transmission line from Imperial County to coastal San Diego County.
- **SCE Devers–Palo Verde No. 2 Transmission Line Project EIR/EIS**. Under contract to the CPUC, Ms. Lee managed preparation of an EIR/EIS to evaluate the impacts of a constructing a 230-mile 500 kV transmission line between the Palo Verde generating hub in Arizona and SCE's Devers Substation.
- **Long-Term Procurement Planning and Barriers to Renewable Power Implementation**. For the CPUC, Ms. Lee and a team of environmental and economic specialists developed environmental and economic data and developed timelines of permitting and barriers to implementing the proposed 33 percent Renewable Portfolio Standard, including ranking and screening of available energy resources.
- **Jefferson-Martin 230 kV Transmission Line Project**. Ms. Lee managed preparation of an EIR for PG&E's proposed 27-mile transmission line through scenic San Mateo County in the Highway 280 corridor, urban Colma and Daly City, and across San Bruno Mountain for the California Public Utilities Commission (CPUC).
- **PG&E Northeast San Jose Transmission Reinforcement Project**: Ms. Lee served as the Project Manager for this CPUC contract to evaluate PG&E's proposed transmission improvements in Santa Clara and Alameda Counties.
- **PG&E Tri-Valley 2002 Capacity Increase Project.** Ms. Lee managed preparation of the Draft and Final EIRs for this controversial and complex project during 2000 and 2001, which was certified by the CPUC in May 2001. The Draft EIR (over 800 pages) evaluated proposed transmission lines and substations in the Tri-Valley area (Cities of Pleasanton, Dublin, Livermore, and San Ramon) of Alameda and Contra Costa Counties, and responded to a high level of local concern regarding electric and magnetic fields (EMFs).

DECLARATION OF
Emily Capello

I**,** Emily Capello**,** declare as follows:

1. I am presently employed by Aspen Environmental Group, consultant to the California Energy Commission's Facilities Siting Office of the Systems Assessments and Facilities Siting Division as an Environmental Scientist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on Alternatives and the Cumulative Scenario for the Calico Solar Project based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 29, 2010 Signed: Original signed by E. Capello

At: San Francisco, California

EMILY CAPELLO

Environmental Scientist

ACADEMIC BACKGROUND

M.P.A., Environmental Science and Policy, Columbia University, 2007
B.A., English Literature and History, Tufts University, 2000

PROFESSIONAL EXPERIENCE

Ms. Emily Capello joined Aspen Environmental Group in 2007 as an Environmental Scientist. She has provided technical writing and management support for the following current projects.

- Sunrise Powerlink Project
- Ivanpah Solar Electric Generating System
- Stirling Energy Systems, Solar Two Project
- City of Palmdale Hybrid Power Plant Project
- Sonoma-Marin Area Rail Transit

Ms. Capello has five years of experience in international agriculture development, environmental education, and rural health and development.

Aspen Environmental Group **2007 - present**

Ms. Capello has contributed to both technical and management aspects of Aspen's environmental projects, including the following:

- **SDG&E Sunrise Powerlink Transmission Line Project EIR/EIS, CPUC and BLM, Section Coordinator, (2007-present).** Ms. Capello managed the environmental analysis for one of the project's connected actions and one of the project's indirect effects located in Baja California, handling data collection in an international context. She also contributed to the project's general analysis and assisted in writing responses to the more than 649 comments on the Draft EIR/EIS and Recirculated Draft EIR/Supplemental Draft EIS. Following the publication of the Final EIR/EIS in October 2008, Ms. Capello assisted with decision support, contributed to the CPUC CEQA Findings of Fact for the project. The highly controversial proposed project is a 150 mile 500 kV and 230 kV transmission line from Imperial County near El Centro to the City of San Diego.
- **California Energy Commission, (2008-present).** Ms. Capello researches and contributes to the Cumulative Scenario and cumulative analysis approach as well as the Alternatives section for a number of Staff Assessment/Environmental Impact Statement for renewable projects in the California Desert region. This includes:
  - **Ivanpah Solar Energy Generating System.** 400 MW solar power tower power plant located in the California desert near Primm, Nevada. The lead agency for this power plant under CEQA is the California Energy Commission (CEC), the power plant would be sited on federal land and the lead agency under NEPA is the United States Bureau of Land Management (BLM).

  - **Stirling Energy Systems, Solar Two, (2008-present).** Stirling engine solar thermal 750 MW project, near El Centro, California.
  - **Calico Solar Project, (2009-present).** Stirling engine solar thermal 850 MW project near Barstow, California.
  - **Palen Solar Power Project, (2009-present).** 500 MW solar trough project near Desert Center, California.
  - **Blythe Solar Power Project, (2009-present).** 1,000 MW solar trough project near Blythe, California.
  - **Genesis Solar Power Project, (2009-present).** 250 MW solar trough project near Blythe, California.

- **City of Palmdale Hybrid Power Plant Project, CEC, Staff, (2008-present).** Researches and contributes to the alternatives analysis in compliance with CEQA for this 617 MW power plant located in Palmdale, California which includes an approximately 35-mile transmission interconnection.
- **Sonoma-Marin Area Rail Transit, SMART, Staff, (2009-present).** Updated and wrote the cumulative scenario for the SMART passenger rail project NEPA environmental review based on a compilation of projects gathered from local planning agency representatives. The SMART project is located along an approximately 70-mile existing rail corridor extending from Cloverdale in Sonoma County, California, to a ferry terminal located in Larkspur, Marin County, California.
- **Northern California CO2 Storage Pilot, Confidential Client, CEQA and NEPA compliance coordinator, (2008-present).** Contributed to the preparation of Department of Energy NEPA environmental questionnaire to comply with Category Exclusion requirements and preparation of the Initial Statement under CEQA for the proposed CO2 sequestration pilot test site in Montezuma Hills, California.
- **Devers-Palo Verde No. 2 Transmission Line Project EIR/EIS Addendum, CPUC and BLM, Staff, (2008-2009).** Researcher and writer for the Addendum to the Final EIR for the Devers-Palo Verde No. 2 Transmission Line Project including research regarding the renewable projects located in the region between Blythe and Desert Center, California.
- **Arizona Utilities CO2 Storage Pilot, CEC and University of California, NEPA compliance coordinator, (2007-2008).** Contributed to the preparation of Department of Energy NEPA environmental questionnaire to comply with Category Exclusion requirements for the proposed CO2 sequestration pilot test site near Joseph City, Arizona.

Previous Employment 2000 to 2007

Ms. Capello worked for *Doctors Without Borders USA* as a researcher to calculate its Carbon Footprint and present means of lowering and offsetting its impact. She was a group manager for consulting work for the *Wildlife Conservation Society's* Translink Project, managing the research, design, and production of multi-media projects focused on conservation and economic development. Ms. Capello was also a Peace Corps Trainer at *CHP, International* from September 2004 to December 2005 and from September 2005 to April 2006. She coordinated and facilitated daily training sessions in multiple rural health, sanitation, agriculture, and apiculture themes. She worked as the Education Department Vice-Director for the *Instituto de Permacultura e Ecovila do Cerrado*, in Brazil, co-writing the permaculture course curriculum, and facilitating and coordinating courses in three languages from April to September 2005.

TRAINING AND PROFESSIONAL ORGANIZATIONS

- *Association of Environmental Professionals:* California Environmental Quality Act (CEQA) One-Day Workshop.

DECLARATION OF
Testimony of William Walters, P.E.

I**, William Walters,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission's Siting, Transmission and Environmental Protection Division, as a senior associate in engineering and physical sciences.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Air Quality** for the **Calico Solar Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 23, 2010 Signed: Original signed by W. Walters

At: Agoura Hills, California

WILLIAM WALTERS, P.E.
Air Quality Specialist

ACADEMIC BACKGROUND
B.S., Chemical Engineering, 1985, Cornell University

PROFESSIONAL EXPERIENCE

Mr. Walters has over 20 years of technical and project management experience in environmental compliance work, including environmental impact reports, emissions inventories, source permitting, energy and pollution control research RCRA/CERCLA site assessment and closure, site inspection, and source monitoring,.

Aspen Environmental Group — 2000 to present

Responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- **Engineering and Environmental Technical Assistance to Conduct Application for Certification Review for the California Energy Commission:**
  - Preparation and project management of the air quality section of the Staff Assessment and/or Initial Study and the visual plume assessment for the following California Energy Commission (CEC) licensing projects: Hanford Energy Park; United Golden Gate, Phase I; Huntington Beach Modernization Project (including Expert Witness Testimony); Woodland Generating Station 2; Ocotillo Energy Project, Phase I; Magnolia Power Project; Colusa Power Project; Inland Empire Energy Center; Rio Linda/Elverta Power Plant Project; Roseville Energy Center; Henrietta Peaker Project; Tracy Peaking Power Plant Project (including Expert Witness Testimony); Avenal Energy Project; San Joaquin Valley Energy Center (including expert witness testimony); Salton Sea Unit 6 Project (including expert witness testimony); Modesto Irrigation District Electric Generation Station (including expert witness testimony); Walnut Energy Center (including expert witness testimony); Riverside Energy Resource Center (including expert witness testimony); Pastoria Energy Facility Expansion; Panoche Energy Center; Starwood Power Plant; and Riverside Energy Resource Center Units 3 and 4 Project (in progress).
  - Preparation and project management of the visual plume assessment for the following California Energy Commission (Energy Commission) licensing projects: Metcalf Energy Center Power Project (including Expert Witness Testimony); Contra Costa Power Plant Project (including Expert Witness Testimony); Mountainview Power Project; Potrero Power Plant Project; El Segundo Modernization Project; Morro Bay Power Plant Project; Valero Cogeneration Project; East Altamont Energy Center (including expert witness testimony); Russell City Energy Center; SMUD Cosumnes Power Plant Project (including expert witness testimony); Pico Power Project; Blythe Energy Project Phase II; City of Vernon Malburg Generating Station; San Francisco Electric Reliability Project; Los Esteros Critical Energy Facility Phase II; Roseville Energy Park; City of Vernon Power Plant; South Bay Replacement Project; Walnut Creek Energy Park; Sun Valley Energy Project; Highgrove Power Plant; Colusa Generating Station; Russell City Energy Center; Avenal Energy Project; Carlsbad Energy Center; Community Power Project; Panoche Energy Center; San Gabriel Generating Station; Sentinel Energy Project; and Victorville 2 Hybrid Power Project.
  - Assistance in the aircraft safety review of thermal plume turbulence for the Riverside Energy Resources Center; Russell City Energy Center Amendment (including expert witness testimony); Eastshore Energy Power Plant (including expert witness testimony); Carlsbad Energy Center (in progress), Riverside Energy Resource Center Units 3 and 4 Project; Victorville 2 Hybrid Power Project; and the Blythe Energy Power

Plant and Blythe Energy Project Phase II (including expert witness testimony) siting cases. Assistance in the aircraft safety review of thermal and visual plumes of the operating Blythe Energy Power Plant. Preparation of a white paper on methods for the determination of vertical plume velocity determination for aircraft safety analyses.

- Preparation and instruction of a visual water vapor plume modeling methodology class for the CEC.
- Preparation and project management of the public health section of the Initial Study for the Woodland Generating Station 2 Energy Commission licensing project.
- Preparation of project amendment or project compliance assessments, for air quality or visual plume impacts, for several licensed power plants, including: Metcalf Energy Center; Pastoria Power Plant; Elk Hills Power Plant; Henrietta Peaker Project; Tracy Peaker Project; Magnolia Power Project; Delta Energy Center; SMUD Cosumnes Power Plant; Walnut Energy Center; San Joaquin Valley Energy Center; City of Vernon Malburg Generating Station; Otay Mesa Power Plant; Los Esteros Critical Energy Facility; Pico Power Project; Riverside Energy Resource Center; Blythe Energy Project Phase II; Inland Empire Energy Center; Salton Sea Unit 6 Project; and Starwood Power-Midway Peaking Power Plant.
- Preparation of the air quality section of the staff paper “A Preliminary Environmental Profile of California’s Imported Electricity” for the Energy Commission and presentation of the findings before the Commission.
- Preparation of the draft staff paper “Natural Gas Quality: Power Turbine Performance During Heat Content Surge”, and presentation of the preliminary findings at the California Air Resources Board Compressed Natural Gas Workshop and a SoCalGas Technical Advisory Committee meeting.
- Preparation of the staff paper “Emission Offsets Availability Issues” and preparation and presentation of the Emission Offsets Constraints Workshop Summary paper for the Energy Commission.
- Preparation of information request and data analysis to update the Energy Commission’s Cost of Generation Model capital and operating cost factors for combined and simple cycle gas turbine projects. Additionally, performed a review of the presentation for the revised model as part of the CEC’s 2007 Integrated Energy Policy Report workshops, and attended the workshop and answering Commissioner questions on the data collection and data analysis.

- For the **Los Angeles Department of Water and Power (LADWP)**:
  - Preparation of the Air Quality Inventory for the LADWP River Supply Pipeline Project EIR.
  - Project management and preparation of the Air Quality Section for the LADWP Valley Generating Station Stack Removal IS/MND support project.
- For the **U.S. Army Corps of Engineers (Corps)**:
  - Preparation of the Air Quality Section and General Conformity Analysis for the Matilija Dam Ecosystem Restoration Project EIS/R for the Corps.
  - Preparation of emission inventory and General Conformity Analysis of the Murrieta Creek Flood Control Project and the Joint Red Flag exercise to be conducted in the Nevada Test and Training Range.
  - Emission inventory for the construction activities forecast for the San Jose/Old San Jose Creeks Ecosystem Restoration project for the Corps.
- Other Projects:
  - Preparation of the Air Quality Section of the LAUSD New School Construction Program EIR and provided traffic trip and VMT calculation support for the Traffic and Transportation Section.

- Preparation of the draft staff paper "Natural Gas Quality: Power Turbine Performance During Heat Content Surge", and presentation of the preliminary findings at the California Air Resources Board Compressed Natural Gas Workshop and a SoCalGas Technical Advisory Committee meeting.
- Preparation of the Air Quality Section of the Environmental Information Document in support of the Coastal Consistency Determinations for the suspension of operation requests for undeveloped units and leases off the Central California Coast.
- Preparation of comments on the Air Quality, Alternatives, Marine Traffic, Public Safety, and Noise section of the Cabrillo Port Liquefied Natural Gas Deepwater Port Draft EIS/EIR for the City of Oxnard.
- Preparation of the emission estimates used in the Air Quality Sections for the DWR Tehachapi Second Afterbay Project Initial Study and EIR.

Camp Dresser & McKee, Inc. 1998 to 2000

Mr. Walters was responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- Preparation of emission inventories and dispersion modeling for criteria and air toxic pollutants for the Los Angeles International Airport Master Plan (LAXMP) EIS/EIR.
- Project Manager/Technical lead for the completion of air permit applications and air compliance audits for two Desa International fireplace accessory manufacturing facilities located in Santa Ana, California.
- Project manager/technical lead for the completion of Risk Management Plans (RMPs) for four J.R. Simplot food processing facilities in Oregon, Idaho, and Washington and the Consolidated Reprographics facility located in Irvine, California.

Planning Consultants Research 1997 to 1998

Mr. Walters was responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- Project Manager for a stationary source emission audit of the entire Los Angeles International Airport complex for Los Angeles World Airports (LAWA) in support of the LAXMP.
- Review of the Emission Dispersion Modeling System (EDMS) and preparation of a report with findings to the Federal Aviation Administration for LAWA in support of the LAXMP.
- Project manager for the ambient air monitoring and deposition monitoring studies performed for LAWA in support of the LAXMP, including the selection of the monitoring sites and specialty subcontractor, and review of all monitoring data.

Aspen Environmental Group/Clean Air Solutions 1995 to 1996

Mr. Walters was responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- Manager of the Portland, Oregon, office of Clean Air Solutions from March 1995 to December 1995, with responsibilities including Project Management, Business Development, and Administration.
- Control technology assessment, engineering support and Notice of Intent to construct preparation for J.R. Simplot's Hermiston, Oregon, food processing facility. Review and revision of an Air Contaminant Discharge Permit application, Title V permit application, and PSD modeling analysis for J.R. Simplot's Hermiston facility.

- Air quality compliance report including an air emission inventory, regulation and permit compliance determination, and recommendations for compliance for Lumber Tech, Inc.'s Lebanon, Oregon, wood products facility.

Fluor Daniel, Inc. — 1990 to 1995 and 1996 to 1997

Mr. Walters was responsible as lead technical or project manager for major environmental projects for both government and private clients. His projects included:

- Prepared several air permit applications for the ARCO Los Angeles Refinery Polypropylene Plant Project; Phase I environmental assessments for properties located in Southern California; and a site investigation and RCRA closure plan for a hazardous waste storage site in Vernon, California.
- Project manager of the Anaconda Smelter site for the U.S. Environmental Protection Agency's (EPA) Alternative Remedial Contract System (ARCS) project during the conclusion of technical activities and project closeout. Prepared a cost recovery report for the project.
- Performed environmental analysis for the Bonneville Power Authority, including air pollution BACT analysis, wastewater analysis, and evaluation of secondary environmental effects of electric power producing technologies.

Jacobs Engineering Group — 1988 to 1990

Mr. Walters was responsible for a wide range of air pollution regulatory and testing projects, including the following:

- Project manager of air toxic emission inventory reports prepared for U.S. Borax's boron mining and refining facility and the Naval Aviation Depot (N. Island Naval Base, San Diego, California).
- Prepared air permit applications and regulatory correspondence for several facilities including the U.S. Department of Energy's Feed Material Production Center uranium processing facility in Fernald, Ohio; Evaluation of a sludge dewatering process at Unocal's Wilmington, California, Refinery; and United Airlines blade repair facility at the San Francisco Airport.
- Characterized and quantified air emissions for offshore oil and gas development activities associated with Federal oil and gas Lease Sale 95, offshore southern California, for the U.S. Minerals Management Service.

CERTIFICATIONS

- Chemical Engineer, California License 5973
- CARB, Fundamentals of Enforcement Seminar
- EPA Methods 1-8, 17; Training Seminar

AWARDS

- California Energy Commission Outstanding Performance Award 2001

DECLARATION OF
Testimony of Chris Huntley

I, **Chris Huntley,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission's Siting, Transmission and Environmental Protection Division, as a senior associate in biological resources.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Biological Resources** for the **Calico Solar Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 24, 2010 Signed: ______________________

At: Agoura Hills, California

Aspen
Environmental Group

CHRISTIAN S. HUNTLEY

Senior Associate/Senior Biologist

ACADEMIC BACKGROUND

Graduate Studies, Biology, California State University Northridge
B.A., Biology, University of California at Santa Cruz, 1992

PROFESSIONAL EXPERIENCE

Mr. Huntley has eleven years of experience with Aspen supporting and managing CEQA/NEPA projects including EIR/EIS, IS/MND, EA, BE/BA, and BA. In addition, Mr. Huntley has extensive experience conducting biological assessments, managing large-scale construction and restoration projects, and supporting agency clients through the Section 7 process. With over 15 years experience as a biologist, Mr. Huntley also has proven experience working with the sensitive biological resources that occur in California. Mr. Huntley has also completed detailed vegetation mapping, sensitive species surveys, and revegetation plans for projects throughout southern California. With extensive experience in managing large scale construction projects, Mr. Huntley has unique experience in resolving conflicts and ensuring compliance with environmental regulations. Supported by a solid background in biological resources, experience in completing CEQA, NEPA, USDA Forest Service Biological Assessments, sensitive species consultation, and over a decade of construction management experience, he works closely with resource agency personnel, contractors and affected jurisdictions to ensure that projects are constructed on time and in compliance with applicable laws, ordinances, regulations and standards.

Aspen Environmental Group — 1998 to present

- **California Energy Commission Emergency Siting Team, Power Plant Development, Compliance Project Manager.** For two years, Mr. Huntley's duties included management of technical staff for the completion of CEQA equivalent environmental permitting for over nine new emergency power plants, review of applicant submittals, drafting of Memoranda of Understanding with Chief Building Officials, conducting audits of building officials, and coordinating with affected agencies to resolve concerns with potential resource impacts. Other duties included maintaining contractor construction milestones, compliance monitoring and reporting, development of mitigation measures and conflict resolution for power plant compliance issues.
- **California Energy Commission Coastal Power Plant Study, Deputy Project Manager/Biologist.** Conducted biological surveys at 21 coastal power plants as part of the CEC's coastal power plant study. Site visits characterized habitat within the footprint of the power plant, landscaping, and identified potential environmental and permitting issues associated with potential expansion of the power plants.
- **California Energy Commission Hydroelectric Power Plant Inventory Study, Deputy Project Manager/Natural Resources Analyst.** Mr. Huntley coordinated a team that collected power and environmental data on over 200 hydroelectric power plants located in California. Physical power data included electrical output, system upgrades, water storage capacity and peaking availability. Environmental information included developing a data base addressing sensitive species issues, fish

screens and ladders, monitoring parameters and a map of known hydroelectric facilities and barriers to anadromous fish passage. Mr. Huntley also obtained water use information on thermal power plants in support of the CEC's bi-annual environmental performance report.

- **Tehachapi Renewable Transmission Line Project California Public Utilities Commission/U.S. Forest Service (2007-2009), Issue Area Coordinator/Biologist.** Mr. Huntley is acting as the issue area coordinator and principal author for biological resources on this 500 kV transmission line proposed by Southern California Edison in support of wind energy projects. This transmission line is 173 miles in length and includes two separate segments that cross the Angeles National Forest. Some of the key issues on this project include potential impacts to Mojave ground squirrel, arroyo toads, California condors, spotted owl, and a host of forest sensitive plant and wildlife species. As part of the project Mr. Huntley mapped over 190 riparian related features and completed extensive surveys of the ANF. Mr. Huntley also managed the completion of comprehensive botanical surveys for the proposed right of way. Other key issues involve the coordination with State Park, Forest, and resource agency staff.
- **El Casco Sub-Transmission Line Project EIR, California Public Utilities Commission (2006-2009), Issue Area Coordinator/Biologist.** Mr. Huntley acted as the issue area coordinator for biological resources and completed the impact analysis section of the EIR for this 17-mile subtransmission line upgrade to be completed by Southern California Edison. This line is located in the Western Riverside Multiple Species Conservation Area and crosses areas supporting several federally protected species including least Bell's vireo, southwestern willow flycatcher, and Stephens' kangaroo rat. Currently, Mr. Huntley provides technical assistance to monitoring staff.
- **Antelope/Pardee Transmission Line Project EIR/EIS-BE/BA, California Public Utilities Commission/U.S. Forest Service (2005-2009), Issue Area Coordinator/Biologist.** Mr. Huntley acted as the issue area coordinator for biological resources on this 500 kV transmission line upgrade to be completed by Southern California Edison. Key issues on this project included compliance with the USFS Forest Plan and sensitive species including California condor, burrowing owl, and rare plants. Mr. Huntley reviewed and prepared the Biological Resource Section for the EIR/EIS, developed project alternatives, coordinated with USFS staff, and conducted sensitive species surveys for arroyo toad in support of this project. Currently, Mr. Huntley provides technical assistance to monitoring staff.
- **Tortoise Monitoring at Las Vegas Wash, U.S. Army Corps of Engineers (2005-2006), Project Manager.** Mr. Huntley managed the survey and report preparation for monitoring activities associated with this task. Monitoring crews conducted work within the Tropicana, Flamingo, and Blue Diamond tributaries as part of the ongoing flood control activities.
- **Devers–Palo Verde Transmission Line Project No. 2 EIR/EIS, California Public Utilities Commission–Bureau of Land Management (2005/2009), Issue Area Coordinator/Biologist.** Mr. Huntley acted as the issue area coordinator for biological resources on this 230-mile 500 kV transmission line upgrade to be completed by Southern California Edison. This project crosses key wildlife areas including the KOFA Wildlife Sanctuary, the San Bernardino National Forest, the Mojave and Sonoran Desert habitat, and sections of the Riverside Multiple Species Conservation Area.
- **Joint Red Flag '05 Exercise Environmental Assessment, U.S. Army Corps of Engineers/ Bureau of Land Management, Nellis Air Force Base Nevada (2004-2005), Project Manager/ Biologist.** Mr. Huntley managed and coordinated the EA process for the ground component of the Joint Red Flag '05 Exercise which was conducted Bureau of Land Management (BLM) lands surrounding Nellis Air Force Base in Lincoln County, Nevada. Mr. Huntley conducted extensive field surveys of the proposed anti-aircraft sites, completed the assessment for biological and visual

resources, prepared the DR/FONSI, managed sensitive species surveys, identified and flagged populations of noxious weeds, and prepared of military training guides for the soldiers in the field.

- **March Air Reserve Base Cactus and Heacock Channels Environmental Assessment and Biological Technical Report U.S. Army Corps of Engineers (2005-2009), Project Manager/Biologist.** Mr. Huntley conducted and managed the preparation of a Biological Technical Report for two channels located along the perimeter of the March Air Reserve Base in Riverside California. Mr. Huntley and a team of biologists conducted burrowing owl surveys, vegetation and vernal pool mapping, and documented existing biological conditions at the two channels. As part of this project detailed GIS maps were created to assist the Corps in preparing environmental documents for the area. Mr. Huntley managed the completion of an Environmental Assessment to evaluate impacts of construction of approximately three miles of flood control channel located at Cactus and Heacock Drainages. Currently, Mr. Huntley provides technical assistance to Corps staff for this project.
- **Patriot Integrated Air Defense Exercise Project Environmental Assessment and Environmental Baseline Survey, Nellis Air Force Base Nevada (2006-2008), Project Manager/Biologist.** Mr. Huntley managed the preparation of an EA for ongoing military activities conducted on Bureau of Land Management (BLM) lands surrounding Nellis Air Force Base in Lincoln and Nye County, Nevada. Mr. Huntley coordinated with the USAF regarding field surveys of the proposed anti-aircraft sites, the assessment of biological and cultural resources, and prepared the DR/FONSI and Right-Of-Way document for the USAF. Mr. Huntley also prepared sections and managed the completion of an Environmental Baseline Report for each of the artillery sites.
- **Lower Colorado Flood Control Project EIR/EIS, U.S. Army Corps of Engineers (2003-2004), Deputy Project Manager/Biologist.** Mr. Huntley conducted reconnaissance surveys and vegetation mapping along a 23-mile section of the Lower Colorado River in Yuma Arizona. In addition, Mr. Huntley updated the biological resource section of the current baseline conditions and is working with a team of State and federal agencies in an effort to determine the future alignment of the Lower Colorado River in this location. As part of this process Mr. Huntley developed project alternatives that met the criteria identified by the United States Boundary Water Commission and State and federal resources agencies.
- **Fort Irwin Environmental Baseline Survey Reports U.S. Army Corps of Engineers (2005), Project Manager/Biologist.** Mr. Huntley managed the preparation of two Environmental Baseline Survey reports near Fort Irwin, San Bernardino County, California to support the land acquisition of over 95 parcels by the U.S. Army for the Fort Irwin National Training Center. Mr. Huntley conducted site investigations, documented existing biological conditions and managed the preparation of the report.
- **Angeles National Forest Fuels Reduction Project, Biological Evaluation/Biological Assessment, U.S. Department of Agriculture Forest Service (2005/2009), Biologist.** Mr. Huntley reviewed existing documents and assisted staff in responding to comments from USFS staff. Mr. Huntley met with USFS staff and conducted site inspections at several plantation and natural stands. Currently, Mr. Huntley is revising BE/BA's for the ANF.
- **Level 3 Fiber Optics Network Construction Monitoring and Supplemental Environmental Review Program, CPUC, Environmental Monitor.** Mr. Huntley's duties included inspection of several southern California segments including Santa Barbara to Burbank, San Bernardino, Corona to Atwood and San Diego to the California/Arizona state line. Environmental compliance during construction addressed biological and cultural resource, air and water quality, traffic control, and public utilities. Other tasks included maintaining daily documentation, review of pre-construction mitigation measures, weekly reporting of compliance activities, and coordination with Level 3 personnel and subcontractors, and affected agencies.

- **Pacific Pipeline Project EIR/EIS for the U.S. Forest Service, Angeles National Forest, and the California Public Utilities Commission, Environmental Monitor.** Served as an Environmental Monitor and supervised mitigation monitoring for all sensitive resources for a construction segment along a 132-mile crude oil pipeline within southern California.
- **SCE Valley-Auld Power Line Project, CPUC, Environmental Monitor.** Conducted inspections of construction of this 11-mile power line upgrade for compliance with the project's Mitigated Negative Declaration mitigation measures and compliance plans. Other tasks included review of pre-construction compliance materials, maintaining inspection documentation, and coordination with SCE and its subcontractors.
- **Piru Creek Repairs Project IS/MND, California Department of Water Resources, Biologist.** Mr. Huntley completed sections of the U.S. Forest Service Biological Assessment/Biological Evaluation, and biological technical report for the Piru Creek Repairs Project. In addition, Mr. Huntley has conducted sensitive species surveys and coordinated with CDFG, USFS and RWQCB regarding permits and sensitive species issues.
- **Compliance and Mitigation Development, California Public Utilities Commission, State Lands Commission, California Department of Water Resources, Biologist.** Working with technical experts Mr. Huntley developed mitigation measures for a number of State and federal projects including the Kinder Morgan pipeline, Santa Ana pipeline and Viejo transmission line project.
- **San Antonio Creek Erosion Repairs Project BA/EA, U.S. Army Corps of Engineers, Biologist.** Mr. Huntley conducted botanical surveys and prepared detailed vegetation maps within San Antonio Creek. Mr. Huntley also prepared the Biological and Environmental Assessments for the project and developed mitigation for sensitive plant and wildlife species.
- **Santa Fe Pacific Pipeline, CPUC, Environmental Monitor.** Inspected construction of three petroleum distribution station sites for compliance with approved project mitigation measures and compliance plans.

SELECTED TECHNICAL EXPERIENCE/TRAINING AND CERTIFICATIONS

- SWPPP trained 2006
- California Energy Commission Outstanding Performance Award, 2001
- CDFG Scientific Collecting Permit for pond turtle and garter snake.
- Certified Caltrans Horizontal Directional Drilling Inspector 2001
- Desert Tortoise Handling Workshop, Ridgecrest California 2001
- CEC Expert Witness Training 2001
- Railroad Right-of-Way Safety Training 2002
- Small boat handling, licensed and certified since 1993
- Research Scuba-diving certification and training since 1989

DECLARATION OF
Testimony of Scott D. White

I, **Scott D. White,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission's Siting, Transmission and Environmental Protection Division, as a senior associate in botany.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Biological Resources** for the **Calico Solar Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 24, 2010 Signed: Scott D W

At: Upland, California

Aspen
Environmental Group

SCOTT D. WHITE

Senior Associate/Senior Biologist

ACADEMIC BACKGROUND

MA, Biology, 1992 and BA, Biology, 1981, Humboldt State University; Secondary Teaching Credential, Life Science, 1982

PROFESSIONAL EXPERIENCE

Scott D. White holds Bachelor's and Master's degrees in biology from Humboldt State University and has over 17 years experience including NEPA, CEQA and SMARA compliance. His primary experience is with southern California floristics and vegetation, including wetlands, coastal sage scrub, chaparral, and forests. He is well experienced with the regional flora, including rare, threatened, and endangered species and is a coauthor of *Vascular Plants of Western Riverside County: An Annotated Checklist*. Mr. White has recently joined Aspen in the firm's Inland Empire office after working for a number of years as a subcontractor to Aspen. He has performed field surveys and analyzed biological resources professionally in California since 1987. His projects have included biological and cumulative impacts analyses; focused surveys for special status species in a variety of habitats; design and implementation of monitoring plans and land management plans; data collection and analysis in coastal sage scrub, chaparral, oak woodlands, desert shrublands and pinyon woodlands; wetlands delineations and mitigation plans for state and federal permitting; upland revegetation plans for mine reclamation; recovery plans for listed T/E species; and interagency planning efforts for long-term land use and conservation planning on public and private lands. He has extensive experience with federal, state and local agencies and has published a number of studies.

Aspen Environmental Group — 2009 to present

Mr. White has recently begun at Aspen. Below are samples of work he previously performed as a subcontractor to Aspen.

- **Newhall Ranch Specific Plan EIR and Sect. 2081 Review, (2006-2010), California Department of Fish and Game.** Document review and comment, agency/applicant meetings and consultation, responses to comments in support of CDFG CEQA and state Endangered Species Act project review, including conservation planning and 2081 Incidental Take Permit document production addressing listed San Fernando Valley spineflower and other biological impacts.
- **Tehachapi Renewal Transmission Project (2008), California Public Utilities Commission/US Forest Service.** Field surveys for rare, threatened and endangered plants on powerline corridor and alternate routes in Chino/Puente Hills, San Gabriel Mountains, Los Angeles Basin, and Inland Empire areas, Los Angeles, Orange, San Bernardino, and Riverside counties.
- **Alta-Oak Creek Wind Project (2008), Kern County**. Vegetation mapping and text descriptions of vegetation and habitat; and review and update of applicant's botanical survey reports, in support of CEQA compliance.

Scott White Biological Consulting and other consulting 1989 to 2009

Consulting Biologist: Scott White Biological Consulting; White & Leatherman BioServices 1998-present; Psomas and Associates, 1995-1998; Tierra Madre Consultants 1989-1995. Mr. White performed biological surveys, report preparation (to meet requirements of CEQA, NEPA, SMARA, state and federal wetlands requirements, and local planning policies), client contact, and agency coordination. Specialties include rare plant surveys, wetlands delineations, vegetation sampling and description, habitat characterization (e.g., suitability for rare wildlife species), revegetation planning, and mitigation design.

Representative projects include the following:

- **Proposed Improvements: State Hwy 79 (2006) and I-215 (2008)**: Field surveys for rare, threatened and endangered plants on numerous public and private parcels on a series of alternate roadway alignments, western Riverside County.
- **San Bernardino National Forest / Rancho Santa Ana Botanic Garden (2008-ongoing):** Field surveys for rare, threatened and endangered plants in San Jacinto and San Bernardino Mountains. (meadows, pebble plains, etc.) in San Bernardino and Riverside counties.
- **West Coast Aggregate tortoise surveys, Biological Technical Reports, Revegetation Plans (1999-2007)**: Field surveys, data collection and analysis; and technical reports and plans for several mining plan revisions, per CEQA and Mining and Reclamation Act; Coachella Valley, Riverside County (many similar surveys and reports for mining and planning projects throughout S. California, 1989-present).
- **Lucerne Valley-Big Bear Lake Fiber Optic Cable (2005)**: Field surveys and impacts analysis for rare, threatened and endangered plants on cable route from desert floor to Big Bear Lake area; wrote Biological Assessment per National Forest guidelines; managed and directed construction monitoring per National Forest requirements, San Bernardino County.
- **Proposed Fort Irwin Gas Pipeline (2004-2005)**: Field surveys and impacts analysis for rare, threatened and endangered plants and animals (including desert tortoise, Lane Mountain milk vetch, and others) on proposed pipeline alignments totaling ca. 66 linear miles, San Bernardino County.
- **San Bernardino National Forest/Wildlands Conservancy (2004):** Field surveys and descriptions of vegetation and flora on series of public and private parcels in mountains and desert foothills for impact assessment of proposed land exchange; San Bernardino County.
- **Angeles National Forest Botanical Surveys (2004):** Field surveys and impacts analysis for rare, threatened and endangered plants on ANF project sites for fuel management, transportation, and recreation; San Gabriel Mountains, Los Angeles and San Bernardino counties.
- **Carbonate Habitat Management Strategy (1999-2004):** Document review and comment, agency/industry meetings and consultation, in support of limestone mining industry in preparation of federal Endangered Species Act compliant management plan to resolve land use conflicts among mining and listed threatened/endangered limestone endemic plants on mining claims in the San Bernardino National Forest, San Bernardino County.
- **Botanical Field Guide (2004):** Field surveys, specimen preparation, photography, and text for botanical field guide for the Soboba Indian Reservation, San Jacinto Mountain foothills, western Riverside County.
- **Draft Recovery Plan for Three Desert *Astragalus* Species (2004-2007):** Review and compilation of specimen data, field survey reports, agency planning documents and conservation biology literature to prepare draft recovery plan per US Fish and Wildlife Service specifications; San Bernardino, Riverside, and Imperial Counties.

- **Foothill Transportation Corridor South (2003):** Field surveys for special status plants including thread-leaved brodiaea on proposed alternate road alignments, Santa Ana Mountain foothills, Orange County.
- **United States Gypsum (2002-2007):** Field surveys for special status plants and animals on proposed quarry expansion lands; Biological Technical Report and detailed Responses to Comments for joint EIR/EIS for Imperial County and USDI Bureau of Land Management.
- **Los Angeles County Department of Public Works (2002-03):** Field surveys for threatened or endangered plants (e.g., Braunton's milk vetch) in existing and proposed flood control channels and debris basins, Santa Clarita Valley and San Gabriel Mtn. foothills, Los Angeles County.
- **Lake Arrowhead dredging sites (2001):** Field surveys, Biological Technical Report and Wetlands Delineation for dredging by Arrowhead Lake Association at inlet channels, including habitat assessment for mountain yellow-legged frog and rare plants. San Bernardino Mountains, San Bernardino County.
- **I-15 Corridor, Escondido - Miramar (1999):** Focused field surveys for sensitive, threatened, and endangered plants (including San Diego Mesa mint) on ca. 20-mile corridor in support of long-term transportation planning; San Diego County.

Botanist: San Bernardino National Forest **1987-1989**

Team leader for data collection and assisted in data analysis for vegetation management planning and ecosystem classification; assisted in analysis and interpretation of vegetation data, leading to a classification system of southern California chaparral; provided mapping and implementation recommendations for prescribed burn planning and other habitat management projects; assisted in vegetation sampling of California spotted owl territories; prepared Environmental Assessments in compliance with NEPA.

SELECTED TECHNICAL EXPERIENCE/TRAINING AND CERTIFICATIONS

- Planning and land use policies, including mitigation banking, to mitigate ongoing loss of native habitats.
- Use of quantitative data and multivariate statistics to classify plant communities and wildlife habitat.
- Occurrence and distributions of native and naturalized plants in Southern California particularly in the Inland Empire and surrounding mountain ranges.
- Role of fire and other natural disturbance in southern California shrublands and forests.
- Effects of brown headed cowbird nest parasitism on native bird populations, and potential application of habitat management to reduce parasitism rates.

CERTIFICATIONS

California Dept. of Fish and Game and USDI Fish and Wildlife Service authorization to collect listed endangered, threatened and rare plants (Research Association permittee under RSABG permits)

SERVICE

- Vegetation Committee; California Native Plant Society (member 1990-1998; acknowledged reviewer of *A Manual of California Vegetation*, J.O. Sawyer & T. Keeler-Wolf (1st ed. 1995, 2nd ed. 2009).
- Guest editor; *Fremontia* Coastal Sage Scrub special issue (October 1995).

- Field trip leader and training seminar instructor for local volunteer organizations including The Crafton Hills Conservancy, The Riverside Land Conservancy, The San Bernardino Valley Audubon Society, California Native Plant Society, and Rancho Santa Ana Botanic Garden.
- Peer reviewer of Federal Register listing proposals and critical habitat proposals, US Fish and Wildlife Service (2004-present).
- Southern California Botanists Board of Directors (1997-2002); President (1999-2000); peer reviews for SCB journal *Crossosoma* (1997-present); Co-editor, *Crossosoma* (effective 2009).
- Research Associate, Rancho Santa Ana Botanic Garden and U.C. Riverside Herbarium

MEMBERSHIPS

California Botanical Association

California Native Plant Society

Southern California Academy of Sciences

The Wildlife Society

Arizona Native Plant Society

Southwestern Association of Naturalists

Southern California Botanists

PROFESSIONAL PRESENTATIONS

- "Critiquing Botanical Consulting from a 20 Year Perspective," presented at California Native Plant Society State-wide conference, Sacramento, 2009.
- "Conservation Planning for Limestone endemic Plants in the Northern San Bernardino Mountains," presented at Southern California Botanists annual symposium, Cal State Fullerton, 2002.
- With Orlando Mistretta: "Introducing Two Federally Listed Carbonate endemic Plants onto a Disturbed Site in the San Bernardino Mountains, California," presented at 3rd Southwestern Rare Plant Symposium, Flagstaff, Arizona, September 2000.
- "Structure and Function in Southern California Chaparral," presented at Southern California Botanists annual symposium, Cal State Fullerton, 1997.
- With Martha Blane: "Planning and Monitoring for Ecological Function," presented at Society for Ecological Restoration California Chapter annual conference, Yosemite National Park, 1996.
- "Vegetation Descriptions, Site Characteristics, and Plant Ecology in Puente Hills Shrublands," presented at Symposium on Natural Resources in the Puente Hills Chino Hills Corridor, Whittier College, 1994.

DECLARATION OF
Testimony of Dal Hunter, Ph.D., C.E.G.

I**, Dal Hunter, Ph.D., C.E.G.,** declare as follows:

1. I am presently employed as a subcontractor to Aspen Environmental Group, a contractor to the California Energy Commission, Systems Assessment and Facilities Siting Division, as an engineering geologist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **GEOLOGY AND PALEONTOLOGY** for the proposed **Calico Solar Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony and changed Condition of Certification is valid and accurate and comports with my prior written testimony in the Final Staff Assessment.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 23, 2010 Signed: Original signed by D. Hunter

At: Black Eagle Consulting, Inc.

Reno, Nevada

Robert D. Hunter, Ph.D., C.E.G.
Engineering Geologist
Vice President

Education

- Ph.D. – Geology – 1989 – University of Nevada, Reno
- M.S. – Geology – 1976 – University of California - Riverside
- B.S. – Geology – 1972 – California State University, Fullerton

Registrations

- Professional Geological Engineer – Nevada
- Registered Geologist – California
- Certified Engineering Geologist – California

Experience

1997 to Present: Black Eagle Consulting, Inc.; Vice President. Dr. Hunter is in charge of all phases of geochemical, geological, and geotechnical projects and is responsible for conducting, coordinating, and supervising geotechnical investigations for public and private sector clients. He is very familiar with design specifications and state and federal requirements.

Dr. Hunter has also provided geological, geotechnical, and paleontological review and written and oral testimony for California Energy Commission (CEC) power plant projects including:

- El Segundo Power Redevelopment Project (Coastal)
- Magnolia Power Project (including compliance monitoring
- Ocotillo Energy Project (Wind Turbines)
- Vernon-Malburg Generating Station
- Inland Empire Energy Center (including testimony and compliance monitoring)
- Palomar Energy Project
- Henrietta Peaker Project
- East Altamont Energy Center
- Avenal Energy Center
- Teayawa Energy Center monitoring
- Walnut Energy Center (including compliance monitoring
- Riverside Energy Resource Center
- Salton Sea Unit 6 (Geothermal Turbines)
- National Modoc Power Plant
- Pastoria Energy Center
- Otay Mesa Generating Project (compliance monitoring)
- Montainview Power Plant Project (compliance)
- Consumes Power plant (compliance monitoring)
- Sunrise Power Project (compliance monitoring)

Attended Expert Witness Training Sponsored by CEC.

1978 to 1997: SEA, Incorporated; Geotechnical Manager, Engineering Geologist. Dr. Hunter was in charge of all phases of geotechnical projects for SEA, including project coordination and supervision, field exploration, geotechnical analysis, slope stability analysis, soil mechanics, engineering geochemistry, mineral and aggregate evaluations, and report preparation. Numerous investigations were undertaken on military, commercial, industrial, airport, residential, and roadway projects. He worked on many geothermal power plants, providing expertise in foundations design, slope stability, seismic assessment, geothermal hazard evaluation, expansive clay, and settlement problems. Project types included high-rise structures, airports, warehouses, shopping centers, apartments, subdivisions, storage tanks, roadways, mineral and aggregate evaluations, slope stability analyses, and fault studies.

1977 to 1978: Fugro (Ertec) Incorporated Consulting Engineers and Geologists; Staff Engineering Geologist; Long Beach, California.

Affiliations

- Association of Engineering Geologists

Publications

- Hunter, 1988, *Lime Induced Heave in Sulfate Bearing Clay Soils*, Journal of Geotechnical Engineering, ASCE, Vol. 14, No. 2, pp. 150-167.

- Hunter, 1989, *Applications of Stable Isotope Geochemistry in Engineering Geology*: Proceedings of the 25th Annual Symposium on Engineering Geology and Geotechnical Engineering.

- Hunter, 1993, *Evaluation of Potential Settlement Problems Related to Salt Dissolution in Foundation Soils*: Proceedings of the 29th Annual Symposium on Engineering Geology and Geotechnical Engineering.

DECLARATION OF
Rick Tyler

I**, Rick Tyler** declare as follows:

1. I am presently employed by the California Energy Commission in the Siting Office of the Energy Facilities Siting Division as a Senior Mechanical Engineer

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I supervised the preparation of Staff Testimony on **Hazardous Materials Management** and **Worker Safety & Fire Protection** for the **Calico Solar Project** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 29, 2010 Signed: Original signed by R. Tyler

At: Sacramento, California

RICK TYLER

Associate Mechanical Engineer

CALIFORNIA ENERGY COMMISSION

EDUCATION B.S., Mechanical Engineering, California State University, Sacramento. Extra course work in Statistics, Instrumentation, Technical Writing, Management; Toxicology, Risk Assessment, Environmental Chemistry, Hazardous Materials Management, Noise Measurement, and regulations regarding control of toxic substances.

Near completion of course work necessary to obtain a certificate in hazardous materials management from University of California, Davis.

EXPERIENCE

Jan. 1998-
Present

California Energy Commission - Senior Mechanical Engineer
Energy Facility Siting and Environmental Protection Division

Responsible for review of Applications for Certification (applications for permitting) for large power plants including the review of handling practices associated with the use of hazardous and acutely hazardous materials, loss prevention, safety management practices, design of engineered equipment and safety systems associated with equipment involving hazardous materials use, evaluation of the potential for impacts associated with accidental releases and preparation and presentation of expert witness testimony and conditions of certification. Review of compliance submittals regarding conditions of certifications for hazardous materials handling, including Risk Management Plans Process Safety Management.

April 1985-
Jan. 1998

California Energy Commission - Health and Safety
Program Specialist; Energy Facility Siting and Environmental Protection Division.

Responsible for review of Public Health Risk Assessments, air quality, noise, industrial safety, and hazardous materials handling of Environmental Impact Reports on large power generating and waste to energy facilities, evaluation of health effects data related to toxic substances, development of recommendations regarding safe levels of exposure, effectiveness of measures to control criteria and non-criteria pollutants, emission factors, multimedia exposure models. Preparation of testimony providing Staff's position regarding public health, noise, industrial safety, hazardous materials handling, and air quality issues associated with proposed power plants. Advise Commissioners, Management, other Staff and the public regarding issues related to health risk assessment of hazardous materials handling.

Nov. 1977- April 1985	California Air Resources Board - Engineer (last 4 years Associate level) Responsible for testing to determine pollution emission levels at major industrial facilities; including planning, supervision of field personnel, report preparation and case development for litigation; evaluate, select and acceptance-test instruments prior to purchase; design of instrumentation systems and oversight of their repair and maintenance; conduct inspections of industrial facilities to determine compliance with applicable pollution control regulations; improved quality assurance measures; selected and programmed a computer system to automate data collection and reduction; developed regulatory procedures and the instrument system necessary to certify and audit independent testing companies; prepared regulatory proposals and other presentations to classes at professional symposia and directly to the Air Resources Board at public hearings. As state representative, coordinated efforts with federal, local, and industrial representatives.
<u>PROFESSIONAL AFFILIATIONS/ LICENSES</u>	Past President, Professional Engineers in California Government Fort Sutter Section; Past Chairman, Legislative Committee for Professional Association of Air Quality Specialists. Have passed the Engineer in Training exam.
<u>PUBLICATIONS, PROFESSIONAL PRESINTATIONS AND ACCOMPLISHMENTS</u>	Authored staff reports published by the California Air Resources Board and presented papers regarding continuous emission monitoring at symposiums. Authored a paper entitled "A Comprehensive Approach to Health Risk Assessment", presented at the New York Conference on Solid Waste Management and Materials Policy. Authored a paper entitled "Risk Assessment A Tool For Decision Makers" at the Association of Environmental Professionals AEP Conference on Public Policy and Environmental Challenges. Conducted a seminar at University of California, Los Angeles for the Doctoral programs in Environmental Science and Public Health on the subject of "Health Risk Assessment". Authored a paper entitled "Uncertainty Analysis -An Essential Component of Health Risk Assessment and Risk Management" presented at the EPA/ORNL expert workshop on Risk Assessment for Municipal Waste Combustion: Deposition, Uncertainty, and Research Needs. Presented a talk on off-site consequence analysis for extremely hazardous materials releases. Presented at the workshop for administering agencies conducted by the City of Los Angeles Fire Department. Evaluated, provided analysis and testimony regarding public health and hazardous materials management issues associated with the permitting of more than 20 major power plants throughout California.

Developed Departmental policy, prepared policy documents, regulations, staff instruction, and other guidance documents and reference materials for use in evaluation of public health and hazardous materials management aspects of proposed power plants.

Project Manager on contracts totaling more than $500,000.

RES.RT

DECLARATION OF
Alvin J. Greenberg, Ph.D.

I**, Alvin J. Greenberg, Ph.D.** declare as follows:

1. I am presently a consultant to the California Energy Commission, Energy Facilities Siting and Environmental Protection Division.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on the **Public Health** section for the **Calico Solar Project Application** based on my independent analysis of the amendment petition, supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: Feb 9, 2010 Signed: Original signed by A. Greenberg

At: Sacramento, California

Risk Science Associates

121 Paul Dr., Suite A, San Rafael, Ca. 94903-2047
415-479-7560 fax 415-479-7563
e-mail agreenberg@risksci.com

Name & Title: **Alvin J. Greenberg, Ph.D., FAIC, REA, QEP**
Principal Toxicologist

Dr. Greenberg has had over two decades of complete technical and administrative responsibility as a team leader in the preparation of human and ecological risk assessments, air quality assessments, hazardous materials handling and risk management/prevention, infrastructure vulnerability assessments, occupational safety and health, hazardous waste site characterization, interaction with regulatory agencies in obtaining permits, and conducting lead surveys and studies. He has particular expertise in the assessment of dioxins, lead, diesel exhaust, petroleum hydrocarbons, mercury, the intrusion of subsurface contaminants into indoor air, and the preparation and review of public health/public safety sections of EIRs/EISs. Dr. Greenberg's expertise in risk assessment has led to his appointment as a member of several state and federal advisory committees, including the California EPA Advisory Committee on Stochastic Risk Assessment Methods, the US EPA Workgroup on Cumulative Risk Assessment, the Cal/EPA Peer Review Committee of the Health Risks of Using Ethanol in Reformulated Gasoline, the California Air Resources Board Advisory Committee on Diesel Emissions, the Cal/EPA Department of Toxic Substances Control Program Review Committee, and the DTSC Integrated Site Mitigation Committee. Dr. Greenberg is the former Chair of the Bay Area Air Quality Management District Hearing Board, a former member of the State of California Occupational Health and Safety Standards Board (appointed by the Governor), and former Assistant Deputy Chief for Health, California OSHA. And, since the events of 9/11, Dr. Greenberg has been the lead person for developing vulnerability assessments, power plant security programs, and conducting safety and security audits of power plants for the California Energy Commission and has assisted the CEC in the assessment of safety and security issues for proposed LNG terminals. In addition to providing security expertise to the State of California, Dr. Greenberg was the Team Leader and main consultant to the State of Hawaii on the updating of their Energy Emergency Preparedness Plan.

Years Experience: 26

Education:

B.S. 1969 Chemistry, University of Illinois Urbana

Ph.D. 1976 Pharmaceutical/Medicinal Chemistry, University of California, San Francisco

Postdoctoral Fellowship 1976-1979 Pharmacology/Toxicology, University of California, San Francisco

Postgraduate Training 1980 Inhalation Toxicology, Lovelace Inhalation Toxicology Research Institute, Albuquerque, NM

Professional Registrations:

Board Certified as a Qualified Environmental Professional (QEP)
California Registered Environmental Assessor - I (REA)
Fellow of the American Institute of Chemists (FAIC)

Professional Affiliations:

Society for Risk Analysis
Air and Waste Management Association
American Chemical Society
American Association for the Advancement of Science
National Fire Protection Association

Technical Boards and Committee Memberships - Present:

Squaw Valley Technical Review Committee
(appointed 1986)

Technical Boards and Committee Memberships - Past:

July 1996 – March 2002
Member, Bay Area Air Quality Management District Hearing Board
(Chairman 1999-2002)

September 2000 – February 2001
Member, State Water Resources Control Board Noncompliant Underground Tanks Advisory Group

January 1999 – June 2001
Member, California Air Resources Board Advisory Committee on Diesel Emissions

January 1994 - September 1999
Vice-Chairman, State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee

September 1998
Member, US EPA Workgroup on Cumulative Risk Assessment

April 1997 - September 1997
Member, Cal/EPA Private Site Manager Advisory Committee

January 1986 - July 1996
Member, Bay Area Air Quality Management District Advisory Council
(Chairman 1995-96)

January 1988 - June 1995
Member: California Department of Toxic Substance Control Site Mitigation Program Advisory Group

January 1989 - February 1995
Member: Department of Toxics Substances Control Review Committee, Cal-EPA

October 1991 - February 1992
Chair: Pollution Prevention and Waste Management Planning Task Force of the Department of Toxics Substances Control Review Committee, Cal-EPA

September 1990 - February 1991
Member: California Integrated Waste Management Board Sludge Advisory Committee

September 1987 - September 1988
ABAG Advisory Committee on Regional Hazardous Waste Management Plan

March 1987 - September 1987
California Department of Health Services Advisory Committee on County and Regional Hazardous Waste Management Plans

January 1984 - October 1987
Member, San Francisco Hazardous Materials Advisory Committee

March 1984 - March 1987
Member, Lawrence Hall of Science Toxic Substances and Hazardous Materials Education Project Advisory Board

Jan. 1, 1986 - June 1, 1986
Member, Solid Waste Advisory Committee, Governor's Task Force on Hazardous Waste

Jan. 1, 1983 - June 30, 1985
Member, Contra Costa County Hazardous Waste Task Force

Sept. 1, 1982 - Feb. 1, 1983
Member, Scientific Panel to Address Public Health Concerns of Delta Water Supplies, California Department of Water Resources

Present Position

January 1983- present
Owner and principal with Risk Sciences Associates, a Marin County, California, environmental consulting company specializing in multi-media human health and ecological risk assessment, air pathway analyses, hazardous materials management-infrastructure security, environmental site assessments, review and evaluation of EIRs/EISs, preparation of public health and safety sections of EIRs/EISs, and litigation support for toxic substance exposure cases.

Previous Positions

Jan. 2, 1983 - June 12, 1984
Member, State of California Occupational Safety and Health Standards Board (Cal/OSHA), appointed by the Governor

Aug. 1, 1979 - Jan. 2, 1983
Assistant Deputy Chief for Health, California Occupational Safety and Health Administration

Feb. 1, 1979 - Aug. 1, 1979

Administrative Assistant to Chairperson of Finance Committee, Board of Supervisors, San Francisco

Jan. 1, 1976 - Feb. 1, 1979
Research Pharmacologist and Postdoctoral Fellow, Department of Pharmacology and Toxicology, School of Medicine, University of California, San Francisco

Jan. 1, 1975 - Dec. 31, 1975
Acting Assistant Professor, Department of Pharmaceutical Chemistry, University of California, San Francisco

Experience

General

Dr. Greenberg has been a consultant in Hazardous Materials Management and Security, Human and Ecological Risk Assessment, Occupational Health, Toxicology, Hazardous Waste Site Characterization, and Toxic Substances Control Policy for over 26 years. He has broad experience in the identification, evaluation and control of health and environmental hazards due to exposure to toxic substances. His experience includes Community Relations Support and Risk Communication through experience at high-profile sites and presentations at professional society meetings.

He has considerable experience in the review and evaluation of exposure via the air pathway - particularly to emissions from power plants, refineries, and diesel exhaust - and a thorough knowledge of the regulatory requirements through his experience at Cal/OSHA, the BAAQMD Hearing Board, as a consultant to the California Energy Commission, and in preparing such assessments for local government and industry. He has assessed exposures to diesel exhaust during construction and operations of stationary and mobile sources and has testified at evidentiary hearings numerous times on this subject.

He is presently assisting the California Energy Commission in assessing the risks to workers and the public of proposed power plants and LNG terminals in the state. His experience in hazard identification, exposure assessment, risk assessment, occupational safety and health, emergency response, and Critical Infrastructure Protection has made him a valuable part of the CEC team addressing this issue. He has reviewed and commented on the DEIS/DEIR for the proposed SES LNG Port of Long Beach terminal, focusing on security issues for the CEC and on safety matters for the City of Long Beach. He has presented technical information and analysis to the State of California Interagency LNG Working Group on thermal radiation public exposure criteria and safety/security at an east coast urban LNG terminal. (Both presentations are confidential owing to the nature of the material.) He has conducted numerous evaluations of the safety and hazards of natural gas pipelines for the CEC and has presented his findings and recommendations at public meetings and evidentiary hearings.

He served for over five years as the Vice-chair of the California State Water Resources Control Board Advisory Committee convened to address toxic substances in sediments in bays, rivers, and estuaries. He has been a member of the Squaw Valley Technical Review Committee since 1986 establishing chemical application management plans at golf courses to protect surface and groundwater quality. He has also conducted numerous ecological risk assessments and characterizations, including those for marine and terrestrial habitats.

Dr. Greenberg has extensive experience in data collection and preparation of human and ecological risk assessments on numerous military bases and industrial sites with Cal/EPA DTSC and RWQCB oversight. He has also been retained to provide technical services to the Cal/EPA Department of Toxic Substances Control (preparation of human health risk assessments) and the Office of Environmental Health Hazard Assessment (review and evaluation of air toxics health risk assessments and preparation of profiles describing the acute and chronic toxicity of toxic air contaminants). He has also conducted several surveys of sites containing significant lead contamination from various sources including lead-based paint, evaluated potential occupational exposure to lead dust and fumes in industrial settings, prepared numerous human health risk assessments of lead exposure, and prepared safety and health plans for remedial investigation of lead contaminated soils. Dr. Greenberg is also a recognized expert on the requirements of California's Proposition 65 and has served as an expert on Prop. 65 litigation.

Sites with EPA, RWQCB and/or DTSC Oversight

Dr. Greenberg has specific experience in assessing human health and ecological risks at contaminated sites at the land/water interface, including petroleum contaminants, metals, mercury, and VOCs at several locations in California including Oxnard, Richmond, Avila Beach, Mare Island Naval Shipyard, San Diego, Hollister, San Francisco, Hayward, Richmond, the Port of San Francisco, and numerous other locations. He has used Cal/EPA methods, US EPA methods, and ASTM Risk Based Corrective Action (RBCA) and Cal/Tox methodologies. He is extremely knowledgeable about SWRCB and SF Bay RWQCB regulations on underground storage tank sites and with ecological issues presented by contaminated sediments including sediment analysis, toxicity testing, tissue analysis, and sediment quality objectives. Dr. Greenberg served on the State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee from 1994 until the end of the program in 1999.

Dr. Greenberg experience on many of these contaminated sites has been as a consultant to local governments, state agencies, and citizen groups. He assisted the City and County of San Francisco in developing local ordinance requiring soil testing (Article 20, Maher ordinance) and hazardous materials use reporting (Article 21, Walker ordinance). He served as the City of San Rafael's consultant to provide independent review and evaluation of the site characterization and remedial action plan prepared for a former coal gasification site. He was a consultant to a citizen group in northern California regarding exposure and risks due to accidental releases from a petroleum refinery and assisted in the assessment of risks due to crude petroleum contamination of a southern California beach. He has prepared a number of risk assessments addressing crude petroleum, diesel and gasoline contamination, including coordinating site investigations, environmental monitoring, and health risk assessment for the County of San Luis Obispo regarding Avila Beach subsurface petroleum contamination. That high-profile project lasted for over one year and Dr. Greenberg managed a team of experts with a budget of $750,000. Another high-profile project included the preparation of an extensive comprehensive human and ecological risk assessment for the Hawaii Office of Space Industry on rocket launch impacts and transportation/storage of rocket fuels at the southern end of the Big Island of Hawaii. Dr. Greenberg's risk assessments were part of the EIS for the project. Dr. Greenberg also worked on another high-profile project conducting Air Pathway Analysis of off-site and on-site impacts from landfill gas constituents, including indoor and outdoor air measurements, air dispersion modeling, flux chamber investigations, and health risk assessment for the County of Santa Barbara. Dr. Greenberg has conducted RI/FS work, prepared health risk assessments, evaluated hazardous waste sites and hazardous materials use at numerous locations in California, Hawaii, Oregon, Minnesota, Michigan, and New York. He has considerable experience in the development of clean-up standards and the development of quantitative risk assessments for site RI/FS work at CERCLA sites, as well as site closures, involving toxic substances and petroleum hydrocarbon wastes. He is experienced in working with both Region IX EPA and the State of California DTSC in negotiating clean-up standards based on the application of both site-specific and non site-specific health and ecological based clean-up criteria. He has significant experience in the development of site chemicals of concern list, quantitative data quality levels, site remedial design, the site closure process, the design and execution of data quality programs and verification of data quality prior to its use in the decision making process on large NPL sites.

Examples

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)
The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Health Risk Assessment and Air Pathway Analysis for the Ballard Canyon Landfill, Santa Barbara County, Ca. (March 1999)

Screening Human Health Risk Assessment, Calculation of Soil Clean-up Levels, and Aquatic Ecological Screening Evaluation, Galilee Harbor, Sausalito, Ca. (May 1998)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

Health Risk Assessment for Residual Mercury at the Deer Creek Facility, 3475 Deer Creek Road, Palo Alto, California. (July 1997)

Phase 2 Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (February 1997)

Human Health Risk Assessment, Teledyne Ryan Aeronautical, McCormick Selph Ordnance. Hollister, California. (December 1996)

Initial Phase Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (October 1996)

Human Health Risk Assessment, Ecological Screening Evaluation, and Development of Proposed Remediation Goals for the Flair Custom Cleaners Site, Chico, California (January 1996)

Human Health Risk Assessment for the X-3 Extrudate Project at Criterion Catalyst, Pittsburg, Ca. (November 1994)

Screening Health Risk Assessment and Development of Proposed Soil Remediation Levels at Hercules Plant #3, Culver City, Ca. (July 1993)

Ecological Screening Evaluation for the Altamont Landfill, Alameda County, Ca. (June, 1993)

Focused Ecological Risk Characterization, Hawaiian Electric Company, Keahole Generating Station Expansion, Hawaii (June 1993)

Human Health Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawaii Office of Space Industry (April 1993)

Ecological Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawaii Office of Space Industry (March 1993)

Human Health Risk Assessment for Current and Proposed Expanded Class II and Class III Operations at the Altamont Sanitary Landfill, Alameda County, Ca.
(March, 1993)

Screening Health Risk Assessment for the Proposed Expansion of the West Marin Sanitary Landfill, Point Reyes Station, Ca.
(March, 1993)

Health Risk Assessment for the Proposed Expansion of the Forward, Inc. Landfill, Stockton, Ca. (September 14, 1992)

Health Risk Assessment for the Rincon Point Park Project, San Francisco, Ca. Prepared for Baseline Environmental Consulting and the San Francisco Redevelopment Agency.
(August 10, 1992)

Health Risk Assessment for the South Beach Park Project, San Francisco, Ca. Prepared for Baseline Environmental Consulting and the San Francisco Redevelopment Agency.
(August 10, 1992)

Screening Health Risk Assessment and Development of Proposed Soil and Groundwater Remediation Levels, Kaiser Sand and Gravel, Mountain View, Ca. Prepared for Baseline Environmental Consulting (January 30, 1992)

Development of Proposed Soil Remediation Levels for the Marine Corps Air-Ground Combat Center, 29 Palms, California (May 30, 1991)

Preliminary Health Risk Assessment for the City of Pittsburg Redevelopment Agency, Pittsburg, California (May 29, 1991)

Military Bases

Dr. Greenberg has experience in conducting assessments at DOD facilities, including RI/FS work, preparation of health risk assessments, evaluation of hazardous waste sites and hazardous materials use at the following Navy sites in California: San Diego Naval Base; Marine Corps Air-Ground Combat Center, 29 Palms; Mare Island Naval Shipyard, Vallejo; Treasure Island Naval Station, San Francisco, Hunters Point Naval Shipyard, San Francisco, and the Marine

Corps Logistics Base, Barstow. He worked with the U.S. Navy and the U.S. EPA in the implementation of Data Quality Objectives (DQO's) at MCLB, Barstow.

Examples

Review and Evaluation of the Remedial Investigation Report and Human Health Risk Assessment for the U. S. Naval Station at Treasure Island, Ca. (June 1999)

Screening Health Risk Assessment for the Proposed San Francisco Police Department's Helicopter Landing Pad at Hunters Point Shipyard, San Francisco, Ca. (September 1997)

Development of Proposed Soil Remediation Levels for the Marine Corps Air-Ground Combat Center, 29 Palms, California (May 30, 1991)

Health Risk Assessment for the Chrome Plating Facility, Mare Island Naval Shipyard, Vallejo, California (October 24, 1988)

Background Levels and Health Risk Assessment of Trace Metals present at the Naval Petroleum Reserve No.1, 27R Waste Disposal Trench Area, Lost Hills, California (August 12, 1988)

RCRA Facility Investigation (RFI) Work Plan of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (August 14, 1989)

Hazardous Waste and Solid Waste Audit and Management Plan, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (July 3, 1989)

Water Quality Solid Waste Assessment Test (SWAT) Proposal RCRA Landfill, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (October 31, 1988)

Waste Disposal Facilities, Waste Haulers, Waste Recycling Facilities Report, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 22, 1988)

Sampling and Analysis Plan, Health and Safety Plan, Site Characterization of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 2, 1988)

Air Quality Solid Waste Assessment Test (SWAT) Proposal, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (August 25, 1988)

Liquefied Natural Gas (LNG)

Dr. Greenberg assisted the CEC in the preparation of the "background" report on the risks and hazards of siting LNG terminals in California ("LNG in California: History, Risks, and Siting" July 2003) and consulted for the City of Vallejo on a proposed LNG terminal and storage facility at the former Mare Island Naval Shipyard. He has also conducted an evaluation and prepared comments on the risks, hazards, and safety analysis of the DEIS/DEIR for the City of Long

Beach on a proposed LNG terminal at the Port of Long Beach (POLB) and conducted an analysis on vulnerability and critical infrastructure security for the CEC on this same proposed LNG terminal. He currently advises the CEC on the POLB LNG proposal on risks, hazards, human thresholds of thermal exposure, vulnerability, security, and represented the CEC at a U.S. Coast Guard briefing on the Waterway Suitability Assessment that included the sharing of SSI (Sensitive Security Information). He has presented technical information and analysis to the State of California LNG Interagency Working Group on thermal radiation public exposure criteria and safety/security at an east coast urban LNG terminal. (Both presentations are confidential owing to the nature of the material.) He has conducted numerous evaluations of the safety and hazards of natural gas pipelines for the CEC and has presented his findings and recommendations at public meetings and evidentiary hearings.

Infrastructure Security

Since 2002, Dr. Greenberg has been trained by and is working with the Israeli company SB Security, LTD, the most experienced and tested security planning and service company in the world. Since the events of 9/11, Dr. Greenberg has been the lead person for developing vulnerability assessments and power plant security programs for the California Energy Commission (CEC). In taking the lead for this state agency, Dr. Greenberg has interfaced with the California Terrorism Information Center (CATIC) and provided analysis, recommendations, and testimony at CEC evidentiary hearings regarding the security of power plants within the state. These analyses include the assessment of Critical Infrastructure Protection, threat assessments, criticality assessments, and the preparation of vulnerability assessments and off-site consequence analyses addressing the use, storage, and transportation of hazardous materials, recommendations for security to reduce the threat from foreign and domestic terrorist activities, perimeter security, site access by personnel and vendors, personnel background checks, management responsibilities for facility security, and employee training in security methods. Dr. Greenberg is the lead person in developing a model power plant security plan, vulnerability assessment matrix, and a security training manual for the CEC. The model security plan is used by power plants in California as guidance in developing and implementing security measures to reduce the vulnerability of California's energy infrastructure to terrorist attack. He has testified at several evidentiary hearings for the CEC on power plant security issues. He also leads an audit team conducting safety and security audits at power plants throughout California that are under the jurisdiction of the CEC. In addition to providing security expertise to the State of California, in August 2004, a team of experts led by Dr. Greenberg was awarded an 18-month contract by the State of Hawaii to update and improve the state's Energy Emergency Preparedness Plan and make recommendations for increased security of critical energy infrastructure on this isolated group of islands.

Air Pathway Analysis

Dr. Greenberg has prepared numerous Air Pathway Analyses and human health risk assessments, evaluating exposure at numerous locations in California, Hawai'i, Oregon, Minnesota, Michigan, and New York. He is experienced in working with Region IX EPA, the State of California DTSC, and the Hawai'i Department of Health Clean Air Branch in the application of both site-specific and non site-specific health risk assessment criteria.

Examples

Human Health Risk Assessment for the Open Burn/Open Detonation Operation at McCormick Selph, Inc., Hollister, Ca. (June 2003)

Air Quality and Human Health Risk Assessment for the Royal Oaks Industrial Complex, Monrovia, Ca. (January 2003)

Human Health Risk Assessment and Indoor Vapor Intrusion Assessment for the former Pt. St. George Fisheries Site, Santa Rosa, Ca. (October 2002)

Human Health Risk Assessment for the former Sargent Industries Site, Huntington Park, Ca. (July 2001)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)

The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Health Risk Assessment and Air Pathway Analysis for the Ballard Canyon Landfill, Santa Barbara County, Ca. (March 1999)

Human Health Risk Assessment, Teledyne Ryan Aeronautical, McCormick Selph Ordnance. Hollister, California. (December 1996)

Initial Phase Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (October 1996)

Human Health Risk Assessment for Current and Proposed Expanded Class II and Class III Operations at the Altamont Sanitary Landfill, Alameda County, Ca.
(March, 1993)

Focused Ecological Risk Characterization, Hawaiian Electric Company, Keahole Generating Station Expansion, Hawai'i (June 1993)

Human Health Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawai'i Office of Space Industry (April 1993)

Ecological Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawai'i Office of Space Industry (March 1993)

Human Health Risk Assessment Due to Emissions from a Medical Waste Incinerator, prepared for Kauai Veterans Memorial Hospital, Kauai, Hawai'i (1994)

Cancer Risk Assessment for the H-Power Generating Station, Campbell Industrial Park, Oahu, Hawai'i (1988)

<u>Hazardous Materials Assessments, Waste Management Assessments, Worker Safety and Fire Protection Assessments, and Public Health Impacts Assessments</u>

Dr. Greenberg also has significant experience as a consultant and expert witness for the California Energy Commission providing analysis, recommendations, and testimony in the areas of hazardous materials management, process safety management, waste management, worker safety and fire protection, and public health impacts for proposed power plant/cogeneration facilities. These analyses include the evaluation and/or preparation of the following:

- Off-site consequence analyses of the handling, use, storage, and transportation of hazardous materials,
- Risk Management Plans (required by the Cal-ARP) and Business Plans (required by H&S Code section 25503.5),
- Safety Management Plans (required by 8 CCR section 5189),
- Natural gas pipeline safety,
- Solid and hazardous waste management plans,
- Phase I and II Environmental Site Assessments,
- Construction and Operations Worker Safety and Health Programs,
- Fire Prevention Programs,
- Human health risk assessment from stack emissions and from diesel engines, and
- Mitigation measures to address PM exposure, including diesel particulates

Examples

- Almond 2 Power Plant Project, City of Ceres, Ca. 2009 – present. Public health.
- Watson Cogeneration Steam and Electric Reliability Project, Carson, Ca. 2009 – present. Public health.
- Hanford Combined-Cycle Power Plant (amendment), Kings County, Ca. 2008 – present. Public health.
- Henrietta Combined-Cycle Power Plant (amendment), Kings County, Ca. 2008 – present. Public health.
- Lodi Energy Center, Lodi, Cal. 2008 – present. Hazardous materials management, worker safety/fire protection.
- Marsh Landing Generating Station, City of Antioch, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection.
- Palmdale Hybrid Power Plant, Palmdale, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection, public health.
- Stirling Energy Systems Solar 1 Project, San Bernardino County, Ca. 2008 – present. Public health.
- Stirling Energy Systems Solar 2 Project, Imperial County, Ca. 2008 – present. Public health.
- San Joaquin Solar 1&2, Fresno County, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection, public health.
- GWF Tracy Combined Cycle Power Plant, Tracy, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection, public health.
- CPV Vaca Station Power Plant, Vacaville, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection.

- Willow Pass Generating Station, Pittsburg, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection, waste management.
- Avenal Energy Power Plant, Avenal, Ca. 2008 – 2009. Worker safety/fire protection, public health.
- Orange Grove Energy, San Diego County, Ca. 2008-2009. Public health.
- Riverside Energy Resource Center Units 3&4, Riverside, Ca. 2008 – 2009. Hazardous materials management.
- Canyon Power Plant, Anaheim, Ca. 2007 – present. Hazardous materials management, worker safety/fire protection, public health.
- Carlsbad Energy Center, Carlsbad, Ca. 2007 – present. Hazardous materials management, worker safety/fire protection, public health.
- Ivanpath Solar Electric Generating System, San Bernardino County, Ca. 2007 – present. Public health.
- Kings River Conservation District Community Power Project, City of Parlier, Ca. 2007 – 2009. Hazardous materials management, worker safety/fire protection.
- Chula Vista Energy Upgrade Project, Chula Vista, Ca. 2007 – 2009. Hazardous materials management, worker safety/fire protection.
- Chevron Richmond Power Plant Replacement Project, Richmond, Ca. 2007 – 2008. Hazardous materials management, public health.
- Humboldt Bay Generating Station, Eureka, Ca. 2006 – 2008. Hazardous materials management, worker safety/fire protection, waste management.
- El Centro Power Plant – Unit 3 Repower Project, El Centro, Ca. 2006 – 2007. Public health.
- San Francisco Energy Reliability Project, San Francisco, Ca. 2004 – 2006. Hazardous materials management, worker safety/fire protection, waste management, public health
- Inland Empire Energy Center, Romoland, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Malburg Generating Station Project, City of Vernon, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Blythe II, Blythe, Ca. 2002-3. hazardous materials, worker safety/fire protection,
- Palomar Energy Center, Escondido, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Cosumnes Power Project, Rancho Seco, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Tesla Power Project, Tesla, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- San Joaquin Valley Energy Center, San Joaquin, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management
- Morro Bay Power Plant, Morro Bay, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Potrero Power Plant Unit 7, San Francisco, Ca., 2001-2: hazardous materials, worker safety/fire protection
- El Segundo Power Redevelopment Project, El Segundo, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Rio Linda Power Project, Rio Linda, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health

- Pastoria II Energy Facility Expansion, Grapevine, Ca., 2001: hazardous materials, worker safety/fire protection
- East Altamont Energy Center, Byron, Ca., 2001-2: hazardous materials, worker safety/fire protection
- Magnolia Power Project, Burbank, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Russell City Energy Center, Hayward, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Woodbridge Power Plant, Modesto, Ca., 2001: hazardous materials, worker safety/fire protection, waste management
- Colusa Power Plant Project, Colusa County, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Valero Refinery Cogeneration Project, Benicia, Ca., 2001: hazardous materials, worker safety/fire protection
- Ocotillo Energy Project, Palm Springs, Ca., 2001: hazardous materials, worker safety/fire protection
- Gilroy Energy Center Phase II Project, Gilroy, Ca., 2001-2: hazardous materials, worker safety/fire protection
- Los Esteros Critical Energy Facility, San Jose, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Roseville Energy Facility, Roseville, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Spartan Power, San Jose, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Inland Empire Energy Center, Romoland, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- South Star Cogeneration Project, Taft, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Tesla Power Plant, Eastern Alameda County, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Tracy Peaker Project, Tracy, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Henrietta Peaker Project, Kings County, Ca., 2001: hazardous materials, worker safety/fire protection, waste management, public health
- Central Valley Energy Center, San Joaquin, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Cosumnes Power Plant, Rancho Seco, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Los Banos Voltage Support Facility, Western Merced County, Ca., 2001-2: waste management, public health
- Palomar Energy Project, Escondido, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Metcalf Energy Center, San Jose, Ca., 2000-1: hazardous materials
- Blythe Power Plant, Blythe, Ca., 2000-1: hazardous materials
- San Francisco Energy Co. Cogeneration Project, San Francisco, Ca., 1994-5: hazardous materials

- Campbell Soup Cogeneration Project, Sacramento, Ca., 1994: hazardous materials
- Proctor and Gamble Cogeneration Project, Sacramento, Ca., 1993-4: hazardous materials
- San Diego Gas and Electric South Bay Project, Chula Vista, Ca., 1993: hazardous materials
- SEPCO Project, Rio Linda, Ca., 1993: hazardous materials
- Shell Martinez Manufacturing Complex Cogeneration Project, Martinez, Ca., 1993: hazardous materials and review and evaluation of EIR

Occupational Safety and Health/Health and Safety Plans/Indoor Air Quality

Dr. Greenberg has significant experience in occupational safety and health, having directed the development, adoption, and implementation of over 50 different Cal/OSHA regulations, including airborne contaminants (>450 substances), lead, asbestos, confined spaces, and worker-right-to-know (MSDSs). He has conducted numerous occupational health surveys and has extensive experience in the sampling and analysis of indoor air quality at residences, workplaces, and school classrooms. He is currently the team leader conducting safety and security audits at power plants throughout California for the California Energy Commission. Safety issues audited include compliance with regulations addressing several safety matters, including but not limited to, confined spaces, lockout/tagout, hazardous materials, and fire prevention/suppression equipment.

Examples

Review and Evaluation of Public and Worker Safety Issues at the proposed SES LNG Facility, Port of Long Beach. prepared for the City of Long Beach. (November 2005)

Confidential safety and security audit reports for 18 power plants in California. prepared for the California Energy Commission. (January 2005 through March 2006)

Report on the Accidental release and Worker Exposure to Anhydrous Ammonia at the BEP I Power Plant, Blythe, Ca. prepared for the California Energy Commission. (October 2004)

Investigation of a Worker Death in a Confined Space, La Paloma Power plant. prepared for the California Energy Commission. (July 2004)

Preliminary Report on Indoor Air Quality in Elementary School Portable Classrooms, Marin County, Ca. (December 1999)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

Air Pathway Analysis for the Ballard Canyon Landfill. Submitted to the County of Santa Barbara, (March 1999)

Review and Evaluation of the Health Risk Assessment for Outdoor and Indoor Exposures at the Former Golden Eagle Refinery Site, Carson, Ca. (May 1998)

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)

The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Phase 2 Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (February 1997)

Determination of Occupational Lead Exposure at a Tire Shop in Placerville, Ca. (April 1993)

Development of an Environmental Code of Regulations for Hazardous Waste Treatment Facilities on La Posta Indian Tribal lands, San Diego County, Ca. (August 1992)

Sampling and Analysis Plan, Health and Safety Plan, Site Characterization of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 2, 1988)

Mercury Contamination

Dr. Greenberg has prepared and/or reviewed several human health and ecological risk assessments regarding mercury contamination in soils, sediments, and indoor surfaces. Dr. Greenberg served on the State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee from 1994 until the end of the program in 1999.

Examples

Review and evaluation of a human health risk assessment of ingestion of sport fish caught from San Diego Bay and which contain tissue levels of mercury and PCBs (November 2004 – present)

Screening Human Health Risk Assessment, Calculation of Soil Clean-up Levels, and Aquatic Ecological Screening Evaluation, Galilee Harbor, Sausalito, Ca. (May 1998)

Health Risk Assessment for Residual Mercury at the Deer Creek Facility, 3475 Deer Creek Road, Palo Alto, California. (July 1997)

Human Health Risk Assessment Due to Emissions from a Medical Waste Incinerator, prepared for Kauai Veterans Memorial Hospital, Kauai, Hawai'i (1994)

DECLARATION OF
Casey Weaver, CEG

I, Casey Weaver declare as follows:

1. I am presently employed by the California Energy Commission in the Engineering Office of the Energy Facilities Siting Division as an Engineering Geologist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on Soil and Water Section, for the Calico Solar Energy Project based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 23, 2010 Signed: Original signed by C. Weaver

At: Sacramento, California

CASEY W. WEAVER, PG, CEG

SUMMARY OF EXPERIENCE:

Certified Engineering Geologist with over 20 years of environmental and geotechnical consulting experience. Experience includes remedial investigations and feasibility studies (RI/FS), groundwater investigations, corrective action plans, landfill studies (SWATs, siting, closure), preliminary environmental site assessments (PESA, Phase I), regulatory compliance (RCRA/CERCLA), geotechnical investigation/evaluation, geologic hazard evaluations, active fault evaluations, seismic studies, landslide evaluation/repair, foundation suitability studies, personnel management and business development.

EDUCATION:

B.S. Geology, Humboldt State University, Arcata, CA, 1981
University of California, Davis Extension Courses

REGISTRATIONS/LICENCES/CERTIFICATIONS:

Certified Engineering Geologist, California
Registered Geologist, California, Oregon, Arizona
Registered Environmental Assessor
OSHA 1910.120 Hazardous Waste Operations and Emergency Response - 40hr
OSHA 1910.120 Hazardous Waste Operations and Emergency Response -Supervising Operations at Hazardous Waste Sites.

PROFESSIONAL HISTORY:

2008 to Present

Engineering Geologist
California Energy Commission, Sacramento, CA

Duties within the Water and Soils Unit of the Engineering Office in the Facilities Siting Division include review and evaluation of applications for certification of thermal power plants within the state of California. The focus of the work is on sensitive project sites that may have issues involving groundwater and surface water resources, soil erosion, flooding potential, water quality and plant-derived waste generation and disposal. In addition, evaluate construction, operation and maintenance of the facilities and conduct investigations to determine if violations of the program’s regulations, the Energy Commission’s conditions of certification, or the California Environmental Quality Act (CEQA) have occurred.

2001 to 2008

Engineering Geologist
State Water Resources Control Board, Headquarters, Sacramento, CA

With the UST Enforcement Unit, under direction from the State Attorney General's Office, conducted inspections of UST systems to evaluate compliance with 1998 upgrade requirements. This work culminated in the largest settlement of its kind in the nation's history. In addition, conducted surveillance of unlawful discharges from remediation systems and conducted investigations of UST Fund fraud cases.

With the USTCF Technical Review Unit, evaluated the technical elements of USTCF claims.

With the Division of Financial Assistance, assisted with the development of program policy for the Agricultural Water Quality Grant Program ($46 million) and the Integrated Water Quality Grant Program ($380 million), participated in stakeholder workshops, contributed to multijurisdictional work groups for program development and implementation.

With the Office of Enforcement, conducted investigations of operator misconduct, wrote enforcement investigation reports and prepared disciplinary letters.

1998 to 2001 **Senior Engineering Geologist**
BSK & Associates, Rancho Cordova, CA

Designed and directed hydrogeologic investigations for use with environmental remediation projects. Supervised field personnel installing groundwater monitoring wells, conducting aquifer tests & SVE pilot tests, reviewed reports and workplans, and conducted business development.

Conducted review of Alquist-Priolo active fault hazard reports as county geologist for Kern County.

1993 to 1998 **Senior Geologist, Geoscience Team Leader and RI/FS Task Leader**
LAW Engineering and Environmental Services, Inc., Sacramento, CA

As Geoscience Team Leader, responsible for career development, training and personnel management of ten employees. This group consisted of 3 senior-level geologists, 4 project level geologists and scientists, 2 junior level geologists and 1 technician.

As RI/FS Task Leader, responsible for the development of cost estimates/budgets, preparation of Work Plans and Sampling and Analysis Plans, management of field activities, data collection and documentation associated with the investigation of 15 Installation Restoration Program sites at Beale Air Force Base awarded under several Delivery Orders with combined project budgets of $18 million. Also responsible for aerial photographic interpretations associated with a basewide (23,000 acres), Preliminary Assessment, and preparation of a basewide Hydrogeologic Evaluation Report.

1990 to 1993

Senior Project Manger/General Manager
Earthtec, Ltd., Roseville, CA

Management of Environmental Department, business development, preparation of cost estimates and proposals, client and regulatory agency interface, supervision and training, report writing, technical review, budget management, and quality control. Initiated and supported the development of company's wetland and wildlife departments. Typical projects included preliminary sire assessments, soil vapor studies, detailed hydrogeologic evaluations, waste plume delineations, and development of remediation alternatives associated with landfills, service stations, bulk oil facilities and other potentially contaminated sites.

1981 to 1990

Project Geologist
SHN Group, Inc. Eureka, CA

Managed project work directed toward solving environmental issues at variably contaminated sites and provided geotechnical information for land development and construction. Responsibilities included development of cost estimates/budgets, planned and supervised field operations, collected and interpreted subsurface information, evaluated areas traversed by Alquist-Priolo Special Studies Zones and sites subject to slope stability hazards. Typical projects included geotechnical evaluations and geologic hazard studies for major subdivisions, hospitals, schools, lumber companies, run-of-the-river hydroelectric projects, underground storage tank sites, and solid waste landfills.

1979 to 1981

Geologist/Seismologic Technician
Woodward-Clyde Consultants, San Francisco, CA

Designed and operated a laboratory model to study surface effects of thrust faulting in connection with seismic evaluation studies for the PG&E Humboldt Bay nuclear reactor. In addition, installed and operated field seismographs in the Humboldt Bay region.

DECLARATION OF
Testimony of Negar Vahidi

I**, Negar Vahidi,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission, Siting, Transmission and Environmental Protection Division, as a **Senior Project Manager/Senior Land Use Technical Specialist**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Land Use** for the **Calico Solar Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 23, 2010 Signed: Original signed by N. Vahidi

At: Agoura Hills, California

NEGAR VAHIDI

Senior Associate
Land Use, Policy Analysis, and Socioeconomics

ACADEMIC BACKGROUND

Master of Public Administration, University of Southern California, 1993
B.A. (with Highest Honors), Political Science, University of California, Irvine, 1991

PROFESSIONAL EXPERIENCE

Ms. Vahidi is an environmental planner with over 15 years of experience managing and preparing a variety of federal and State of California environmental, planning, and analytical documents for large-scale infrastructure and development projects. Ms. Vahidi brings the experience of being both a public and private sector planner, specializing in the integration and completion of NEPA and CEQA documentation, joint documentation, land use, socioeconomic, and public policy analysis, environmental justice analysis, and public and community involvement programs. Her diversity and experience in preparing NEPA, CEQA, and NEPA/CEQA joint documentation can be shown through a sample of her projects.

Aspen Environmental Group **1992 to 1998 and 2001 to present**

Ms. Vahidi has participated in CEQA and NEPA analyses of major utility development projects, providing public policy and land use expertise as well as managing Public Participation Programs. She has conducted land use analyses for major environmental assessments, including identification of ownership and land use types and identification of sensitive land uses and sensitive receptors. She has also gathered and analyzed information on State, federal and local laws, policies and regulations relevant to land uses and public policy. Her specific projects are described below.

- **TANC Transmission Project (TTP), several Northern California Counties.** Ms. Vahidi is currently serving as the Deputy Project Manager in charge of preparation of the EIR/EIS and guiding the CEQA/NEPA analysis. The Transmission Agency of Northern California (TANC) and Western Area Power Administration (Western), an agency of the U.S. Department of Energy (DOE), are the CEQA lead agency and NEPA lead agency, respectively. The TTP generally would consist of approximately 600 miles of new and upgraded 500 kilovolt (kV) and 230 kV transmission lines, substations, and related facilities generally extending from northeastern California near Ravendale in Lassen County to the California Central Valley through Sacramento and Contra Costa Counties and westward into the San Francisco Bay Area. Ms. Vahidi worked with TANC and Western to initiate the scoping process, including preparation of the NOP, preparing for scoping meetings, frameworking the EIR/EIS document, etc. She also led the preparation of the project scoping report.
- **Littlerock Reservoir Sediment Removal Project EIS/EIR, Palmdale, CA.** Ms. Vahidi is the Project Manager for this joint EIS/EIR evaluating the impacts of sediment removal alternatives for the Littlerock Reservoir and Dam on USFS Angeles National Forest (NEPA Lead Agency) lands in Los Angeles County. The Palmdale Water District (District) [CEQA Lead Agency] proposes to remove approximately 540,000 cubic yards of sediment from the reservoir (behind the dam) and haul it to off-site commercial gravel pits located 6 miles north of the dam site in the community of Littlerock. The project involves impacts to the arroyo toad, extensive coordination with USFWS for a Section 7 consultation, incorporation of new Forest Service Plan updates and requirements into the

analysis, preparation of the Forest Service required BE/BA, and analysis of compliance with federal air quality conformity requirements. Under Ms. Vahidi's direction, Aspen developed six different project alternatives for sediment removal, involving detailed hydraulics analysis and preparation of a hydraulics technical report. The most feasible of these alternatives (grade control structure) was chosen by the PWD as their proposed project to be evaluated in the EIS/EIR. In addition, the PWD is currently considering an additional alternative (use of a slurry line for sediment removal) presented by Aspen. Aspen is currently working on the Administrative Draft EIR/EIS and assisting the PWD with portions of their Proposition 50 grant application to the DWR.

- **El Casco System Project, Riverside, CA.** Ms. Vahidi is serving as the Project Manager for this EIR being prepared for the CPUC to evaluate SCE's application for a Permit to Construct (PTC) the El Casco System Project. The Proposed Project would be located in a rapidly growing area of northern Riverside County, which includes the Cities of Beaumont, Banning, and Calimesa. A 115 kV subtransmission line begins at Banning Substation and extends westward toward the proposed El Casco Substation site within the existing Banning to Maraschino 115 kV subtransmission line and Maraschino–El Casco 115 kV subtransmission line ROWs. Major issues of concern include impacts to existing and residential land uses, which have led to the development of a partial underground alternative and a route alternative different than the project route proposed by SCE (the Applicant). The 1,200-page Draft EIR was released for a 45-day public review and comment on December 12, 2007, and evaluates project alternatives at the same level of detail as the Proposed Project analysis.

- **Sacramento Area Voltage Support Supplemental Environmental Impact Statement (SEIS), Western Area Power Administration.** Ms. Vahidi served as the task leader for several social science sections for the SEIS for a double-circuit 230 kV circuit between Western's O'Banion/Sutter Power Plant and Elverta Substation/Natomas Substation. New transmission lines and transmission upgrades are needed to mitigate transmission line overload, reduce the frequency of automatic generation and load curtailment during the summer peak load periods, and help maintain reliability of the interconnected system operation. Ms. Vahidi directed the preparation of the land use, aesthetics, socioeconomics, and environmental justice sections of the SEIS.

- **Sunset Substation and Transmission and Distribution Project CEQA Documentation, Banning, CA.** The City of Banning proposes to construct the Sunset Substation and supporting 33-kilovolt (kV) transmission line that would interconnect with the City's existing distribution system. The purpose of this new substation and transmission is to relieve the existing overloads that are occurring within the City's electric system and to accommodate projected growth in the City. Ms. Vahidi served as the Environmental Project Manager for the initial stages of CEQA documentation prepared for the City's Utility Department.

- **San Onofre Nuclear Generating Station (SONGS) Steam Generator Replacement Project, San Clemente, CA.** Ms. Vahidi served as the Technical Senior in charge of developing the methodology and guiding the analysis for the Land Use and Recreation Section of this EIR. This project EIR addressed the environmental effects of SCE's proposed replacement of Steam Generator Units 2 & 3 at the SONGS Nuclear Power Plant located entirely within the boundaries of the U.S. Marine Corps Base Camp (MCBCP) Pendleton. Issues of concern included potential conflicts resulting from the transport of the large units through sensitive recreation areas such as beaches, and the San Onofre State Park.

- **Diablo Canyon Power Plant (DCPP) Steam Generator Replacement Project, San Luis Obispo County, CA.** Ms. Vahidi served as the Technical Senior in charge of developing the methodology and guiding the analysis for the Land Use and Recreation Section of this EIR. The EIR addressed impacts associated with the replacement of the eight original steam generators (OSGs) at DCPP Units 1 and 2 due to degradation from stress and corrosion cracking, and other maintenance difficulties. The Proposed Project would be located at the DCPP facility, which occupies 760 acres within PG&E's 12,000-acre owner-controlled land on the California coast in central San Luis Obispo County. Land use issues of concern include impacts to agricultural lands, recreational resources, and potential Coastal Act inconsistencies.

- **Cabrillo Port Liquefied Natural Gas (LNG) Deepwater Port, Ventura County, CA.** Under contract to the City of Oxnard, Aspen was tasked to review the Draft EIS/EIR for this the proposed construction and operation of an offshore floating storage and regasification unit (FSRU) that would be moored in Federal waters offshore of Ventura County. As proposed, liquefied natural gas (LNG) from the Pacific basin would be delivered by an LNG Carrier to and offloaded onto, the FSRU; re-gasified; and delivered onshore via two new 21.1-mile (33.8-kilometer), 24-inch (0.6-meter) diameter natural gas pipelines laid on the ocean floor. These pipelines would come onshore at Ormond Beach near Oxnard, California to connect through proposed new onshore pipelines to the existing Southern California Gas Company intrastate pipeline system to distribute natural gas throughout the Southern California region. Ms. Vahidi reviewed the document for technical adequacy and assisted the City in preparing written comments for the following sections of the EIS/EIR: Aesthetics, Land Use, Recreation, Socioeconomics, and Environmental Justice.
- **Long Beach LNG Import Project, Long Beach, CA.** Under contract to the City of Long Beach, Aspen was tasked to review the Draft EIS/EIR for the proposed construction and operation of this onshore LNG facility to be located at the Port of Long Beach. Ms. Vahidi reviewed the document for technical adequacy and assisted the City in preparing written comments for the following sections of the EIS/EIR: Aesthetics, Land Use, Recreation, Socioeconomics, Environmental Justice, and Port Master Plan Amendment.
- **Post-Suspension Activities of the Nine Federal Undeveloped Units and Lease OCS-P 0409, Offshore Southern California**. Aspen assisted the U.S. Department of the Interior, Minerals Management Service (MMS) to prepare an Environmental Information Document (EID) evaluating the potential environmental effects associated with six separate suspensions for undeveloped oil and gas leases Pacific Outer Continental Shelf (OCS) located offshore Southern California. These undeveloped leases lie between 3 and 12 miles offshore Santa Barbara, Ventura and southern San Luis Obispo Counties and are grouped into nine units, with one individual lease that is not unitized. As the Senior Aspen social scientist, Ms. Vahidi guided the analysis of community characteristics and tourism resources, recreation, visual resources, social and economic environment, and military operations.
- **Otay River Watershed Management Plan (ORWMP) and Special Area Management Plan (SAMP) in San Diego County, CA.** Ms. Vahidi served as a Technical Senior for social science and land use issues. The ORWMP focused on developing strategies to protect and enhance beneficial uses within this watershed and thereby comply with the San Diego Region's NPDES permit, and the SAMP intended to achieve a balance between reasonable economic development and aquatic resource preservation, enhancement, and restoration in this 145-square-mile (93,000 acres) area through the issuance of Corps and CDFG programmatic permits.

California Energy Commission (CEC)

In response to California's power shortage, Aspen has assisted the CEC in evaluating the environmental and engineering aspects of new power plant applications throughout the State under three separate contracts. Ms. Vahidi has served as Technical Senior for land use (since 2001), and a specialist for socio-economics and environmental justice, and alternatives analyses and special studies. Her specific projects are listed below.

- Technical Assistance in Application for Certification Review (Contract # 700-99-014; 3/6/2000 through 12/31/2003)
  - **Woodland Generation Station No. 2, Modesto, CA**. As the land use Technical Specialist, prepared the Land Use and Recreation, and Agricultural Resources Staff Assessments of this 80-megawatt nominal, natural gas-fired power generating facility and associated linear facilities (i.e., gas and water pipeline and

transmission line. The Staff Assessment evaluated potential impacts on nearby residential, recreational, and agricultural land uses, including important farmlands being traversed by linear faculties.

- **Valero Cogeneration Project, Benicia, CA**. Prepared the Socioeconomics Staff Assessment for a proposed cogeneration facility at the Valero Refinery in Benicia. Issues addressed included impacts on public services and other project-related population impacts such as school impact fees.
- **Rio Linda/Elverta Power Project, Sacramento, CA**. Prepared the Socioeconomics Staff Assessment for a 560-megawatt natural gas power plant in the northern Sacramento County. Issues of importance included environmental justice and impacts on property values.
- **Magnolia Power Project, Burbank, CA**. As the Socioeconomics technical specialist, prepared the Staff Assessment for this nominal 250-megawatt natural gas combined-cycle fired electrical generating facility to be located at the site of the existing City of Burbank power plant. Environmental justice issues and potential impacts on local economy and employment were evaluated
- **Potrero Power Plant Project, San Francisco, CA**. Prepared the land use portion of the Alternatives Staff Assessment for this proposed nominal 540 MW natural gas-fired, combined cycle power generating facility. Analysis included review of several alternative sites for development of the power plant and the comparative merits of those alternatives with the proposed site located on the San Francisco Bay.
- **Los Esteros Critical Energy Facility, San Jose, CA.** Technical Senior for the Land Use Staff Assessment of this 180-megawatt natural-gas-fired simple cycle peaking facility. Issues included potential impacts resulting from loss of agricultural land, and impacts associated with the project's non-compliance with local General Plan land use and zoning designations.
- **East Altamont Energy Center, Alameda County, CA.** Technical Specialist for the Land Use Assessment for a 1,100-megawatt nominal, natural gas-fired power plant and associated linear facilities. Provided expert witness testimony on Land Use Staff Assessment. Major issues addressed in the Staff Assessment included loss of Prime Farmlands, recommendation of land preservation mitigation, and the project's non-compliance with local General Plan land use and zoning designations.
- **Tracy Peaker Project, Tracy, CA.** Technical Senior for the Land Use Staff Assessment of this 169-megawatt simple-cycle peaking facility in an unincorporated area of San Joaquin County. Provided expert witness testimony on Land Use Staff Assessment. Issues included potential impacts resulting from loss of agricultural land under Williamson Act Contract, and evaluation of cumulative development in the fast-growing surrounding area.
- **Avenal Energy Project, Kings County, CA.** Socioeconomics Technical Specialist for this 600-megawatt combined cycle electrical generating facility, and associated linear facilities.
- **Tesla Power Project, Alameda County, CA.** Land Use Technical Senior and Alternatives Technical Specialist in charge of preparation of two Staff Assessments for this project. The project will be a nominal 1,120-MW electrical generating power plant with commercial operation planned for third quarter of 2004. The Tesla Power Project will consist of a natural gas-fired combined cycle power generator, with 0.8 miles of double-circuit 230-kilovolt transmission line connected to the Tesla PG&E substation, 24-inch 2.8-mile natural gas pipeline, and 1.7-mile water line constructed along Midway Road.
- **Sacramento Municipal Utility District Consumes Power Plant Project, Sacramento, CA.** Socioeconomics and Alternatives Technical Specialist in charge of preparation of two Staff Assessments for this nominal 1,000-megawatt (MW) combined-cycle natural gas facility. Provided expert witness testimony on Socioeconomics Staff Assessment. The project would include the construction and operation of a natural gas power plant at the Rancho Seco Nuclear Plant, 25 miles southeast of the City of Sacramento, in Sacramento County. The project would be located on a 30-acre portion of an overall 2,480-acre site owned by SMUD.
- **Inland Empire Energy Center, Riverside County, CA.** Technical Specialist for the Land Use Assessment for a 670-megawatt natural gas-fired, combined-cycle electric generating facility and associated linear facilities including, a new 18-inch, 4.7-mile pipeline for the disposal of non-reclaimable wastewater, and a new 20-inch natural gas pipeline. Provided expert witness testimony on Land Use Staff Assessment. The project would be located on approximately 46-acres near Romoland, within Riverside County. Major issues addressed in the Staff Assessment included potential loss of agricultural lands, impacts to planned school uses, and the project's potential non-compliance with local General Plan land use and zoning designations.

- **Senior Technical Lead, Land Use Resources.** The California Energy Commission (CEC) requested that the Aspen Team provide Technical Seniors for the Land Use Resources area in order to help coordinate and review Land Use Resource Assessments. As a Technical Senior, Negar Vahidi was responsible for the technical review of Land Use sections for various power plants assigned to them.
- **Legislative Bill Review.** As a Land Use Technical Senior for the CEC, Ms. Vahidi conducted legislative bill review related to energy facilities siting. She conducted portions of the CEC Systems Assessment & Facilities Siting Division analysis of Senate Bill 1550 which was intended to give the Superintendent of Public Instruction/CDE approval authority over siting of power plants within one mile of existing or proposed K-12 school sites by requiring the CDE (in coordination with the State Architect, and the commission) to develop appropriate siting guidelines.

- Engineering & Environmental Technical Assistance to Support the Energy Facility Planning and Licensing Program Contract (Contract # 700-02-004; 6/30/03 through 3/30/06)
  - **Environmental Performance Report (EPR).** Ms. Vahidi managed the preparation of the Socioeconomics chapter of the EPR for the California Energy Commission, which eventually became part of the State of California's Integrated Energy Policy Report (IEPR). The Socioeconomics chapter addressed: the importance of reliable and affordable electricity supply power plant construction and operation impacts, including labor force, taxation, etc.; and trends in the energy section, including renewable power sources such as wind and solar. She also conducted the analysis of a new portion of the Land Resources Chapter, which addressed the siting and land use issues associated with renewable power. This new portion of the land use analysis compared the land use and siting constraints associated with renewable power infrastructure such as wind and solar versus other forms of power infrastructure, such as gas pipelines, transmission lines, LNG facilities, and power plants.
  - **Coastal Plant Study.** Ms. Vahidi served as the Social Sciences Task Manager for this special study being conducted as part of Aspen's contract with the California Energy Commission. The study included identification and evaluation of potential issues associated with the possible modernization, re-tooling, or expansion of California's 25 coastal power plants including: northern California power plants such as Humboldt, Potrero, Hunter's Point, Pittsburg, and Oakland; central coast power plants such as Contra Costa, Diablo Canyon Nuclear, Morro Bay, Moss Landing, Elwood, Mandalay, and Ormond Power Plants; and southern California power plants such as the Alamitos, Long Beach, Los Angeles Harbor, Haynes, Redondo Beach, Scattergood, El Segundo, Huntington Beach, Encina, Silver Gate, South Bay, and San Onofre Nuclear. As Task Manager her responsibilities included, identification of potential political, social, community, and physical land use impacts that may arise from the potential increased output of energy from plants in highly sensitive coastal communities. The intent of the study is to identify red flag items for the Energy Commission in order to streamline future licensing processes. Her task as the Social Science Task Manager also included a thorough review of applicable Local Coastal Plans, and Coastal Commission regulations associated with Coastal Development Permits and Consistency Determinations.
  - **Natural Gas Market Outlook Report (NGMOR**). Ms. Vahidi assisted the CEC's Natural Gas Unit as a technical editor in their preparation and publication of the NGMOR. She managed Aspen's efforts, including format and graphics, to edit technical sections prepared by Natural Gas Unit Staff under a condensed time frame. The Preliminary NGMOR was released for public review in June 2003.

- Peak Workload Support for the Energy Facility Siting Program and the Energy Planning Program (Contract #700-05-002; 4/11/06 through 3/30/09)
  - **Chula Vista Energy Upgrade Project, Chula Vista, CA.** Senior Technical Specialist for the Land Use Staff Assessment for MMC Energy, Inc.'s Application for Certification (AFC) to construct and operate replacements and upgrades of equipment at the Chula Vista Power Plant, located on a 3.8-acre parcel in the City of Chula Vista's Main Street Industrial Corridor and within the City's Light Industrial zoning district. Issues of concern include the impacts of the power plant on adjacent residential and open space land uses, and compliance with applicable local LORS. Provided expert witness testimony on Land Use Staff Assessment.
  - **Ivanpah Solar Electric Generating System Project, San Bernardino County, CA.** Senior Technical Specialist for the Socioeconomics Staff Assessment/BLM EIS for a 400-megawatt solar thermal electric power generating system. The project's technology would include heliostat mirror fields focusing solar energy on power tower receivers producing steam for running turbine generators. Related facilities would

include administrative buildings, transmission lines, a substation, gas lines, water lines, steam lines, and well water pumps. The proposed project would be developed entirely in the Mojave Desert region of San Bernardino County, California. The document was prepared in compliance with both NEPA and CEQA requirements.

- **Sentinel Energy Project, Riverside County, CA.** Senior Technical Specialist for the Land Use Staff Assessment for CPV Sentinel's Application for Certification (AFC) to construct and operate an 850-megawatt (MW) peaking electrical generating facility near SCE's Devers Substation. The proposed project site consists of 37 acres of land situated approximately eight miles northwest of the center of the City of Palm Springs with portions of the construction laydown area and natural gas pipeline within the Palm Springs city limits. Land use issues of concern include the project's compliance with local LORS.
- **Carrizo Energy Solar Farm, San Luis Obispo County, CA.** Senior Technical Specialist for the Land Use Staff Assessment for Carrizo Energy, LLC's Application for Certification (AFC) to build the Carrizo Energy Solar Farm (CESF), which will consist of approximately 195 Compact Linear Fresnel Reflector (CLFR) solar concentrating lines, and associated steam drums, steam turbine generators (STGs), air-cooled condensers (ACCs), and infrastructure, producing up to a nominal 177 megawatts (MW) net. The CESF is located in an unincorporated area of eastern San Luis Obispo County, west of Simmler and northwest of California Valley, California. The CESF includes the solar farm site, a minimal offsite transmission system connection, and construction laydown area. The CESF site will encompass approximately 640 acres of fenced area in an area zoned for agricultural uses as specified in the San Luis Obispo County General Land Use Plan. Issues of concern include the impacts of the power plant on adjacent land uses and compliance with applicable local LORS.
- **Carlsbad Energy Center Project, Carlsbad, CA.** Senior Technical Specialist for the Land Use and Alternatives Staff Assessments for Carlsbad Energy Center, LLC's Application for Certification (AFC) to build the Carlsbad Energy Center Project (CECP), which will consist of a 558 MW gross combined-cycle generating facility configured using two units with one natural-gas-fired combustion turbine and one steam turbine per or unit. Issues of concern include major incompatibilities with local LORS, and cumulative impacts from widening of I-5.
- **Marsh Landing Generating Station, Contra Costa County, CA.** Senior Technical Specialist for the Land Use Staff Assessment for the Mirant Marsh Landing, LLC AFC for a 930 MW natural gas-fired power plant, which would be would be sited adjacent to the existing Contra Costa Power Plant in unincorporated Contra Costa County, near the City of Antioch.
- **Canyon Power Plant, Anaheim, CA.** Senior Technical Specialist for the Socioeconomics Staff Assessments for a nominal 200 megawatt (MW) simple-cycle plant, using four natural gas-fired combustion turbines and associated infrastructure proposed by Southern California Public Power Authority (SCPPA). This project is a peaking power plant project located within the City of Anaheim, California.
- **Willow Pass Generating Station, Pittsburg, CA.** Senior Technical Specialist for the Land Use Staff Assessment for a new, approximately 550-megawatt (MW) dry-cooled, natural gas-fired electric power facility proposed by Mirant. Development of Willow Pass would entail the construction of two generating units and ancillary systems including, adjacent electric and gas transmission lines, and water and wastewater pipelines.
- **Marsh Landing Generating Station, Contra Costa County, CA.** Senior Technical Specialist for the Land Use Staff Assessment for a new, 930-megawatt (MW) gas-fired electric generating facility proposed by Mirant. Delta. The proposed 27-acre Project site would be located at the existing Contra Costa Power Plant.
- **Stirling Energy Systems Solar One, San Bernardino County, CA.** Senior Technical Specialist for the Land Use Staff Assessment/BLM EIS for a nominal 850-megawatt (MW) Stirling engine project, with construction planned to begin late 2010. The primary equipment for the generating facility would include the approximately 30,000, 25-kilowatt solar dish Stirling systems (referred to as SunCatchers), their associated equipment and systems, and their support infrastructure. Major issues of concern include the conversion of approximately 8,230 acres of open space to industrial uses, compliance with BLM's CDCA Plan, etc.
- **Stirling Energy Systems Solar Two, Imperial County, CA.** Senior Technical Specialist for the Land Use Staff Assessment/BLM EIS for a nominal 750-megawatt (MW) Stirling engine project, with construction

planned to begin either late 2009 or early 2010. The primary equipment for the generating facility would include the approximately 30,000, 25-kilowatt solar dish Stirling systems (referred to as SunCatchers), their associated equipment and systems, and their support infrastructure. Major issues of concern include conversion of 6,500 acres of public recreation land used for OHV use and camping, and compliance with the BLM's CDCA plan..

- **GWF Tracy Combined Cycle Power Plant, San Joaquin County, CA.** Senior Technical Specialist for the Land Use Staff Assessment for GWF's proposal to modify the existing TPP (see description above), a nominal 169-megawatt (MW) simple-cycle power plant, by converting the facility into a combined-cycle power plant with a nominal 145 MW, net, of additional generating capacity.
- **City of Palmdale Hybrid Power Plant Project, Palmdale, CA.** Senior Technical Specialist for the Land Use Staff Assessment for the Palmdale Hybrid Power Project (PHPP) proposed by the City of Palmdale. The PHPP consists of a hybrid of natural gas-fired combined-cycle generating equipment integrated with solar thermal generating equipment to be developed on an approximately 377-acre site in the northern portions of the City of Palmdale (City).
- **Lodi Energy Center, Lodi, CA.** Senior Technical Specialist for the Socioeconomics Staff Assessment for a combined-cycle nominal 225-megawatt (MW) power generating facility.
- **Abengoa Mojave Solar One Project, San Bernardino County, CA.** Senior Technical Specialist for the Land Use Staff Assessment of a nominal 250 megawatt (MW) solar electric generating facility to be located near Harper Dry Lake in an unincorporated area of San Bernardino County. Issues of concern include the impacts associated with the conversión of 1,765 acres of open space lands.
- **Genesis Solar Energy Project, Riverside County, CA.** Senior Technical Specialist for the Land Use Staff Assessment/BLM EIS for two independent solar electric generating facilities with a nominal net electrical output of 125 megawatts (MW) each, for a total net electrical output of 250 MW. Electrical power would be produced using steam turbine generators fed from solar steam generators. The project is located approximately 25 miles west of the city of Blythe. Major issues of conern include conversión of 4,460 acres of BLM lands to an industrial use.
- **Contra Costa Generating Station, Contra Costa County, CA.** Senior Technical Specialist for the Land Use Staff Assessment for a natural gas-fired, combined-cycle electrical generating facility rated at a nominal generating capacity of 624 megawatts (MW). The project would be located in the City of Oakley.

- **Topaz Solar Project EIR, San Luis Obispo County, CA.** (Applicant: First Solar). Aspen is managing preparation of an EIR for this 500 MW solar photovoltaic project in the Carrizo Plain area. A major issue of concern is the conversion of approximately 6,000 acres of open space (60 percent of which are under land preservation contracts) to an industrial use. Ms. Vahidi is the Senior in charge of developing the methodology, approach, and thresholds of significance for analysis of impacts related to agricultural land conversion using the CA Department of Conservation LESA Model. One major issue of concern related to agricultural resources is impacts to lands under Williamson Act contracts. She will be guiding the analysis.
- **California Valley Solar Ranch EIR, San Luis Obispo County, CA.** (Applicant: SunPower). Aspen is managing preparation of an EIR for this 250 MW solar photovoltaic project in the Carrizo Plain area. A major issue of concern is the conversion of approximately 4,000 acres of open space to an industrial use. Ms. Vahidi is the Senior in charge of developing the methodology, approach, and thresholds of significance for analysis of impacts related to agricultural land conversion using the CA Department of Conservation LESA Model. She will be guiding the analysis.
- **Santa Ana Valley Pipeline Repairs Project, San Bernardino and Riverside Counties, CA.** Under Aspen's on-going environmental services contract with the DWR, Ms. Vahidi served as the project manager for CEQA documentation and permitting efforts related to the repair of 12 sites along the pipeline portion of the East Branch of the California Aqueduct. The repair of the 12 sites was crucial because, eight of the Priority 1 sites included areas of the pipeline that were under high stress and subject to rupture. Issues of concern included, potential impacts to special status species, sensitive receptors, and traffic. As the DWR's CEQA consultant, Ms. Vahidi determined that the proposed SAPL Repairs Project would qualify for a CEQA Categorical Exemption, and recommended the preparation

of a Technical Memorandum to justify this exemption. The Technical Memorandum and supporting documentation, including a Biological Constraints Report, and analyses of proposed project potential construction-related air quality, noise, and traffic impacts, were prepared and presented to DWR as one packet to support both a Class 1 and Class 2 CEQA Exemption. Subsequent to preparation of this packet, DWR filed a Notice of Exemption on June 13, 2003 for their repair activities.

- **Piru Creek Erosion Repairs and Bridge Seismic Retrofit Project, Northern Los Angeles County, CA.** Under Aspen's on-going environmental services contract with the DWR, Ms. Vahidi served as the project manager for CEQA documentation for this project. An IS/MND was prepared to evaluate the impacts of the project, which proposed to maintain four access routes to DWR's facilities along the West Branch of the California Aqueduct downstream of the Pyramid Dam. Repair and improvement activities would occur on Osito Canyon (an intermittent tributary to Piru Creek) at Osito Adit, adjacent to Old Highway 99 at North Adit (or access tunnel), alongside an eroded section of Old Highway 99 along Piru Creek, and at Pyramid Dam Bridge. Repair activities would serve to improve conditions of access routes, as well as strengthening and reinforcing them against seismic or flood events. Project-related construction could result in potentially significant impacts to biological resources, cultural resources, geology and soils, hazards and hazardous materials, hydrology and water quality, noise, and transportation and traffic.
- **Pyramid Lake Repairs and Improvements Project, northern Los Angeles County.** Under Aspen's on-going environmental services contract with the DWR, Ms. Vahidi served as the project manager for CEQA documentation, ADA (Americans with Disabilities Act) compliance, and permitting efforts for this project. DWR and the Department of Boating and Waterways (DBW) are planning repairs and improvements at various recreational sites at Pyramid Lake, which is located on the border between Los Padres National Forest and Angeles National Forest; recreation is managed by Angeles National Forest. The lake is also part of Federal Energy Regulatory Commission Project 2426. Aspen worked with DWR and DBW to determine ADA compliance components at each site. CEQA documentation in support of a Class 1 and 2 Categorical Exemption was prepared to evaluate the potential impacts of the repairs and improvements, and provide CEQA clearance for filing of required permit applications, including but not necessarily limited to 404, 401, and 1602 permits. In addition to the CEQA documentation and preparation of permit applications, Aspen coordinated DWR and DBW's efforts with the USFS, and the permitting agencies (i.e., CDFG, RWQCB, and USACE). Through coordination with the USAC, Aspen prepared the NEPA EA for Corps 404 permit process, and reviewed and coordinated revisions to the 1602 with CDFG.
- **Mulholland Pumping Station and Lower Hollywood Reservoir Outlet Chlorination Station Project, Los Angeles, CA.** Under Aspen's on-going environmental services contract with the City of Los Angeles Department of Water and Power (LADWP), Ms. Vahidi served as the Project Manager for preparation of CEQA documentation for this project. LADWP proposed to replace the existing historic pumping/chlorination station building as well as the existing lavatory and unoccupied Water Quality Laboratory buildings with a new single structure pumping/chlorination station within the LADWP's Hollywood Reservoir Complex located in the Hollywood Hills section of the City Los Angeles. These improvements were required due to the age and deterioration of the facility and the potential risk of seismic damage to existing structures. An Initial Study was prepared in support of a City of Los Angeles General Exemption.
- **River Supply Conduit (RSC) Upper Reach Project EIR, Los Angeles and Burbank, CA.** Under Aspen's on-going environmental services contract with the City of Los Angeles Department of Water and Power (LADWP), Ms. Vahidi served as the Task Leader for land use issues and is in charge of development and analysis of project alternatives for the CEQA document for this project. The RSC is a major transmission pipeline in the LADWP water distribution system. The existing RSC pipeline's purpose is to transport large amounts of water from the Los Angeles Reservoir Complex and local ground water wells to reservoirs and distribution facilities located in the central areas within of the City of Los Angeles. The LADWP proposed a new larger RSC pipeline to replace and realign the

Upper and Lower Reaches of the existing RSC pipeline, which would involve the construction of approximately 69,600 linear feet (about 13.2 miles) of 42-, 48-, 60-, 66-, 72-, 84-, and 96-inch diameter welded steel underground pipeline.

- **Valley Generating Station Site Survey & Documentation Report, Los Angeles, CA.** Ms. Vahidi managed the preparation of a comprehensive report (over 150 pages) documenting all of the structures and facilities located at the Valley Generating Station (VGS). The report includes exhibits that illustrate locations of each structure at the VGS, a detailed appendix of color photos of each structure, and a written description of each structure. The report also provides a general discussion of the history and background of the VGS and its development to provide a context for the structures on site.
- **Taylor Yard Water Recycling Project (TYWRP), Los Angeles and Glendale, CA.** Under Aspen's on-going environmental services contract with the City of Los Angeles Department of Water and Power (LADWP), Ms. Vahidi served as the Project Manager for preparation of CEQA documentation for this project. LADWP proposed to construct the TYWRP in order to provide recycled water produced by the Los Angeles–Glendale Water Reclamation Plant (LAGWRP) to the Taylor Yard. An important part of the City of Los Angeles' expanding emphasis on water conservation is the concept that water is a resource that can be used more than once. Because all uses of water do not require the same quality of supply, the City has been developing programs to use recycled water for suitable landscaping and industrial uses. The project is located in the southernmost part of the City of Glendale and northeastern part of the City of Los Angeles. The IS/MND was adopted in the Summer of 2007.
- **Devers–Palo Verde 500 kV Transmission Line Project EIS/EIR, southern California/western Arizona.** For this EIR/EIS prepared by U.S. Bureau of Land Management and CPUC, Ms. Vahidi served as the Deputy Project Manager and Social Sciences Issue Area Coordinator for SCE's proposed 250-mile transmission line project from the Palo Verde Nuclear power plant in Arizona to the northern Palm Springs area in California. Major issues of concern include EMF and visual impacts on property values, impacts on the area's vast recreational resources and tribal lands, and the development and evaluation of several route alternatives, including the Devers-Valley No. 2 Route Alternative, which eventually was approved by the CPUC.
- **Antelope-Pardee 500 kV Transmission Line Project EIR/EIS, Los Angeles County, CA.** For this EIR/EIS prepared by USFS, Angeles National Forest and CPUC, Ms. Vahidi is served as the Deputy Project Manager and Social Sciences Issue Area Coordinator for SCE's proposed 25-mile transmission line project from the Antelope Substation in the City of Lancaster, through the ANF, and terminating at SCE's Pardee Substation in Santa Clarita. Major issues of concern included impacts to biological, recreational, and cultural resources within Forest lands, EMF and visual impacts on property values, impacts on residences in the urbanized southern regions of the route, and the development and evaluation of several route alternatives.
- **Antelope Transmission Project, Segments 2 & 3 EIR, Los Angeles and Kern Counties, CA.** For this EIR being prepared by the CPUC, Ms. Vahidi served as the Deputy Project Manager and Social Sciences Issue Area Coordinator. The proposed Project includes both Segment 2 and Segment 3 of the Antelope Transmission Project, and involves construction of new transmission line infrastructure from the Tehachapi Wind Resource Area in southern Kern County, California, to SCE's existing Vincent Substation in Los Angeles County, California. The Tehachapi Wind Resource Area is one of the State's greatest potential sources for the generation of wind energy. A variety of wind energy projects are currently in development for this region. Major issues of concern include EMF and visual impacts on property values, impacts on residences and agricultural resources, and the development and evaluation of several substation and route alternatives.
- **Tehachapi Renewable Transmission Project (TRTP) EIR/EIS, Kern, Los Angeles, and San Bernardino Counties, CA.** For this EIR/EIS prepared by USFS, Angeles National Forest and CPUC,

Ms. Vahidi is served as the Deputy Project Manager in the early stages (i.e., during Scoping) of the project for SCE's proposal to construct, use, and maintain a series of new and upgraded high-voltage electric transmission lines and substations to deliver electricity generated from new wind energy projects in eastern Kern County. Approximately 46 miles of the project would be located in a 200- to 400-foot right-of-way on National Forest System land (managed by the Angeles National Forest) and approximately three miles would require expanded right-of-way within the Angeles National Forest. The proposed transmission system upgrades of TRTP are separated into eight distinct segments: Segments 4 through 11. Segments 1 (Antelope-Pardee) and Segments 2 and 3 (Antelope Transmission Project) were evaluated in separate CEQA and NEPA documents as described above.

- **Jefferson-Martin 230 kV Transmission Line Project EIR, San Francisco Bay Area, CA.** Ms. Vahidi served as the Issue Area Coordinator for the Social Science issues of the EIR, and was responsible for preparation of the socioeconomics, recreation, and public utilities sections of the EIR prepared on behalf of the California Public Utilities Commission (CPUC) to evaluate a proposed 27-mile transmission line in San Mateo County. Major issues of concern included EMF and visual impacts on property values, impacts on the area's vas recreational resources, and evaluation of several route alternatives.
- **Miguel-Mission 230 kV #2 Project EIR, San Diego, CA.** Ms. Vahidi conducted the land use, recreation, socioeconomics, and environmental justice analyses for this EIR for a proposed 230 kV circuit within an existing transmission line ROW between Miguel and Mission substations in San Diego County. The proposed project included installing a new 230 kV circuit on existing towers along the 35-mile ROW, as well as relocate 69 kV and 138 kV circuits on approximately 80 steel pole structures. In addition, the Miguel Substation and Mission Substation would be modified to accommodate the new 230 kV transmission circuit.
- **Viejo System Project, Orange County, CA.** Ms. Vahidi served as the Deputy Project Manager for the project's CEQA documentation, including and Initial Study, prepared on behalf of the CPUC to evaluate Southern California Edison's (SCE) Application for a Permit to Construct the Viejo System Project, which was in SCE's forecasted demand of electricity and goal of providing reliable electric service in southern Orange County. The Viejo System Project would serve Lake Forest, Mission Viejo, and the surrounding areas. Components of the project included, construction of the new 220/66/12 kilovolt (kV) Viejo Substation, installation of a new 66 kV subtransmission line within an existing SCE right-of-way, replacement of 19 double-circuit tubular steel poles with 13 H-frames structures, and minor modification to other transmission lines. Major issues of concern include visual impacts of transmission towers, EMF effects, and project impacts on property values.
- **MARS EIR/EIS, Monterey, CA.** Ms. Vahidi served as the technical specialist in charge of preparing the Environmental Justice analysis for this EIR/EIS, which would evaluate the effects associated with the installation and operation of the proposed Monterey Accelerated Research System (MARS) Cabled Observatory Project (Project) proposed by Monterey Bay Aquarium Research Institute (MBARI)[NEPA Lead Agency]. The goal of the Project was to install and operate, in State and Federal waters, an advanced cabled observatory in Monterey Bay that would provide a continuous monitoring presence in the Monterey Bay National Marine Sanctuary (MBNMS) as well as serve as the test bed for a state-of-the-art regional ocean observatory, currently one component of the National Science Foundation (NSF) Ocean Observatories Initiative (OOI). The Project would provide real-time communication and continuous power to suites of scientific instruments enabling monitoring of biologically sensitive benthic sites and allowing scientific experiments to be performed. The environmental justice analysis evaluated the potential for any disproportionate project impacts to both land-based populations and fisheries workers. The CEQA Lead Agency was CSLC.
- **Kinder Morgan Concord-Sacramento Pipeline EIR**. Ms. Vahidi prepared the environmental justice and utilities and service systems sections of an EIR evaluating a proposed 70-mile petroleum products pipeline for the California State Lands Commission. Analysis included consideration of potential impacts of pipeline accidents in Contra Costa, Solano, and Yolo Counties.

- **Shore Marine Terminal Lease Consideration Project EIR, Contra Costa County, CA.** Served as Aspen's Project Manager (under contract to Chambers Group, Inc.) in charge of conducting the preparation of the Land Use, Recreation, Air Quality, and Noise sections of this EIR evaluating Shore Terminal, LLC's application to the California State Lands Commission (CLSC) to exercise the first of two 10-year lease renewal options, with no change in current operations. Shore Terminals operations comprise the marine terminal and on-land storage facilities in an industrial part of the city of Martinez. The marine terminal is on public land leased from the CSLC with the upland storage facilities located on private land.
- **Looking Glass Networks Fiber Optic Cable Project IS/MND, northern and southern California.** As part of Aspen's ongoing contract with the CPUC for review of Telecommunications projects, this document encompassed the evaluation of project impacts and network upgrades in the San Francisco Bay Area and the Los Angeles Basin Area. Ms. Vahidi served as the Deputy Project Manager and Study Area Manager for the Los Angeles Basin for this comprehensive CEQA document reviewing the potential impacts of hundreds of miles of newly proposed fiber optic lines throughout northern and southern California, including Los Angeles and Orange Counties. Issues of concern focused on potential construction impacts of linear alignments in highly urbanized rights-of-way, and resultant land use, traffic and utilities conflicts.
- **U.S. Army Corps of Engineers, Los Angeles District.** Ms. Vahidi is responsible for managing Delivery Orders and conducting the analyses of the social science issue areas for 16 projects throughout southern California and Arizona as part of two environmental services contracts. Delivery orders have included:
  - **Northeast Phoenix Drainage Area Alternatives Analysis Report, Phoenix and Scottsdale, AZ.** As the project manager guided the preparation of an alternatives analysis report that evaluated the potential environmental impacts associated with channel and detention basin alternatives to control flooding problems resulting from fast rate of development in the northeast Phoenix area.
  - **Imperial Beach Shore Protection EIS/EIR, Imperial Beach, CA.** Responsible for preparing the affected environment and environmental consequences sections for the land use, recreation, aesthetics, and socioeconomics issue areas. This EIS will analyze the impacts of shore protection measures along a 4.7-mile stretch of beach in southwest San Diego County.
  - **U.S. Food and Drug Administration Laboratory EIS/EIR, Irvine, CA.** Prepared the land use and recreation; socioeconomics, public services, and utilities; and visual resources/aesthetics analyses for this proposed "mega-laboratory" on the University of California Irvine Campus. Also developed the cumulative projects scenario for analyses of cumulative impacts. As the Public Participation Coordinator for the EIS/EIR review process, prepared the NOP, set up the scoping meeting and public hearing, prepared meeting handouts, and developed the project mailing list.
  - **San Antonio Dam EIS, Los Angeles and San Bernardino Counties, CA.** Responsible for preparing the cultural resources, land use and recreation, and aesthetics sections for the analysis of impacts resulting from the re-operation of San Antonio Dam to increase flood protection.
  - **Rio Salado Environmental Restoration EIS, Phoenix and Tempe, AZ.** Conducted the land use and recreation, and aesthetics analyses for this environmental restoration project in the Salt River and Indian Bend Wash located in the Cities of Phoenix and Tempe. Incidental to the primary objective of the Proposed Action (environmental restoration) is the creation of passive recreational opportunities associated with the restored habitat areas, such as trails for walking and biking, and areas for observing wildlife and learning about the natural history of the river.
  - **Airspace Restrictions EA, Ft. Irwin, CA.** Conducted the land use, recreation, aesthetics, and socioeconomics analyses of impacts for the conversion of unrestricted airspace to restricted airspace above Ft. Irwin in the Mojave Desert.
  - **National Guard Armory Building EA, Los Angeles, CA.** Conducted the land use, aesthetics, and socioeconomics analyses and prepared the cumulative impacts and policy consistency sections.

- **Supplemental EA for the Seven Oaks Dam Woolly Star Land Exchange, San Bernardino County, CA.** Prepared the land use and recreation analyses and policy consistency section.
- **Lower Santa Ana River Operations and Maintenance EA, Orange County, CA.** Responsible for conducting the land use, recreation, aesthetics, socioeconomics, and cultural resources analyses.
- **EA for Area Lighting, Fencing, and Roadways at the International Border, San Diego, CA.** Conducted the land use, aesthetics, and socioeconomics analyses and prepared the policy consistency section.
- **Border Patrol Checkpoint Station EA, San Clemente, CA.** Analyzed the aesthetic impacts of the installation of a concrete center divider and a Pre-inspected Automated Lane adjacent to and parallel to Interstate 5.
- **Upper Newport Bay Environmental Restoration Project, Newport Beach, CA.** Prepared physical setting, socioeconomics, land and water uses, and cultural resources sections for the Baseline Conditions Report and the Environmental Planning Report.
- **Whitewater/Thousand Palms Flood Control Project, Thousand Palms, CA.** Prepared the land use and recreation, aesthetics, and socioeconomics affected environment sections for the project's Baseline Conditions Report that was incorporated into the project EIS.
- **San Antonio Creek Bridges Project, Vandenberg Air Force Base, CA.** Prepared the physical setting, land use, socioeconomics, utilities, and aesthetics sections for analyses of bridge alternative impacts for missile transport on Vandenberg Air Force Base.
- **Ft. Irwin Expansion Mitigation Plan, Mojave Desert, CA.** Responsible for developing Ft. Irwin's Public Access Policy based on mitigation measures from the Army's Land Acquisition EIS for the National Training Center. Policy includes provisions for access by research and scientific uses.

- **Los Angeles Unified School District (LAUSD), Los Angeles County, CA.** Ms. Vahidi is Program Manager for Aspen's Environmental Master Services Agreement with the LAUSD (nation's second largest school district) to prepare CEQA documents (EIRs, IS/MNDs, Categorical Exemptions) in review of the LAUSD's four-phased new school construction program intended to meet existing and projected overcrowded conditions (200,000 seat shortfall) within the LAUSD (i.e., City of Los Angeles and all or parts of 28 surrounding jurisdictions cover 700 square miles of land). As the Program Manager, she is responsible for client interface and providing CEQA expertise to the LAUSD on day-to-day basis, QA/QC activities for all Aspen documents submitted, budget tracking and allocation, staff assignments, and the general day-to-day management of this contract. Thus far, Aspen has been awarded 48 CEQA document assignments for new school projects, school expansions and additions. In addition to her duties as the contract manager, Ms. Vahidi has managed the preparation of several CEQA documents under this contract, including:
  - **East Valley Middle School No. 2 EIR.** This middle school was proposed to be located at the previous Van Nuys Drive-In site. The EIR focused on impacts associated with air quality, hazards and hazardous materials, noise, land use and planning, and traffic and transportation. Major issues of concern included traffic and noise generated by school operation activities. The EIR included LAUSD design standards and measures employed to minimize environmental impacts.
  - **Canoga Park New Elementary School IS/MND.** This elementary school would be developed on a parcel of land owned by the non-profit organization, New Economics For Women (NEW). This "Turn-Key" project consisted of a Charter Elementary School to be developed by NEW and sold to the LAUSD for operation. It was later decided that NEW would lease the school back and run it as a charter school. Issues of concern included, pedestrian safety, traffic, air quality, noise, and land use.
  - **Mt. Washington Elementary School Multi-Purpose Room Addition Project IS/MND.** This project proposed the development of a multi-purpose room facility, including a library, auditorium, and theater, to the existing Mt. Washington Elementary School campus located in Los Angeles. The surrounding residential community had concerns regarding the proposed project's impacts on aesthetics, traffic, air quality, and noise. Of particular concern, were impacts generated due to the after-hours use of the multi-purpose room facility by civic and community groups.

  - **New School Construction Program EIR.** Serves as a Study Area Manager (Valley Districts), and Issue Area Coordinator (IAC) (i.e., technical lead and reviewer) for social science issues, including land use, socioeconomics, public services, population and housing, and utilities and service systems. As the IAC, she has formulated the scope of work and methodology for analysis of issues and mitigation options. In addition to her managerial duties, Ms. Vahidi is preparing the Land Use section of the EIR, and directing the preparation of the Project's Scoping Report.
  - **Belmont Senior High School 20-Classroom Modular Building Addition Project.** Under Aspen's on-going master services agreement with the LAUSD, served as the project manager for CEQA documentation and permitting efforts related to the addition of modular classrooms to the existing Belmont Senior High School campus. Issues of concern included, potential impacts to sensitive receptors adjacent to the school from construction-related air quality, noise, and traffic, and operation-related noise generated by the new classrooms. As the LAUSD's CEQA consultant, Ms. Vahidi directed the preparation of technical documentation in support of a Class 32 In-Fill CEQA Categorical Exemption. This technical documentation included analyses of potential project-related air quality, noise, and traffic impacts, which were then submitted to LAUSD as one packet. Subsequent to preparation of this packet, LAUSD filed a CEQA Notice of Exemption for the classroom addition project.
  - **Narbonne High School Stadium Lighting Project MND Addendum.** Served as the project manager for this project proposed to add a new stadium, lighting, and associated sport facilities needed to address existing needs at Narbonne High School. Issues of concern include lighting impacts to the surrounding neighborhood, and available parking stock.
- **SCE Calnev Power Line and Substation Project IS/MND.** Aspen was contracted to thoroughly review and analyze Southern California Edison Company's Application for a Permit to Construct and Proponent's Environmental Assessment (PEA) for the Calnev Power Line and Substation Project in the City of Colton. Ms. Vahidi served as the Deputy Project Manager for preparation of the IS/MND. Tasks include: a site visit, and evaluation of the project's compliance with the Commission's General Order 131D, Rule 17.1, and associated information submittal requirements; and preparation of a letter report identifying data deficiencies of the Application and PEA. Upon formal CPUC acceptance of the Application and PEA, Aspen prepared a CEQA Initial Study Checklist by identifying baseline data, project characteristics, and determining impact significance for each issue area. Each issue area's impact determination was supported by a paragraph or more of analysis describing the rationale for the impact identified, or for the lack of a significant impact. Upon completion of the Initial Study, the Mandatory Findings of Significance were prepared and Aspen determine that a Mitigated Negative Declaration should be prepared per CEQA Guidelines.
- **SCE Six Flags Substation and Power Line Project IS/MND.** Ms. Vahidi served as Deputy Project Manager for preparation of the IS/MND. Reviewed and provided comments on the permit application by SCE to construct a substation and power line to provide electrical service to Six Flags Amusement Park in Valencia, CA. Subsequent to the application completeness review, she prepared the project's Initial Study Checklist and Mitigated Negative Declaration for the California Public Utilities Commission (CPUC). Identified possible deficiencies and provided recommendations.
- **Industrywide Survey for the South Coast Air Quality Management District.** Ms. Vahidi coordinated Aspen's work for an Air Toxics Survey of harmful emissions by auto body and paint shops, performed in compliance with AB2588. She was responsible for development of an industrywide emission inventory for these facilities; she also performed information management, facility verifications, survey mail-outs, emissions calculations, analysis of calculated results, and preparation of the final report.
- **Technical Support to NEPA Lawsuit, Angeles National Forest, CA.** Ms. Vahidi prepared a detailed project chronology and a list of all applicable federal, State, and local laws and regulations in support of the USDA Office of General Counsel and National Forest's response to the City of Los Angeles' 1996 lawsuit on the adequacy of the Pacific Pipeline EIS.
- **Yellowstone Pipeline EIS, Lolo National Forest, Montana.** Environmental Justice and Public Services Issue Area Specialist. Responsible for conducting the analysis of project impacts on minority and

low-income populations to comply with Presidential Executive Order 12898 on Environmental Justice using Census data to determine population density, minority population percentages and unemployment rates to determine the potential for disproportionate project impacts on affected communities. Also responsible for conducting analysis of project impacts such as population inmigration and pipeline accidents on public services in western Montana. During the EIS scoping process, she served as the project public participation coordinator and was responsible for preparation of the project newsletter, setup of the first round of scoping meetings, and determination of project information centers.

- **Santa Fe Pacific Pipeline Project EIR.** Ms. Vahidi was responsible for development and screening of alternatives for a 13-mile petroleum products pipeline from Carson to Norwalk, CA. Prepared analyses of project impacts on socioeconomics, public services, utilities, and aesthetics.
- **Pacific Pipeline Project Mitigation Monitoring, Compliance, and Reporting Program (MMCRP).** Ms. Vahidi served as the expert technical reviewer for the socioeconomics and environmental justice issues. As the MMCRP Agency Liaison, was responsible for developing protocol for efficient interagency communication procedures in coordination of mitigation activities with the CPUC, USFS, Responsible Agencies, and the project proponent. Also responsible for the development and management of the MMCRP Community Outreach and Public Access Program.
- **Pacific Pipeline Project EIR.** For the California Public Utilities Commission's (CPUC) EIR on the originally proposed route of this proposed pipeline (from Santa Barbara County to Los Angeles), Ms. Vahidi developed and coordinated a public participation program to comply with CEQA's mandate for information disclosure and public involvement in decision-making. The Final EIR was certified in September 1993.
- **Pacific Pipeline Project EIS and Subsequent EIR.** Ms. Vahidi prepared the socioeconomics and public services analysis, the Environmental Justice analysis in compliance with Presidential Executive Order 12898, as well as portions of the Land Use and Public Recreation analyses, including a comprehensive comparative analysis of project alternatives on this EIS/Subsequent EIR for the U.S. Forest Service (Angeles National Forest) and the CPUC. Ms. Vahidi managed the subsequent GIS mapping of socioeconomic data relative to pipeline corridor alternatives and other industrial facilities. She also prepared the cumulative projects list (covering a five county area for the Proposed Project and its alternatives) used for the cumulative scenario analyses of the various issue areas in the EIS/SEIR. As the Public Participation Program Coordinator for the project, she developed, implemented, and managed the public involvement efforts for the NEPA and CEQA environmental review processes. This included: setup and logistics for 20 separate scoping meetings, informational workshops, and public hearings along the project route; preparation of all meeting handouts; preparation of project newsletters and public notices; placement of project documents on Internet; and maintenance of the a project telephone information hotline. She also reviewed over 2,000 public comments (written and verbal) received on the Draft EIS/SEIR, for subsequent distribution to the project team.
- **Alturas Transmission Line Project EIR/EIS.** Ms. Vahidi conducted the analysis of potential impacts on minority populations and low-income populations in compliance with Presidential Executive Order 12898 on Environmental Justice using Census data to determine population density, minority population percentages and unemployment rates, and the potential impacts of the transmission line on affected communities. She also prepared the cumulative projects list and map used for analyses of cumulative impacts. She managed development of meeting handouts; scheduling and logistics for four scoping meetings; developed and maintained project mailing list; reviewed public scoping comments and prepared the Scoping Report; coordinated four sets of informational workshops and public hearings for the Draft EIR/EIS; supervised the distribution of comments on the Draft EIR/EIS to the project team; and coordinated the distribution of the Draft and Final EIR/EIS to affected public agencies, organizations, and citizens.

EIP Associates **1998 to 2001**

- **Program EIR for the Divestiture of PG&E's Hydroelectric Generation Assets.** For the CPUC's EIR evaluating the Pacific Gas & Electric Company's (PG&E) proposal to divest their hydroelectric facilities in California, served as the land use technical analyst for two watershed areas, and the Task Manager for the Socioeconomics and Transportation sections of the EIR covering five watershed areas. PG&E owns and operates the largest private hydroelectric power system in the nation. Situated in the Sierra Nevada, Southern Cascade, and Coastal mountain ranges of California, this system is strung along 16 different river basins and annually generates approximately five percent of the power consumed each year in California. The proposed sale of assets also includes approximately 140,000 acres of land proposed for sale with the hydroelectric system. The EIR analyzes the range of operational changes that could occur under new ownership, including complex integrated models that analyze power generation and water management. The land use section of the EIR examines the implications of the change in ownership of lands and the potential for impacts due to development or potential changes in use. Contributed significantly to the extensive GIS analysis, which was conducted to determine the development suitability and potential intensity of development that might occur on the lands if sold. These results served as one of the primary bases for analysis of impacts associated with the sale of the hydroelectric assets.
- **Section 108 Loan Guarantee EA/FONSI for the Waterfront Development Project.** Served as the Manager and Principal Preparer for this EA/FONSI for the City of Huntington Beach Economic Development Department. Prepared NEPA documentation evaluating the impacts resulting from the use of HUD Section 108 Loan guarantee funds for the Waterfront Resort Expansion Project in accordance with The HUD NEPA Guidelines and Format 1 (Environmental Assessments at the Community Level). Tasks included: (1) Evaluation of activities that would be categorically excluded from NEPA based on an assessment of the NEPA Implementing Guidelines for HUD Projects; (2) Evaluation of proposed actions compliance with all applicable federal statutes, regulations, and policies; and (3) Preparation of an Environmental Assessment/Mitigated Finding of No Significant Impact (EA/FONSI) for proposed actions that are not categorically excluded. Proposed actions to be evaluated consisted mainly of infrastructure improvement projects, rehabilitation and/or development of affordable housing, provision of relocation assistance, facilitation of development and/or redevelopment plans, property acquisition, provision of open space, etc.
- **MTA Mid Cities/Westside Transit Corridor Study EIS/EIR.** Served as the EIS/EIR Deputy Project Manager (DPM) for this 3-phase (including prepared the Major Investment Study (MIS), the Environmental Impact Statement (EIS), and an evaluation of the urban design implications of transit interventions on selected routes) study intended to address current and long range traffic congestion in the central and westside areas of the Los Angeles, Basin. Three east/west corridors and a range of transit alternatives ranging including Rapid Bus, light rail, and heavy rail are being evaluated. In addition to her duties as DPM for this comprehensive joint EIS/EIR, Ms. Vahidi prepared the Environmental Justice Analysis (per Executive Order 12898), the Section 4(f) Parklands discussion, and the land use and socioeconomics sections of the EIS/EIR.
- **Wes Thompson Ranch Development Project EIR.** Served as the EIR Project Manager for this hillside residential development in the City of Santa Clarita. Issues of concern included seismic and air quality impacts associated with the excavation of 2 million cubic yards of soil, the project's non-compliance with the City's hillside ordinance for innovative design, and traffic generated by project-related population growth in the area. Four different site configuration alternatives were developed as part of the EIR analysis. Other issues of concern included sensitive biological resources, the potential for hydrological impacts due to disturbance of the hillside, and cultural resources.
- **City of Santa Monica Environmental Assessments.** As one of the City's qualified CEQA consultants managed several environmental assessment documents for housing, commercial, institutional, and mixed-use developments in compliance with CEQA, including:

- **Berkeley Manor Condominium EIR and Technical Reports**. This one-issue EIR originally was a CEQA Categorical Exemption per direction of the City. During preparation of the Categorical Exemption documentation, it was determined that project-generated traffic would have potentially significant impacts. As a result, a traffic technical report was prepared as the background document for and EIR. In addition, shade and shadow impacts were evaluated in a technical report to ensure that shading impacts from the proposed structure on surrounding uses would not be significant. A simple Excel model was developed for calculation of shade and shadow angles.
- **Seaview Court Condominiums IS/MND.** This comprehensive Initial Study/Mitigated Negative Declaration included six technical reports including traffic, cultural resources, parking survey, shade and shadow analysis, and a geotechnical assessment to evaluate the level of severity of this development in the waterfront area of Santa Monica. Major issues of concern were; parking and project-generated traffic on adjacent narrow residential streets; visual obstruction and shading impacts of the proposed structure; liquefaction and seismic impacts to adjacent properties as result of the project's excavation for a subterranean parking garage; and the potential impacts of the project to impact the integrity of a historic district and the historic Seaview Walkway to the beachfront.
- **Four-Story Hotel IS/MND.** A comprehensive Initial Study/Mitigated Negative Declaration was prepared for this four-story hotel adjacent to St. John's Hospital in Santa Monica. Major issues of concern included project-generated traffic on surrounding multi-family residential uses and emergency access to the hospital.
- **Santa Monica College Parking Structure B Replacement EIR.** This focused EIR addressed issues related to traffic and neighborhood land use impacts associated with the addition of a 3-story parking structure in the center of the SMC campus. Major issues of concern included the potential for project-generated traffic to cause congestion at the school's main entrance on Pico Boulevard, and the potential for overflow traffic to impact the Sunset Community of single-family homes adjacent to the school.
- **North Main Street Mixed-Use Development Project EIR.** This EIR included evaluation of impacts resulting from the development of a mixed-use development in Santa Monica's "Commercial Corridor" on Main Street, with ground-floor residences and boutique commercial uses. Major issues of concern included traffic and parking impacts to Main Street and surrounding residential land uses, shade and shadow impacts, and neighborhood impacts.

- **Specific Plans and Redevelopment Projects.** As the senior technical lead for land use, prepared the project description, alternatives screening and development, cumulative scenario, and land use analysis for:
  - **Cabrillo Plaza Specific Plan EIR in Santa Barbara.** This project consisted of a mixed-use commercial development on Santa Barbara's waterfront on Cabrillo Boulevard. On-site uses included an aquarium, specialty retail, restaurants, and office space.
  - **Culver City Redevelopment Plan and Merger EIR.** This programmatic EIR evaluated the impacts of the City's redevelopment of its redevelopment zones. A major land use survey and calculation of acreage of redevelopment lands was conducted as part of the EIR.
  - **Dana Point Headlands Specific Plan EIR.** This EIR evaluated the development of coastal bluff in the City with hotel, single- and multi-family residential, and commercial uses. Major issues of concern included ground disturbance as a result of excavation, impacts to terrestrial and wildlife biology, recreation impacts to beachgoers, and project-generated population inducement.
  - **Blocks 104/105 Redevelopment Project EIR in Huntington Beach (Project Manager).** This EIR evaluated the development of a supermarket, retail shops, and office space in the City's Waterfront Redevelopment Zone. Issues of concern evaluated included traffic, land use, and impacts to on-site historic structures.

HONORS AND AWARDS

- 2006 American Planning Association, Los Angeles Section Environmental Award for the Los Angeles Unified School District New School Construction Program, Program EIR
- 2004 Association of Environmental Professionals Statewide Best EIR Award for the Jefferson-Martin 230 kV Transmission Project EIR.
- 2001 Outstanding Performance Award from the State of California Energy Commission.

- 1992-93 recipient of the USC Merit ("Ides of March") Scholarship from the Southern California Association of Public Administrators (SCAPA).
- University of California, Irvine, School of Social Sciences. Graduated with Highest Honors in Political Science.

PROFESSIONAL ASSOCIATIONS

- American Planning Association (APA), Los Angeles Section Executive Board Member
- Association of Environmental Professionals (AEP)

DECLARATION OF
Testimony of Susanne Huerta

I**, Susanne Huerta,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission, Siting, Transmission and Environmental Protection Division, as an **Associate Planner/Land Use Staff Professional**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Land Use** for the **Calico Solar Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 23, 2010 Signed: Original signed by S. Huerta

At: Agoura Hills, California

Aspen Environmental Group

Susanne R. Huerta
Environmental Planner

Academic Background

Master of Urban Planning, New York University, 2007
B.A., Geography, University of California, Los Angeles, 2004

Professional Experience

Ms. Huerta is an Environmental Planner with five years of experience in environmental consulting, city planning, economic development and GIS analysis. She is currently conducting the technical analysis for agricultural and land use analyses for numerous solar and wind energy generating facilities. While attending graduate school, Ms. Huerta interned for a city planning consultant firm in New Jersey. Her city planning background includes experience in the preparation of master plans, the evaluation of site plans and subdivisions, and conducting land use surveys. At Aspen Environmental Group, Ms. Huerta conducts research and prepares environmental analyses in accordance with CEQA, NEPA, and various other environmental laws and regulations. Ms. Huerta's project-specific efforts are provided below.

Aspen Environmental Group — 2007 to present

- **Topaz Solar Farm Project Environmental Impact Report (EIR), San Luis Obispo County, CA, Project Assistant/Technical Specialist (2009-Present).**Ms. Huerta is currently preparing the Project Description and the technical analysis for the agriculture section for this 550 MW solar photovoltaic power plant on the Carrizo Plain of eastern San Luis Obispo County. The project includes solar arrays that would cover approximately 4,200 acres, as well as an electric substation and switching station.
- **California Valley Solar Ranch Project EIR, San Luis Obispo County, CA, Technical Specialist (2009-Present).** Ms. Huerta is currently preparing the technical analysis for the agricultural resources for this 250 MW solar photovoltaic power plant on the Carrizo Plain of eastern San Luis Obispo County. The project includes solar arrays that would cover nearly 2,000 acres, as well as an electric substation, a 2.5-mile transmission line, and expansion of a surface aggregate mine.
- **Pacific Wind Project EIR, Kern County, CA, Technical Specialist (2009-Present).** Ms. Huerta is currently preparing the technical analysis for land use and public services. The project is proposed to be located on approximately 8,300 acres of land with up to 250 wind turbines to produce up to 250 MW of wind energy.
- **Alcoa Dike Project Supplemental Environmental Assessment EA/EIR, US Army Corps of Engineers, Technical Specialist (2009-Present).** Ms. Huerta is a preparing the land use and visual analysis for the Supplemental EA/EIR Addendum under the NEPA/CEQA for the United States Army Corps of Engineers. A Supplemental EA/EIR Addendum is being performed to address design changes to the approved Alcoa Dike located in the Prado Basin, Riverside County.
- **Auxiliary Dike Project Supplemental Environmental Assessment (EA)/EIR, US Army Corps of Engineers, Technical Specialist (2009).** Ms. Huerta prepared the land use and visual analysis for the Supplemental EA/EIR Addendum under the NEPA/CEQA for the United States Army Corps of Engineers. A Supplemental EA/EIR Addendum is being performed to address design changes to the approved Auxiliary Dike located in the Prado Basin, Riverside County.

- **Baldwin Hills Community Standards District (CSD), City of Culver City, Technical Specialist (2009).** Technical Specialist for the review of a County of Los Angeles environmental document and preparation of an oil and gas drilling ordinance for the City of Culver City in Los Angeles County. Ms. Huerta reviewed the technical comments on the Baldwin Hills Community Standards District EIR prepared by the County of Los Angeles for the Inglewood Oil Field. The technical review included the evaluation of the County's proposed CSD (drilling ordinance), which the County revised based on public comments. The City used the review comments as part of their formal comments submitted on the County's EIR and CSD.
- **California River Parkways Trailhead Project Initial Study/Mitigated Negative Declaration (IS/MND), Ventura County Watershed Protection District, Technical Specialist, (2009).** The project would provide a new point of entry to the Ventura County-maintained Ojai Valley Trail and the Ventura River Trail, building on an existing trails network, and would include a new parking lot and crosswalk. Ms. Huerta performed the analyses for land use, agricultural and mineral resources, public services, and recreation resources.
- **TANC Transmission Project, Transmission Agency of Northern California, Staff Professional (2009).** Public scoping for 600 miles of proposed 230-kV and 500-kV transmission lines and associated infrastructure extending from eastern Lassen County south through the Sacramento Valley, and branching west to the Bay Area and east to Tuolumne County: Ms. Huerta assisted in the acquisition and processing of 6,600 scoping comments and information requests; responded via phone, email, and postal mail to public and agency inquiries throughout the twice extended, five-month scoping period; quantitatively evaluated scoping data; and authored sections of the scoping report.
- **Alta-Oak Creek Mojave Project EIR, Kern County, CA, Technical Specialist (2008-2009).** Ms. Huerta is prepared the technical analysis for land use, public services, population, and housing resources. The project is proposed to be located on approximately 11,000 acres of land with up to 350 wind turbines to produce up to 800 MW of wind energy. This would be the first project of the Alta Wind Energy Center which is designed to produce 1,500 MW of wind power in the Tehachapi Wind Resource Area of Kern County**.**
- **Santa Maria River Levee Repair Project, US Army Corps of Engineers, Technical Specialist (2008).** An Environmental Assessment (EA) is being performed for the corrective action to repair the design deficiency of the Santa Maria River Levee in order to avoid the potentially catastrophic consequences of a levee breach that would affect the population of the city of Santa Maria. Ms. Huerta has prepared technical analysis of potential land use and socioeconomic impacts for the EA under NEPA.
- **River Supply Conduit (RSC) Upper Reach Project EIR, Los Angeles and Burbank, CA, Technical Reviewer (2008).** Under Aspen's environmental services contract with the City of Los Angeles Department of Water and Power (LADWP), Ms. Huerta assisted in preparation of the potential impacts to recreational resources for this EIR. The RSC is a major transmission pipeline in the LADWP water distribution system. The existing RSC pipeline's purpose is to transport large amounts of water from the Los Angeles Reservoir Complex and local ground water wells to reservoirs and distribution facilities located in the central areas within of the City of Los Angeles. The LADWP proposed a new larger RSC pipeline to replace and realign the Upper and Lower Reaches of the existing RSC pipeline.
- **Tehachapi Renewable Transmission Project (TRTP) EIR/EIS, Kern, Los Angeles, and San Bernardino Counties, CA, Technical Specialist (2007-Present).** In preparation of a joint EIR/EIS for the CPUC and USDA Forest Service (Angeles National Forest), Ms. Huerta conducted research and analysis for impacts related to public services and utilities, and prepared the Cumulative Impact Scenario. In addition, she prepared the EIR/EIS Summary; and assisted in preparation of the Project

Description, Alternative Screening Report, Scoping Report, and the public comment period of the Draft EIR/EIS.

California Energy Commission (CEC)

In response to California's power shortage, Aspen has assisted the CEC in evaluating the environmental and engineering aspects of new power plant applications throughout the State under three separate contracts. Ms. Huerta has served as a Staff Professional for Land Use Staff Assessments since 2008. Her specific projects are listed below.

- Peak Workload Support for the Energy Facility Siting Program and the Energy Planning Program (Contract #700-05-002; 4/11/06 through 3/30/09)
  - **Carrizo Energy Solar Farm, San Luis Obispo County, CA.** Staff Professional for the Land Use Staff Assessment for Carrizo Energy, LLC's Application for Certification (AFC) to build the Carrizo Energy Solar Farm (CESF), which will consist of approximately 195 Compact Linear Fresnel Reflector (CLFR) solar concentrating lines, and associated steam drums, steam turbine generators (STGs), air-cooled condensers (ACCs), and infrastructure, producing up to a nominal 177 megawatts (MW) net. The CESF is located in an unincorporated area of eastern San Luis Obispo County, west of Simmler and northwest of California Valley, California. The CESF includes the solar farm site, a minimal offsite transmission system connection, and construction laydown area. The CESF site will encompass approximately 640 acres of fenced area in an area zoned for agricultural uses as specified in the San Luis Obispo County General Land Use Plan. Issues of concern include the impacts of the power plant on adjacent land uses and compliance with applicable local LORS.
  - **Willow Pass Generating Station, Pittsburg, CA.** Staff Professional for the Land Use Staff Assessment for a new, approximately 550-megawatt (MW) dry-cooled, natural gas-fired electric power facility proposed by Mirant. Development of Willow Pass would entail the construction of two generating units and ancillary systems including, adjacent electric and gas transmission lines, and water and wastewater pipelines.
  - **Stirling Energy Systems Solar One, San Bernardino County, CA.** Staff Professional for the Land Use Staff Assessment/BLM EIS for a nominal 850-megawatt (MW) Stirling engine project, with construction planned to begin late 2010. The primary equipment for the generating facility would include the approximately 30,000, 25-kilowatt solar dish Stirling systems (referred to as SunCatchers), their associated equipment and systems, and their support infrastructure. Major issues of concern include the conversion of approximately 8,230 acres of open space to industrial uses, compliance with BLM's CDCA Plan, etc.
  - **Stirling Energy Systems Solar Two, Imperial County, CA.** Staff Professional for the Land Use Staff Assessment/BLM EIS for a nominal 750-megawatt (MW) Stirling engine project, with construction planned to begin either late 2009 or early 2010. The primary equipment for the generating facility would include the approximately 30,000, 25-kilowatt solar dish Stirling systems (referred to as SunCatchers), their associated equipment and systems, and their support infrastructure. Major issues of concern include conversion of 6,500 acres of public recreation land used for OHV use and camping, and compliance with the BLM's CDCA plan.
  - **City of Palmdale Hybrid Power Plant Project, Palmdale, CA.** Staff Professional for the Land Use Staff Assessment for the Palmdale Hybrid Power Project (PHPP) proposed by the City of Palmdale. The PHPP consists of a hybrid of natural gas-fired combined-cycle generating equipment integrated with solar thermal generating equipment to be developed on an approximately 377-acre site in the northern portions of the City of Palmdale (City).
  - **Abengoa Mojave Solar One Project, San Bernardino County, CA.** Staff Professional for the Land Use Staff Assessment of a nominal 250 megawatt (MW) solar electric generating facility to be located near Harper Dry Lake in an unincorporated area of San Bernardino County. Issues of concern include the impacts associated with the conversión of 1,765 acres of open space lands.

PREVIOUS EXPERIENCE

Burgis Associates, Inc. — May 2006 to May 2007

Ms. Huerta worked as a consultant for city planning departments and private developers throughout northern New Jersey. Her primary projects were to draft a master plan reexamination report and an open space and recreation element of a master plan. Within these projects she evaluated existing socioeconomic conditions and land uses, and conducted an inventory of recreational facilities and open space. She also used ArcGIS to illustrate zoning recommendations and update land use and zoning maps. Other routine projects included the evaluation of site plan, subdivision and variance applications for compliance with local, State and federal regulations.

Brooklyn Economic Development Corporation — September to December 2005

Ms. Huerta conducted research and field surveys for community revitalization projects. She also participated in collaborative meetings with other community organizations.

ADDITIONAL TRAINING AND COURSES

- Successful CEQA Compliance (February 2009)
- CEQA Basics Workshop Series (November 2008)
- Advanced courses in ArcGIS
- Graduate courses in Environmental Impact Assessment and Environmental Policy

PROFESSIONAL AFFILIATIONS

- American Planning Association

DECLARATION OF
Erin Bright

I**, Erin Bright,** declare as follows:

1. I am presently employed by the California Energy Commission in the **Engineering Office** of the Siting Transmission and Environmental Protection Division as a **Mechanical Engineer**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Noise and Vibration** for the **Calico Solar Project** based on my independent analysis of the Application, supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 29, 2010 Signed: Original signed by E. Bright

At: Sacramento, California

Erin Bright
Mechanical Engineer

Experience Summary

One year of experience in the electric power generation field, including analysis of noise pollution, construction/licensing of electric generating power plants, and engineering and policy analysis of thermal power plant regulatory issues. One year of experience in the alternative energy field, including analysis of alternative fuel production and use.

Education

- University of California, Davis--Bachelor of Science, Mechanical Engineering and Materials Science
- University of California, Davis Extension Program--Renewable Energy Systems

Professional Experience

2007 to Present-- Mechanical Engineer, Energy Facilities Siting Division - California Energy Commission

Performed analysis of generating capacity, reliability, efficiency, noise, and the mechanical, civil/structural and geotechnical engineering aspects of power plant siting cases.

2006 to 2007--Energy Analyst, Fuels & Transportation Division - California Energy Commission

Performed analysis of use potential and environmental effects of emerging non-petroleum fuels, including compressed natural gas, biomass, hydrogen and electricity, in heavy and light duty transportation vehicles. Contributor to Energy Commission's alternative fuels plan.

DECLARATION OF
Kristin Ford

I**,** Kristin Ford declare as follows:

1. I am presently employed by the California Energy Commission in the Facilities Siting Office of the Energy Facilities Siting Division as a Planner I.

2. I prepared staff testimony for the Calico Solar Project based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

3. The information in the project description is correct, as the subject site will be owned by Stirling Energy Systems.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 3/25/10 Signed: Original signed by K. Ford

At: Sacramento, California

Kristin S. Ford

Experience

Environmental Planner November 2009 to Present
California Energy Commission, Sacramento, California
- Conduct CEQA-equivalent environmental review for proposed and existing power plants.
- Write analysis for Socioeconomics, Traffic, Visual Resources and Land Use sections for staff assessments.
- Provide expert witness testimony on Socioeconomics, Traffic, Visual Resources and Land Use issues at Energy Commission hearings.

Assistant Planner June 2006 to July 2009
City of Sacramento, Environmental Planning Services, Sacramento, California
- Evaluated, prepared and supervised the preparation of a variety of environmental documents under the California Environmental Quality Act (CEQA); analyzed data and made recommendations on complex planning matters involving issues related to land use, traffic, utilities, aesthetics, noise, energy, historic preservation, air quality and biological resources.
- Prepared, researched and reviewed Mitigation Monitoring Plans per CEQA, the California State & Federal Endangered Species Acts (CESA & FESA), the Clean Water Act (CWA), the Migratory Bird Treaty Act (MBTA) and the Natomas Basin Habitat Conservation Plan.
- Conducted biological resources site assessments for proposed development projects. Determined the need for preparation and/or review of specific studies, such as Wetland Delineations, Nesting Raptor Surveys, and Arborist Reports, to identify resources and provide mitigation measures.
- Coordinated the release of the City of Sacramento's 2030 General Plan Draft/Final Environmental Impact Report between various City departments, the Planning Commission, City Council and the consultant team.

Environmental Coordinator August 2005 to June 2006
Nella Oil Company, Auburn, California
- Coordinated company-wide environmental regulatory compliance activities, including:
  - site investigations;
  - underground fuel-storage tank environmental compliance recommendations and subsequent tank upgrades; and
  - hazardous waste removal.
- Maintained and managed Air Quality Management District and Environmental Health Department permits for 60+ gas stations.

Student Assistant March 2005 to August 2005
California Energy Commission, Sacramento, California
- Conducted research and provided technical writing support to Biology and Water Departments for the annual Energy Policy Report impact analyses.
- Maintained and managed compliance files on power plant facilities.

Student Assistant June 2004 to March 2005
Central Valley Regional Water Quality Control Board, Sacramento, California
- Supported National Pollutant Discharge Elimination System (NPDES) staff by:
  - maintaining waste water treatment plant discharge self-monitoring reports and case files; and
  - analyzed (Amador, Sutter, Placer and Yolo county) wastewater treatment plant monthly monitoring reports for possible permit violations.

Education

2005 **Bachelor of Arts, Environmental Studies**, *California State University, Sacramento*
2001 **Associate of Arts, Liberal Studies**, *Allan Hancock College, Santa Maria, California*

DECLARATION OF
Marie McLean

I**,** Marie McLean, declare as follows:

1. I am presently employed by the California Energy Commission in the Environmental Office of the Siting, Transmission, and Environmental Protection Division as an Environmental Planner ll.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on Traffic and Transportation for the Staff Assessment for the Calico Solar Project (08-AFC-13) based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 03/29/10______________ Signed: Original signed by M. McLean

At: Sacramento, California

MARIE McLEAN

QUALIFICATIONS SUMMARY

Twenty years experience in the field of environmental research, analysis, and planning, with specific emphasis on the economics of water, energy, and land use and its social, visual, and cultural ramifications. Specific projects involved (1) assessing economic costs and benefits of water delivery contracts and energy sales; (2) conducting and presenting visual analyses of historic and other local, state, and federal resources; (3) preparing local, state, and federal resource assessment forms; (4) determining and communicating benefits and costs of proposed development projects (housing, energy, and water) on the social and economic life of communities in which they are located; and (5) as member of local design review, historic preservation, and housing boards, recommended programs and policies and monitored their implementation.

RECENT PROFESSIONAL EXPERIENCE

California Energy Commission, Planner II, Environmental Office-Facilities Siting, January 2008—present.

Conduct technical analyses for complex facility siting cases and planning studies in the area of socioeconomics and visual resources.

Electricity Oversight Board; June 1, 2007—December 31, 2008.

Developed, conducted, and presented economic studies on energy markets and transmission projects; California Independent System Operator (CAISO) market redesign and technology upgrade program; and investigated, analyzed, and reported the effects of existing and proposed energy programs on supply, demand, and rates.

California Department of Water Resources, State Water Project Analysis Office,
June 2001—July 31, 2007.

Developed and implemented complex analyses of the social, economic, and financial ramifications of contracted and proposed water deliveries and transfers and changes to valuation methods for selling energy in deregulated markets. Researched, identified, and reported on market activities in energy and water and their economic effects on ratepayers.

EDUCATION

Bachelor of Arts, Economics, California State University, Sacramento, 1983

DECLARATION OF
Dr.Obed Odoemelam

I, **Obed Odoemelam** declare as follows:

1. I am presently employed by the California Energy Commission in the Facilities Siting, Transmission, and Environmental Protection Division as a Staff Toxicologist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Transmission Line safety and Nuisance** for Calico Solar Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 3/29/10 Signed: Original signed by O. Odoemelam

At: Sacramento, California

RESUME

DR. OBED ODOEMELAM

EDUCATION:

1979-1981 University of California, Davis, California. Ph.D., Ecotoxicology

1976-1978 University of Wisconsin, Eau Claire, Wisconsin. M.S., Biology.

1972-1976 University of Wisconsin, Eau Claire, Wisconsin. B.S., Biology

EXPERIENCE:

1989
The Present: California Energy Commission. Staff Toxicologist.

Responsible for the technical oversight of staffs from all Divisions in the Commission as well as outside consultants or University researchers who manage or conduct multi-disciplinary research in support of Commission programs. Research is in the following program areas: Energy conservation-related indoor pollution, power plant-related outdoor pollution, power plant-related waste management, alternative fuels-related health effects, waste water treatment, and the health effects of electromagnetic fields. Serve as scientific adviser to Commissioners and Commission staff on issues related to energy conservation. Serve on statewide advisory panels on issues related to multiple chemical sensitivity, ventilation standards, electromagnetic field regulation, health risk assessment, and outdoor pollution control technology. Testify as an expert witness at Commission hearings and before the California legislature on health issues related to energy development and conservation. Review research proposals and findings for policy implications, interact with federal and state agencies and industry on the establishment of exposure limits for environmental pollutants, and prepare reports for publication.

1985-1989 California Energy Commission.

Responsible for assessing the potential impacts of criteria and noncriteria pollutants and hazardous wastes associated with the construction, operation and decommissioning of specific power plant projects. Testified before the Commission in the power plant certification process, and interacted with federal and state agencies on the establishment of environmental limits for air and water pollutants.

1983-1985 California Department of Food and Agriculture.

Environmental Health Specialist.

Evaluated pesticide registration data regarding the health and environmental effects of agricultural chemicals. Prepared reports for public information in connection with the eradication of specific agricultural pests in California.

DECLARATION OF
William D. Kanemoto

I**,** William Kanemoto**,** declare as follows:

1. I am presently under contract with Aspen Environmental Group to provide environmental technical assistance to the California Energy Commission. Under Contract No. 700-05-002, I am serving as a Visual Resource Specialist to provide Peak Workload Support for the Energy Facility Siting Program and for the Energy Planning Program.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the final staff testimony on Visual Resources for the Calico (SES 1) Power Plant Licensing Case based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared visual simulation of project vapor plumes is valid and accurate with respect to the data provided to me.

5. I am personally familiar with the facts and conclusions applicable to the vapor plume simulations and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 22, 2010 Signed: [signature]

At: Oakland, California

William Kanemoto
<u>Visual Resource/Aesthetics Analyst</u>

Academic Background:

M. Landscape Architecture, University of Michigan, Ann Arbor, 1982
B.A. Liberal Arts (Honors), University of California, Santa Cruz, 1973

Professional Experience:

Principal
William Kanemoto & Associates, Oakland, California, 1993 - Present

William Kanemoto is Principal of William Kanemoto & Associates, an environmental consulting practice specializing in visual analysis and computer visualization in the context of environmental review. In this capacity he has served as principal investigator for visual analysis and simulation on a wide range of major infrastructure and development projects, including the High Desert Power Project AFC, Port of Oakland Expansion EIS, Route 4 East/Pittsburg BART EIS, FMC Substation and Transmission Line PEA, and numerous other infrastructure and transportation projects. Mr. Kanemoto received recognition from the California Association of Environmental Professionals for visual analysis, computer simulation, animation, and video production for the Stanford Sand Hill Road Projects EIR, prepared by EIP Associates and judged 'Best State-Wide EIR of 1997'.

Associate Director
Environmental Simulation Laboratory,
Institute of Urban and Regional Development,
Center for Environmental Design Research
University of California, Berkeley, 1994 - 2000

Instructed graduate students in the College of Environmental Design, U.C. Berkeley, served as consultant on various major planning projects in the San Francisco Bay Area, and conducted design collaborations with counterparts at Keio University and ARK CyberUniversity in Tokyo, Japan via the Internet.

Principal Investigator/Project Manager
Dames & Moore, San Francisco/Oakland, California, 1988-1992

Served as principal investigator of numerous visual analyses of major infrastructure projects throughout the U.S., in Europe, and in Asia. Gained extensive familiarity with the application of a wide range of professionally accepted visual assessment techniques in the context of CEQA, NEPA, and related regulatory requirements of the CPUC, CEC, FERC, DOT, U.S. Forest Service, BLM, and other agencies.

Project Manager
LSA Associates, Pt. Richmond, California, 1987-1988

Project manager and planner on environmental impact reports for various residential and commercial development projects in northern California.

Environmental Planner
Holton Associates, Berkeley, California, 1984-1987

Preparation of various resource and regulatory studies including EIRs, FERC Exhibit E, Section 404 alternative analyses, riparian restoration studies, and cumulative impact methodology studies for EPRI and Sierra County, CA.

DECLARATION OF JAMES JEWELL

I, **James Jewell** declare as follows:

1. I am presently employed by the California Energy Commission in the Facilities Siting Office of the Systems Assessments and Facilities Siting Division as a Illumination Specialist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Glint and Glare** for the **Calico Solar Project** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony and errata is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and errata and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 03/29/10 Signed: Original signed by J. Jewell

At: Sacramento, CA

JAMES EARL JEWELL, LC, ATF, IES, CIES (Hon), SAH

EDUCATION:

BA, College of the Pacific
MFA, School of Drama, Yale University

EMPLOYMENT:

1957-67, Engineering Division, Holzmueller Corporation
1967-69, Theatre Consulting Service, Bolt, Beranek & Newman
1969-87, Lighting Services Administrator, Pacific Gas & Electric Company
1987- present, Consultant in Lighting
Since 1993 in association with Alan Lindsley, AIA, IES

PROFESSIONAL ACTIVITIES:

Illuminating Engineering Society
President – 1984-85
Vice President – 1983-84
Director – 1979-86
Office Lighting Committee – 1976 - present, Chairman, 1978-80
Roadway Lighting Committee – 1974 – present, Chairman, 1990-92
Regional Energy Committee Chairman – 1974-76, 1978-84
Energy Advisory Committee – 1973-75
Technical Missions – China – 1984, 1987, 1988

European Lighting Congress: Strasbourg, 1969; Florence, 1977; Granada, 1981; Lausanne, 1985; Budapest, 1989; Edinburgh, 1993; Berlin, 2001

Pacific Basin Lighting Congress: Chairman, Shanghai, 1989; Bangkok, 1993; Nagoya, 1997; Organizing Committee, Delhi, 2002; Cairns, 2005; Bangkok, 2009

Edison Electric Institute: Street Lighting Committee – 1971-87, Chairman 1979-81

International Commission on Illumination:
Board of Administration – 1983-87, 1987-91
Division Four (Lighting for Transport)
Technical Committee 4.34 -- 1980-95
Technical Committee 4.25 -- 1992-99

Professional Light Designers Convention: London, 2007; Berlin, 2009

Expert Witness – Admitted as an expert witness in the Superior Courts of Amador, Contra Costa, and San Francisco Counties.

AWARDS AND HONOURS:

IES Regional Technical Award – 1985
IES Distinguished Service Award – 1986
College of Fellows of the American Theatre --1988
Honourary Member, China IES – 1989
CIE Distinguished Service Award – 1991
IES Louis B. Marks Award – 1993

CERTIFICATION:

LC – Granted in 1990 by the National Council on the Qualification of Lighting Professionals

RELEVENT WORK EXPEREIENCE:

With PG&E appeared before CEC Committee and Staff on lighting issues with respect to the siting and licensing of Geysers steam power plants.

On behalf of PG&E and the IES appeared before the Simonson Committee to consult on the development of the lighting portions of Title 24.

On behalf of PG&E and the IES appeared before the CEC on numerous occasions to support the development of fluorescent lamp promotional programs and to assist in developing rigorous lighting ballast standards for California and on other lighting energy management issues.

While at PG&E supported and oversaw funding for projects on daylight following and electronic ballasts. Projects supported by both the DOE and CEC.

In practice as a lighting consultant worked with private clients and jurisdictions on matters concerned with light trespass and "intrusive" lighting.

JEJewell
19 February, 2010

DECLARATION OF
Ellen Townsend-Hough

I, **Ellen Townsend-Hough** declare as follows:

1. I am presently employed by the California Energy Commission in the Engineering Office of the Siting Transmission& Environmental Protection Division as an Associate Mechanical Engineer.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on Waste Management for the Calico Solar Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 3/29/10 Signed: Original signed by E. Townsend-Hough

At: Sacramento, California

Ellen Townsend-Hough

SUMMARY

I am a chemical engineer with over 20 years of experience. My professional career has afforded me many unique growth and development opportunities. Working knowledge of the California Environmental Quality Act. Strength in analyzing and performing complex engineering analyses. Also worked as a policy advisor to a decision-maker for three years.

PROFESSIONAL EXPERIENCE

Writing

- Write letters, memos, negative declarations, environmental impact reports that require technical evaluation of mechanical engineering and environmental aspects of pollution control systems, environmental impacts, public health issues and worker safety.

Technical Analysis and Presentation

- Performs mechanical engineering analysis of designs for complex mechanical engineering analysis of designs for systems such as combustion chambers and steam boilers, turbine generators, heat transfer systems, air quality abatement systems, cooling water tower systems, pumps and control systems

- Review and process compliance submittals in accordance with the California Environmental Quality Act, the Warren Alquist Act, the Federal Clean Air Act and the California and Federal Occupational Health and Safety Acts to assure compliance of projects

- Provides licensing recommendations and function as an expert witness in regulatory hearings.

- Provide public health impact analysis to assess the potential for impacts associated with project related air toxic/non-criteria pollutant emissions.

- Evaluate the potential of public exposure to pollutant emissions during routine operation and during incidents due to accidents or control equipment failure

- Provide an engineering analysis examining the likelihood of compliance with the design criteria for power plants and also examine site specific potential significant adverse environmental impacts

Technical Skills

- Establish mitigation that reduces the potential for human exposure to levels which would not result in significant health impact or health risk in any segment of the exposed population.

- Assist with on-site audits and inspection to assure compliance with Commission decisions.

- Review and evaluate the pollution control technology applied to thermal power plants and other industrial energy conversion technologies.

- Work with the following software applications: WORD, Excel, and PowerPoint.

Policy Advisor

- Provided policy, administrative and technical advice to the Commissioner Robert Pernell. My work with the Commissioner focused on the policy and environmental issues related to the Commission's power plant licensing, research and development and export programs.

- Track and provide research on varied California Energy Commission (CEC) programs. Prepare analysis of economic, environmental and public health impacts of programs, proposals and other Commission business items.

- Represent Commissioner's position in policy arenas and power plant siting discussions.

- Write and review comments articulating commission positions before other regulatory bodies including Air Resources Board, California Public Utilities Commission, and the Coastal Commission.

- Wrote speeches for the Commissioner's presentations.

EMPLOYMENT HISTORY

2002-Present	Associate Mechanical Engineer	CEC Sacramento CA
1999-2002	Advisor to Commissioner	CEC Sacramento CA
1989-1999	Associate Mechanical Engineer	CEC Sacramento CA
1992-1993	Managing Partner	EnvironNet Sacramento CA
1988-1989	Sales Engineering Representative	Honeywell Inc Commerce CA
`1987-1988	Chemical Engineer	Groundwater Technology Torrance CA
1985-1986	Technical Marketing Engineer	Personal Computer Engineers Los Angeles CA
1985-1985	Energy Systems Engineer	Southern California Gas Company Anaheim CA
1980-1985	Design and Cogeneration Engineer	Southern California Edison Rosemead CA
1975-1980	Student Chemical Engineer	Gulf Oil Company Pittsburgh PA

EDUCATION

Bachelor of Science, Chemical Engineering
Drexel University, Philadelphia Pennsylvania

Continuing Education

Hazardous Material Management Certificate, University California Davis
Urban Redevelopment and Environmental Law, University of California Berkley
Analytical Skills, California Department of Personnel Administration (DPA) Training Center
Legislative Process/Bill Analysis, DPA Training Center
Federally Certified Environmental Justice Trainer

References furnished upon request.

DECLARATION OF
SHAHAB KHOSHMASHRAB

I**, SHAHAB KHOSHMASHRAB**, declare as follows:

1. I am presently employed by the California Energy Commission in the **ENGINEERING OFFICE** of the Facilities Siting Division as a **MECHANICAL ENGINEER**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I participated in the preparation of the staff testimony on **FACILITY DESIGN**, for the **Calico Solar Project** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 23, 2010 Signed: Original signed by S. Khoshmshrab

At: Sacramento, California

DECLARATION OF
SHAHAB KHOSHMASHRAB

I**, SHAHAB KHOSHMASHRAB**, declare as follows:

1. I am presently employed by the California Energy Commission in the **ENGINEERING OFFICE** of the Facilities Siting Division as a **MECHANICAL ENGINEER**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I participated in the preparation of the staff testimony on **Power Plant Efficiency**, for the **Calico Solar Project** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 23, 2010   Signed: Original signed by S. Khoshmshrab

At: Sacramento, California

DECLARATION OF
SHAHAB KHOSHMASHRAB

I**, SHAHAB KHOSHMASHRAB**, declare as follows:

1. I am presently employed by the California Energy Commission in the **ENGINEERING OFFICE** of the Facilities Siting Division as a **MECHANICAL ENGINEER**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I participated in the preparation of the staff testimony on **Power Plant Reliability**, for the **Calico Solar Project** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 23, 2010 Signed: Original signed by S. Khoshmshrab

At: Sacramento, California

Shahab Khoshmashrab
Mechanical Engineer

Experience Summary

Nine years experience in the Mechanical, Civil, Structural, and Manufacturing Engineering fields involving engineering and manufacturing of various mechanical components and building structures. This experience includes QA/QC, construction/licensing of electric generating power plants, analysis of noise pollution, and engineering and policy analysis of thermal power plant regulatory issues.

Education

- California State University, Sacramento-- Bachelor of Science, Mechanical Engineering
- Registered Professional Engineer (Mechanical), California

Professional Experience

2001-2004--Mechanical Engineer, Systems Assessment and Facilities Siting– California Energy Commission

Performed analysis of generating capacity, reliability, efficiency, noise and vibration, and the mechanical, civil/structural and geotechnical engineering aspects of power plant siting cases.

1998-2001--Structural Engineer – Rankin & Rankin

Engineered concrete foundations, structural steel and sheet metal of various building structures including energy related structures such as fuel islands. Performed energy analysis/calculations of such structures and produced structural engineering detail drawings.

1995-1998--Manufacturing Engineer – Carpenter Advanced Technologies

Managed manufacturing projects of various mechanical components used in high tech medical and engineering equipment. Directed fabrication and inspection of first articles. Wrote and implemented QA/QC procedures and occupational safety procedures. Conducted developmental research of the most advanced manufacturing machines and processes including writing of formal reports. Developed project cost analysis. Developed/improved manufacturing processes.

DECLARATION OF
Sudath A. Edirisuriya

I, Sudath A.Edirisuriya declare as follows:

I am presently employed by the California Energy Commission in the Engineering Office of the Systems Assessments and Facilities Siting Division as an Electrical Engineer.

A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

I helped prepare the staff testimony on Transmission System Engineering for the Calico Solar Energy Project based on my independent analysis and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.

I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Date: March 29, 2010. Signed: Sudath A.Edirisuriya

At: Sacramento, California

Sudath A. Edirisuriya
1916 Ackleton Way
Roseville CA 95661 **Phone 916-654-4851**

EDUCATION:

Bachelor of Science in Electrical Engineering at California State University Fullerton

ATTAINMENTS:

Member of the Professional Engineers in California Government
Vice President Electrical Engineering Society-California State University Fullerton.

EXPERIENCE:

November-2001 to Present: - Associate Electrical Engineer, System Assessment and Facilities Siting Division, California Energy Commission.
Working in the Transmission System Engineering unit on licensing generation projects. Work involves evaluating generation interconnection studies (SIS and FS), their reliability and environmental impacts on transmission system, preparing staff assessment reports, presenting testimony. Perform reliability studies and coordinating data and technical activities with utilities, California ISO and other agencies. Conduct and perform planning studies and contingency analysis including power flow, short-circuit, transient, and post-transient analysis to maintain reliable operation of the power system. Understanding of regulatory and reliability guidelines, WECC and NERC planning and operation criteria, CPUC and FERC requirements. Review technical analyses for WECC/CA ISO/PTO transmission systems and proposed system additions; and provide support for regulatory filings.

June-1998 to November-2001: - Project Electrical Engineer, Design Electrical Engineering Section, Department of Transportation, California.
Electrical Engineering knowledge and skills in the design, construction and maintenance of California state work projects involving all the public work areas; contract administration, construction management, plan checking, field engineering and provide liaison with consultants, developers, and contractors. Plan review in facility constructions, highway lighting, sign lighting, rest area lighting, preparation of project reports, cooperative agreements, review plans for compliance of construction and design guide lines for national electrical code, standards and ordinance. Review process included breaker relay coordination, detail wiring diagrams, layout details, service coordination, load, conductor sizes, derated ampacity, voltage drop calculations, harmonic and flicker determination.

June-1993 to May-1998:- Substation Electrical Engineer, City of Anaheim, California.
Performed protective relay system application, design and setting determination in Transmission & Distribution Substation. Understanding of principles of selective coordination system protection and controls for Electric Utility Equipment. Understanding of Power theory and Analysis of symmetrical components. Ability to review engineering plans, specifications, estimates and computation for Electrical

Utility Projects. Practices of Electrical Engineering design, to include application of Electro-mechanical and solid state relays in Electrical Power Systems. Software skills in RNPDC (Fuse Coordination Program), Capacitor Bank allocation program, and GE Load Flow Program. Design projects using CAD, Excel spread sheets including cost estimates, wiring diagrams, material specifications and field coordination.

Performed underground service design 12kV and 4kV duct banks; pole riser; getaway upgrade; voltage drop calculation, ampacity calculation and wiring diagrams. Design and maintenance of substations in City Electrical Utility System. Upgrade Station Light and power transformers; upgrade capacitor banks; replacement of 12kV-4kV power circuits; Breakers at Metal Clad Switchgear. Design one-line diagrams; three line diagrams; grounding circuits; schematics; coordination of relay settings; conduit and material list preparation. Calculation of derated ampacity; inrush current, short circuit current.

DECLARATION OF
Mark Hesters

I**, Mark Hesters** declare as follows:

1. I am presently employed by the California Energy Commission in the **Siting, Transmission and Environmental Protection Division** as a Senior Electrical Engineer.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Transmission System Engineering**, for the **Calico** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 29, 2010 Signed: Original signed by M. Hesters

At: Sacramento, California

Mark Hesters

916-654-5049
mark.hesters@energy.state.ca.us

Qualifications

- Analyzed the reliability impacts of electric power plants for nine years.
- As an expert witness, produced written and oral testimony in numerous California Energy Commission proceedings on power plant licensing.
- Expertise in power flow models (GE PSLF and PowerWorld), production cost models (GE MAPS), Microsoft word-processing, spreadsheet and database programs.
- Contributing author to many California Energy Commission reports.
- Represented the Energy Commission in the development of electric reliability and planning standards for California.

Experience

Senior Electrical Engineer

2005-Present California Energy Commission, Sacramento, CA

- Program manager of the transmission system engineering analysis for new generator Applications of Certification.
- Lead the development of transmission data collection regulations.
- Overhauled the transmission data adequacy regulations for the Energy Commission's power plant certification process.
- Participated in the analysis of regional transmission projects.
- Technical lead for Commission in regional planning groups.
- Energy Commission representative to the Western Electric Coordinating Council Operations Committee.

Associate Electrical Engineer

1998–2005 California Energy Commission, Sacramento, CA

- Lead transmission systems analyst for power plant licensing under 12-month, 6-month and 21-day licensing processes.
- Provided expert witness testimony on the potential transmission impacts of new power plants in California Energy Commission licensing hearings.
- Authored chapters for California Energy Commission staff reports on regional transmission issues.
- Studied the economics of transmission projects using electricity production simulation tools.
- Analyzed transmission systems using the GE PSLF and PowerWorld load flow models.
- Collected and evaluated transmission data for California and the Western United States

Electric Generation Systems Specialist

1990–1998 California Energy Commission, Sacramento, CA

- Lead generation planner for southern California utilities.
- Analyzed electric generation systems using complex simulation tools.
- Provided analysis on the impact of resource plans on air quality and electricity costs for California Energy Commission reports.
- Developed modeling characteristics for emerging technologies.
- Evaluated resource plans.

Education

1985–1989 University of California at Davis Davis, CA

- B.S., Environmental Policy Analysis and Planning

DECLARATION OF
MARY DYAS

I, **MARY DYAS** declare as follows:

1. I am presently employed by the California Energy Commission in the **SITING AND COMPLIANCE OFFICE** of the Siting Transmission and Environmental Protection Division as a **COMLPIANCE PROJECT MANAGER**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **JOINT AGENCY GENERAL CONDITIONS INCLUDING COMPLIANCE MONITORING AND CLOSURE PLAN**, for the **CALICO SOLAR PROJECT** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: February 23, 2010 Signed: M Dyas

At: Sacramento, California

MARY DYAS

CALIFORNIA ENERGY COMMISSION – COMPLIANCE PROJECT MANAGER

PROFESSIONAL EXPERIENCE

Planner II/III – Energy Facilities Compliance Project Manager *05/01/2008 to Present*
Siting Unit / Siting and Compliance Office, California Energy Commission, Sacramento, California

Compliance Project Manager—Provide oversight of energy facility construction and operation activities to ensure compliance with conditions of certification. Function as team leader for all compliance monitoring activities, processing of post-certification amendments, complaints, and facility closures.

Currently acting as working team leader on projects filed with the Energy Commission including renewable energy projects (SES Solar One and Solar Two), transmission line projects (Blythe Transmission Line), and natural gas-fired energy projects (Russell City Energy Center) in the licensing, construction and operational phases of each project.

Planner I/II – Energy Facilities Siting Project Manager *01/18/2006 to 04/30/2008*
Siting Unit / Siting and Compliance Office, California Energy Commission, Sacramento, California

Siting Project Manager – Provide day-to-day management of complex and controversial energy facility siting projects and renewable solar projects, including the Carrizo Energy Solar Farm Project, Bullard Energy Center, El Centro Unit 3 Repower Project and Chevron Replacement Project. Planning, organizing and directing the work of an interdisciplinary environmental and engineering staff team engaged in the review of complex or controversial energy facility siting Applications for Certification.

Energy Analyst / Associate Energy Specialist – LNG Research *09/27/2002 to 01/17/2006*
Natural Gas Office / Transportation Division, California Energy Commission, Sacramento, California

Coordinating and assisting with the facilitation of monthly Interagency LNG Working Group meetings involving cooperative federal, state, and local agencies; assisting with report writing conducting LNG facility assessments; Organizing/facilitating public workshops and preparing status reports on LNG facility development for use by Commissioners and Governor's Office, as well as reviewing and analyzing LNG-related legislative bills in California; Creating and maintaining the Commission LNG webpage, researching and preparing numerous LNG fact sheets for public education, and gathering information on new technology, tracking new LNG projects, and LNG market information.

Office Technician / Energy Analyst - Assistant Siting Project Manager *06/27/2000 to 09/27/2002*
Siting Unit / Siting and Compliance Office, California Energy Commission, Sacramento, CA

Assisting energy facility project managers with organization of and conducting workshops and public meetings between staff and power plant developers, other governmental agencies, private organizations, and the public. Also assisting with the reviewing, evaluating and editing of project correspondence, reports, and testimony as well as assisting project secretaries, and Office Managers as needed. Also performed all the same duties in relation to the Emergency Power Plant Permitting 21-day, 4-month, 6-month and 12-month projects.

Office Technician / Energy Analyst - Assistant Siting Project Manager *06/27/2000 to 09/27/2002*
Siting Unit / Siting and Compliance Office, California Energy Commission, Sacramento, CA

Managing the Siting Peak Workload Contract, including the preparation of hundreds of work authorizations, invoices, and general coordination of work between technical staff and contractor and preparing associated budget information for office managers and executive office.

EDUCATION

Bachelor of Science degree in Biological Sciences *California State University, Sacramento ~ 1995*

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION
For the CALICO SOLAR (Formerly SES Solar One)

Docket No. 08-AFC-13

PROOF OF SERVICE
(Revised 3/11/10)

APPLICANT
Felicia Bellows,
Vice President of Development
Tessera Solar
4800 North Scottsdale Road,
Ste. 5500
Scottsdale, AZ 85251
felicia.bellows@tesserasolar.com

Camille Champion
Project Manager
Tessera Solar
4800 North Scottsdale Road,
Suite 5500
Scottsdale, AZ 85251
camille.champion@tesserasolar.com

CONSULTANT
Angela Leiba
AFC Project Manager
URS Corporation
1615 Murray Canyon Rd.,
Ste. 1000
San Diego, CA 92108
Angela_Leiba@URSCorp.com

APPLICANT'S COUNSEL
Allan J. Thompson
Attorney at Law
21 C Orinda Way #314
Orinda, CA 94563
allanori@comcast.net

INTERESTED AGENCIES
California ISO
e-recipient@caiso.com

Jim Stobaugh
BLM – Nevada State Office
P.O. Box 12000
Reno, NV 89520
jim_stobaugh@blm.gov

Rich Rotte, Project Manager
Bureau of Land Management
Barstow Field Office
2601 Barstow Road
Barstow, CA 92311
Richard_Rotte@blm.gov

Becky Jones
California Department of
Fish & Game
36431 41st Street East
Palmdale, CA 93552
dfgpalm@adelphia.net

INTERVENORS
California Unions for Reliable
Energy (CURE)
c/o: Loulena A. Miles,
Marc D. Joseph
Adams Broadwell Joseph &
Cardozo
601 Gateway Boulevard,
Ste. 1000
South San Francisco, CA 94080
lmiles@adamsbroadwell.com

Defenders of Wildlife
Joshua Basofin
1303 J Street, Suite 270
Sacramento, California 95814
e-mail service preferred
jbasofin@defenders.org

Basin and Range Watch
Laura Cunningham
Kevin Emmerich
P.O. Box 70
Beatty, NV 89003
atomictoadranch@netzero.net

Patrick C. Jackson
600 N. Darwood Avenue
San Dimas, CA 91773
e-mail service preferred
ochsjack@earthlink.net

ENERGY COMMISSION
ANTHONY EGGERT
Commissioner and Presiding Member
aeggert@energy.state.ca.us

JEFFREY D. BYRON
Commissioner and Associate Member
jbyron@energy.state.ca.us

Paul Kramer
Hearing Officer
pkramer@energy.state.ca.us

Kristy Chew, Adviser to
Commissioner Byron
kchew@energy.state.ca.us

Caryn Holmes, Staff Counsel
1516 9th Street, MS-14
Sacramento, California 95814
cholmes@energy.state.ca.us

Christopher Meyer
Project Manager
cmeyer@energy.state.ca.us

Jennifer Jennings
Public Adviser
publicadviser@energy.state.ca.us

*indicates change

DECLARATION OF SERVICE

I, April Albright declare that on March 30, 2010, I served and filed copies of the attached Staff Assessment and Draft Environmental Impact Statement. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: [www.energy.ca.gov/sitingcases/solarone].

The documents have been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

FOR SERVICE TO ALL OTHER PARTIES:

__✓__ sent link of the electronic document to all email addresses on the Proof of Service list;

______ by personal delivery;

__✓__ delivered CD on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date. Hard copies are available upon request.

AND

FOR FILING WITH THE ENERGY COMMISSION:

__✓__ sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (*preferred method*);

OR

______ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 08-AFC-13
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

Original signed by: ____________________
April Albright

*indicates change