C. ENVIRONMENTAL ANALYSIS

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[2]. These Conditions of Certification meet the Energy Commission's responsibility to comply with California Environmental Quality Act.

Staff has 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)[3] 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]).

---

[1] This analysis has been completed solely by Energy Commission staff and only reflects the findings and recommendations of Energy Commission staff. BLM will complete a separate Final Environmental Impact Statement for this project and the official federal findings and recommended mitigation measures will be provided in that document. Please see the Executive Summary of this Supplemental Staff Assessment (SSA) for more information regarding the separation of Energy Commission and BLM environmental review process.

[2] Staff's conclusions provided in the SA/DEIS have not changed. This Supplemental Staff Assessment (SSA) includes information regarding minor changes to the project description and emissions and describes a project related future action. The applicant provided comments on the Staff Assessment/Draft Environmental Impact Statement (SA/DEIS). Revisions to the conditions and editorial revisions requested by the applicant, acceptable to staff, along with other revisions determined necessary based on other comments received or for continuity with other solar project recommended conditions of certification have been included in this SSA.

[3] 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.

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 originally proposed project would have 34,000 solar dish Stirling systems, occupying 8,230 acres of public land managed by 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 Supplemental Staff Assessment (SSA) includes staff's assessment of the applicant's May and June 2010 Supplements to the Calico Solar (formerly SES Solar One) Application for Certification (TS 2010ab, TS 2010am), which includes changes in water supply, project boundary and acreage (reduced to 6,215 acres), and source of hydrogen used in the Stirling engines. In general, these changes do not significantly affect the air quality analysis. Additionally, this SSA addresses applicant and other comments received to date on the SA/DEIS.

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

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.
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, establishes 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.

Applicable LORS	Description
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[4] 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 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.

[4] 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 form through reactions in the atmosphere that result in ozone, and sulfate and nitrate PM10/PM2.5.

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 National Environmental Policy Act (NEPA)[5] air quality analysis 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. A refined impact and mitigation analysis has been

[5] This is CEC staff's analysis approach that goes beyond the minimum procedural requirements of NEPA.

conducted per CEQA requirements, and that analysis is 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.

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 became 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.

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.

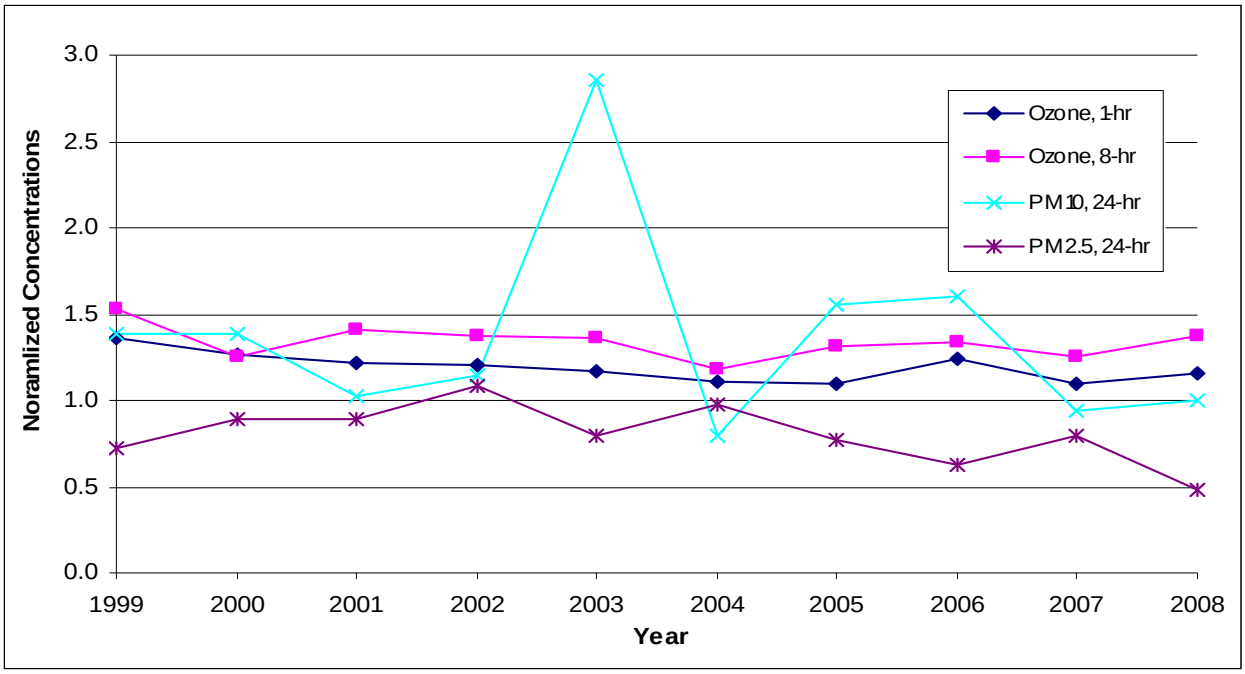
Ambient air quality monitoring data for ozone, PM10, PM2.5, CO, NO_2, and SO_2, compared to most restrictive applicable standards for the years between 2003 through 2008 (the last year that the complete annual data is currently available) at the most representative monitoring stations for each pollutant 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/m^3)

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	µg/m^3	143	40	78	80	47	50	50
PM10	Annual	µg/m^3	25.7	21.3	25.4	21.9	29.8	26.1	20
PM2.5 [a]	24 hours	µg/m^3	28	34	27	22	28	17	35
PM2.5	Annual	µg/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[6].

[6] 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[b]	Percent of Standard
NO_2	1 hour	154.4	339	46%
	1 hour Fed	129.6[c]	188	69%
	Annual	41.8	57	73%
PM10	24 hour	80	50	160%
	Annual	29.8	20	149%
PM2.5	24 hour [a]	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] PM 2.5 24-hour data shown in **Air Quality Table 4** are 98th percentile values which is the basis of the ambient air quality standard and the basis for determination of the recommended background concentration.
[b] The limiting AAQS is the most stringent of the CAAQS or NAAQS for that pollutant and averaging period.
[c] - This background level is the three year average of the 98th percentile of maximum daily 1-hour concentrations.

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.)[7].

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[8] and finds them to be reasonable considering the level of emissions mitigation now stipulated by the applicant. The applicant also provided additional modeling analysis to show compliance with the new federal 1-hour NO2 standard (TS 2010y). Staff has reviewed this analysis and has determined that it provides conservative impact results.

Project Description

The proposed project would be located on approximately 6,215[9] 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

[7] 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.

[8] 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).

[9] After this analysis was completed, on May 5, 2010 the applicant has modified the boundary of the facility by moving the northern project boundary south by a little more than one-half mile and providing a 4,000 foot wildlife corridor between the project and the Cady Mountains, reducing the project footprint from 8,230 acres to 6,215 acres. This smaller project site and shorter access roads should reduce overall average on-site construction vehicle mileage and thus reduce construction emissions.

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[10]. 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 2,327-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 configured in approximately 383 solar groups on 3,888-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.

The applicant has proposed minor modifications to the originally proposed project description noted above (TS 2010ab, TS 2010am), including:

- Alternative Water Supply
- Project Boundary Modification
- Hydrogen System Alternatives

The alternative water supply impacts the air quality discussion since this modified water source does not require truck or train delivery of water, reducing air quality emissions and impacts relative to the original project. The alternative water supply would come from the Well #3 on private lands immediately adjacent to the Project. The operating boundary modifications reduce the project footprint by approximately 2,015 acres by moving the northern project boundary south by a little more than one half mile and providing a 4,000 foot wildlife corridor between the project and the base of the Cady Mountains.

The hydrogen system was original described as a centralized system with onsite hydrogen generation. The applicant has identified that an alternative non-centralized distribution system, which retains the onsite hydrogen generation, may be used. The hydrogen would be distributed using the mirror washing trucks, so no additional maintenance trips/emissions are forecast to occur.

Project Emissions

Project Construction

The total duration of project construction for Calico Solar is estimated to be approximately 59 months[11] (TS 2010g). The construction duration would depend on the

[10] 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.

[11] 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.

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 off-road 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. 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.

The project construction emissions have not been updated by the applicant; however, on balance the construction emissions are expected to be minimally reduced due to the proposed modifications/alternatives since:

1) The rail delivery of water provided in the SA/DEIS is not longer required. Instead, water from Well #3 would be transported through an underground pipeline, which would be approximately 0.51 miles long.

2) The smaller project site and shorter access roads should reduce the overall average onsite construction vehicle mileage reducing construction emissions.

3) The hydrogen distribution system would no longer be constructed if the non-centralized distribution system alternative is used.

While there would be a minor increase in onsite construction emissions from the construction of the water pipeline, the overall construction emissions on balance are assumed to be minimally reduced by the elimination of water transportation and the effects of the smaller site footprint.

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.

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. Another source of onsite maintenance vehicle traffic is the maintenance of the power conversion units (PCUs), 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).

The project operation emissions have not been updated by the applicant; however, the operation emissions are expected to be minimally reduced due to the proposed modifications/alternatives since:

1) The rail delivery of water provided in the SA/DEIS is not longer required.

2) The smaller project site and shorter access roads should reduce the overall average onsite operation vehicle mileage reducing operation emissions.

The non-centralized hydrogen system would not increase vehicle trips/vehicle mileage and resulting operating emissions as it is proposed that the hydrogen cylinders be distributed by the mirror washing trucks. 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.

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).

As project construction and operational emissions are expected to be minimally reduced due to the latest proposed modifications/alternatives (TS 2010am), the worst-case overlapping construction/operation emissions are also expected to be minimally reduced.

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 revisions to the project do not substantially change the worst-case onsite construction emissions that were modeled and would actually reduce the onsite operation emissions due to the reduction in facility size and vehicle travel requirements. Therefore, the modeling assessment provided in the SA/DEIS remains valid. However, the applicant did provide an additional modeling analysis to show compliance with the new federal 1-hour NO_2 standard (TS 2010y). Staff has reviewed this analysis and has determined that it provides conservative impact results.

This new modeling analysis was conducted for operation[12]. The applicant remodeled operations 1-hour NOx emissions using a five year meteorological (Daggett Airport) and hourly ozone (Barstow) datasets, and added the maximum 1-hour modeled concentration (51.8 $\mu g/m^3$) with the three-year average 98th percentile background value (129.6 $\mu g/m^3$) determined for Barstow from 2006 to 2008. This maximum combined concentration (181.3 $\mu g/m^3$) was found to be below the new federal standard (188

[12] Staff is only reviewing compliance with this standard for operations per discussion with U.S. EPA Region 9 staff.

µg/m^3). This analysis used the first Tier, most conservative tier, of a four tier modeling approach that could have been used to show compliance with this standard.

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 emissions are 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 (µg/m^3)	Background (µg/m^3)	Total Impact (µg/m^3)	Standard (µg/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 gasoline 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[13] 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.

[13] The soil stabilizer product used would require prior approval by the Energy Commission.

- 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.
- Traffic speed on all unpaved site areas and sealed roads would be limited to 15 miles per hour.[14]
- 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 off-road 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.

[14] 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).

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 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.	51.8	154.4	206.2	339	61%
	1-hr Fed	51.8	129.6	181.3	188	96%
	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; and TS 2010y.

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™ 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[15]. 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.

[15] 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.

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 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[16].

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**).

C.1.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

This alternative is analyzed Alternative Section B.2 of this Supplemental Staff Assessment.

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

[16] Such as the State of California 33 percent Renewable Portfolio Standard (RPS) mandated under Executive Order S-14-08.

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 windblown 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.

<u>Regulation II – Permits</u>

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 RESPONSE TO PUBLIC AND AGENCY COMMENTS

No public or agency comments have been received to date on the Air Quality Section of the SA/DEIS.

C.1.13 MITIGATION MEASURES/ PROPOSED CONDITIONS OF CERTIFICATION

C.1.13.1 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).

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit to the 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 30 days prior to the start of any ground disturbance, the project owner shall submit the AQCMP to the CPM for approval. The AQCMP shall include effectiveness and environmental data for the proposed soil stabilizer. The CPM will

[17] Air quality benefits should not be confused with greenhouse gas/climate change benefits, which are discussed in Appendix AIR-1.

notify the project owner of any necessary modifications to the plan within 15 days from the date of receipt.

AQ-SC3 Construction Fugitive Dust Control: The AQCMM shall submit documentation to the 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 that would not comply with the performance standards identified in **AQ-SC4** from leaving the project site. The following fugitive dust mitigation measures shall be included in the Air Quality Construction Mitigation Plan (AQCMP) required by **AQ-SC2**, and any deviation from the AQCMP mitigation measures shall require prior CPM notification and approval.

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 or treated prior to taking initial deliveries.

b. All unpaved construction roads and unpaved operation and maintenance 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 to areas beyond where the soil stabilizers are being applied for dust control. All other disturbed areas in the project and linear construction sites shall be watered as frequently as necessary during grading (consistent with **BIO-7**); 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.

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.

Verification: The AQCMM shall provide the CPM a Monthly Compliance Report 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 CPM or AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

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 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 before that time.

Verification: The AQCMM shall provide the CPM a Monthly Compliance Report 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 or 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. The following off-road diesel construction equipment mitigation measures shall be included in the Air Quality Construction Mitigation Plan (AQCMP) required by **AQ-SC2**, and any deviation from the following mitigation measures shall require prior CPM notification and approval.

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 50 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 10 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.

Verification: The AQCMM shall include in the Monthly Compliance Report 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 or AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

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 vehicles that meet California on-road vehicle emission standards or appropriate U.S.EPA/California off-road engine emission standards for the latest model year available when obtained.

Verification: At least 30 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.

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 that would not comply with the performance standards identified in **AQ-SC4** 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 either 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 to areas beyond where the soil stabilizers are being applied for dust control.

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.

Verification: At least 30 days prior to start of commercial operation, the project owner shall submit to 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. Within 60 days after commercial operation, the project owner shall provide to 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 federal air permit.

The project owner shall submit to the CPM any modification to any federal permit proposed by the District or U.S. Environmental Protection Agency (U.S. EPA), and any revised federal permit issued by the District or U.S. EPA, for the project.

Verification: The project owner shall submit any ATC, PTO, and proposed federal 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 ATC/PTO documents and all federal air permits to the CPM within 15 days of receipt.

C.1.13.2 DISTRICT CONDITIONS

DISTRICT FINAL DETERMINATION OF COMPLIANCE CONDITIONS (MDAQMD 2010a)

District conditions **AQ-1** through **AQ-15** are CEQA-only required conditions.

Application No. 00010423 (Emergency Generator)

EQUIPMENT DESCRIPTION:

ARB Certified Tier III engine, 399 bhp, fueled on ARB diesel, 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.

Verification: 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.

Verification: 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 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:

5,000 gallon capacity gasoline tank with Phase I and Phase II vapor recovery.

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. 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.1.14 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.1.15 REFERENCES

ARB 2005 (California Air Resources Board). Characterization of Ambient PM10 and PM2.5 in California, Technical Report. http://www.arb.ca.gov/pm/pmmeasures/pmch05/pmch05.htm. June 2005.

ARB 2008 (California Air Resources Board). California Ambient Air Quality Data 1980-2006 on CD ROM. February, 2008.

ARB 2009a (California Air Resources Board). California Ambient Air Quality Standards available on ARB Website. http://www.arb.ca.gov/research/aaqs/aaqs2.pdf. Accessed November 2009.

ARB 2009b (California Air Resources Board). Air Designation Maps available on ARB website. http://www.arb.ca.gov/desig/adm/adm.htm. Accessed November 2009.

ARB 2009c (California Air Resources Board). California Ambient Air Quality Data Statistics available on ARB website. http://www.arb.ca.gov/adam/ welcome.html. Accessed October 2008.

CCR 2006. California Code of Regulations, Chapter 3 (CEQA Guidelines), Article 17, §§15250—15253 as amended on July 11, 2006.

CEC 2009f – California Energy Commission/C. Meyer (tn 52052). CEC and BLM Staff Data Requests Set 1, dated June 17, 2009. Submitted to CEC/Docket Unit on June 17, 2009.

CEC 2009m – California Energy Commission/C. Meyer (tn 53729). CEC and BLM Staff Data Requests Set 2, Part 1 (#s 128-141), dated October 22, 2009. Submitted to CEC/Docket Unit on October 22, 2009.

FR 2004 (Federal Register). Office of the Federal Register, National Archives and Records Administration. Vol. 69, No. 78, pg. 21800. April 22.

MDAQMD 2009b – Mojave Desert Air Quality Management District/A. De Salvio (tn 52078). Mojave Desert AQMD Preliminary Decision / Determination, dated June 18, 2009. Submitted to CEC/Docket Unit on June 18, 2009.

MDAQMD 2010a – Mojave Desert Air Quality Management District/A. De Salvio (tn 55110). Mojave Desert AQMD Final Decision/Determination on the Proposed Project, dated January 27, 2010. Submitted to CEC/Docket Unit on February 1, 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 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 2009v - URS/C. Lytle (tn 53096). Applicant's Air Quality and Public Health & Safety Modeling Files, dated August 31, 2009. Submitted to CEC/Docket Unit on August 31, 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.

TS 2010e - Tessera Solar/F. Bellows (tn 55182). Supplemental Information Regarding Proposed Project Description Changes, dated February 3, 2010. Submitted to CEC/Docket Unit on February 4, 2010.

TS 2010g - Tessera Solar/F. Bellows (tn 55390). Construction Milestone Schedule & Project Layout Figure, dated February 12, 2010. Submitted to CEC/Docket Unit on February 16, 2010.

TS 2010q – Tessera Solar. Applicant’s Revised Construction and Operation Emission Estimates for the Train Water Hauling Option. March 2010.

TS 2010am - Tessera Solar/ F. Bellows (tn 56700). Applicant's Submittal of a Supplement to the AFC, dated May 14, 2010. Submitted to CEC/Docket Unit on May 18, 2010.

TS 2010y - Tessera Solar/ F. Bellows (tn 56501). Applicant’s Federal N02 1 Hour Standard Modeling Analysis, dated April 30, 2010. Submitted to CEC/Docket Unit on April 30, 2010.

TS 2010ag - Tessera Solar/ F. Bellows (tn 57018). Applicant's Submittal of Alternative Site Layout #2 - Engineering Figure with SunCatcher Layout, and Revised

Project Boundary with 4000' Desert Tortoise Corridor Figure, dated June 2, 2010. Submitted to CEC/Docket Unit on June 2, 2010.

U.S.EPA 2009a - United States Environmental Protection Agency. The Green Book Nonattainment Areas for Criteria Pollutants. http://www.epa.gov/oar/oaqps/greenbk/index.html. Accessed November 2009.

U.S.EPA 2009b. - United States Environmental Protection Agency. AirData database ambient air quality data for Barstow and Trona, California. http://www.epa.gov/aqspubl1/annual_summary.html. Accessed October 2009.

WC (Weather Channel) 2009. Averages and records for Barstow, California. website: http://www.weather.com. Accessed November 2009.

APPENDIX AIR-1 - GREENHOUSE GAS EMISSIONS

Testimony of William Walters, P.E.

SUMMARY OF CONCLUSIONS[18]

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.

[18] Staff's conclusions provided in the SA/DEIS have not changed. This Supplemental Staff Assessment (SSA) includes information regarding minor changes to the project description (TS 2010ag and TS 2010am).

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 (U.S. EPA) 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). On May 13, 2010, U.S. EPA announced a final rule “tailoring” GHG emissions to Prevention of Significant Deterioration (PSD) requirements (U.S.EPA 2010) and raised the emissions threshold for rule applicability to 100,000 tons per year of carbon dioxide equivalent emissions.

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.
40 CFR Parts 51, 52, 70 and 71.	This rule "tailors" GHG emissions to PSD and Title V permitting applicability criteria.
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[19] 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 reductions to be achieved by 2020.[20] 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,

[19] 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.

[20] Governor Schwarzenegger has also issued Executive Order S-3-05 establishing a goal of 80% below 1990 levels by 2050.

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 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[21], 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[22] (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.[23] 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[24] include regulation, spinning reserve, non-

[21] Public Utilities Code § 8340 et seq.

[22] The Emission Performance Standard only applies to carbon dioxide, and does not include emissions of other greenhouse gases converted to carbon dioxide equivalent.

[23] See Rule at http://www.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/64072.htm

[24] See CEC 2009b, page 95.

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 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[25], 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.

The project construction GHG emissions have not been updated by the applicant, however the GHG emissions are expected to minimally decrease due to the proposed project modifications/alternatives (TS 2010am) for the same reasons as identified previously in the Air Quality discussion.

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

[25] 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.

maintenance fleet and employee trips, emergency generator engine, and sulfur hexafluoride emissions from new electrical component equipment.

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.

The project operation GHG emissions have not been updated by the applicant, however the GHG emissions are expected to minimally decrease due to the proposed project modifications/alternatives (TS 2010am) for the same reasons as identified previously in the Air Quality discussion.

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*[26]. **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 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[27].

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 6,215 acre proposed project (TS 2010ag), 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 9,198 MT of CO_2 per year, which would correspond to 0.005 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

[26] 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.

[27] 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.

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 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[28]. Energy Commission staff estimates that as much as 18,000 GWh of additional savings due to uncommitted energy efficiency programs may be forthcoming.[29] 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.

[28] Energy efficiency savings are already represented in the current Energy Commission demand forecast adopted December 2009 (CEC 2009c).

[29] 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.

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**.

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[30], 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

[30] 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.

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 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[31] (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.

[31] 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.

AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

This alternative is analyzed is the Alternative Section of this Supplemental Staff Assessment.

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.

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. The proposed project would also not be subject to the federal air quality permitting requirements of the new PSD and Title V Tailoring Rule that has a CO2E emissions trigger of 100,000 tons per year. Additionally, 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.

RESPONSE TO PUBLIC AND AGENCY COMMENTS

No public or agency comments have been received to date on the Greenhouse Gas Section of the SA/DEIS.

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.

REFERENCES

ARB 2006 – Air Resources Board. AB 32 Fact Sheets, California Global Warming Solutions Act of 2006 and Timeline. www.arb.ca.gov/cc/cc.htm. September 2006.

ARB 2008a – Air Resources Board. Instructional Guidance for Mandatory GHG Emissions Reporting. http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep-guid/ghg-rep-guid.htm. December 2008

ARB 2008b – California Air Resource Board. Climate Change, Proposed Scoping Plan a Framework for Change, Pursuant to AB 32. Released October 2008, approved

December 2008. <http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm>.

CalEPA 2006 – California Environmental Protection Agency. Climate Action Team Report to Governor Schwarzenegger and the Legislature. March, 2006. http://www.climatechange.ca.gov/climate_action_team/reports/2006report/2006-04-03_FINAL_CAT_REPORT.PDF

CEC 1998 – California Energy Commission. 1997 Global Climate Change, Greenhouse Gas Emissions Reduction Strategies for California, Vol. 2, Staff Report. 1998. http://www.climatechange.ca.gov/publications/97GLOBALVOL2.pdf

CEC 2003 – California Energy Commission. 2003 Integrated Energy Policy Report. December 2003. http://www.energy.ca.gov/reports/100-03-019F.pdf

CEC 2007 – California Energy Commission. 2007 Integrated Energy Policy Report – Scenario Analysis of California's Electricity System. http://www.energy.ca.gov/2007_energypolicy/documents/index.html. 2007.

CEC 2009a – California Energy Commission. Committee Report (08-GHG OII-01). Committee Guidance On Fulfilling California Environmental Quality Act Responsibilities For Greenhouse Gas Impacts In Power Plant Siting Applications. March 2009. http://www.energy.ca.gov/ghg_powerplants/documents/index.html.

CEC 2009b – California Energy Commission. Framework for Evaluating Greenhouse Gas Implications of Natural Gas-Fired Power Plants in California, CEC-700-2009-009, MRW and Associates. May 27, 2009. http://www.energy.ca.gov/2009publications/CEC-700-2009-009/CEC-700-2009-009.PDF

CEC 2009c – California Energy Commission, California Energy Demand 2010-2020 Adopted Forecast. December 2009. http://www.energy.ca.gov/2009publications/CEC-200-2009-012/CEC-200-2009-012-CMF.PDF

CEC 2009d – California Energy Commission, 2009 Integrated Energy Policy Report. December 16, 2009. http://www.energy.ca.gov/2009publications/CEC-100-2009-003/CEC-100-2009-003-CMF.PDF

CEC 2010 – California Energy Commission, 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), http://www.energy.ca.gov/2010publications/CEC-200-2010-001/index.html

CPUC 2008 – California Public Utilities Commission. Final Opinion on Greenhouse Gas Regulatory Strategies, Joint Agency proposed final opinion, publication # CEC-100-2008-007-D. Posted: September 12, 2008. http://www.energy.ca.gov/2008publications/CEC-100-2008-007/CEC-100-2008-007-D.PDF

Greenpeace 2005. Concentrated Solar Thermal Power – Now! Authors: Rainer Aringhoff and Georg Brakmann ESTIA, Dr. Michael Geyer (IEA SolarPACES), and Sven Teske Greenpeace International. September 2005. http://www.greenpeace.org/raw/content/international/press/reports/Concentrated-Solar-Thermal-Power.pdf.

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 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 2010i – Stirling Energy Systems (tn 55067). Applicant's Submittal of the Hydraulic and Hydrologic Study, dated January 23, 2010. Submitted to CEC/Docket Unit on January 28, 2010.

TS 2010g - Tessera Solar/F. Bellows (tn 55390). Construction Milestone Schedule & Project Layout Figure, dated February 12, 2010. Submitted to CEC/Docket Unit on February 16, 2010.

TS 2010am - Tessera Solar/ F. Bellows (tn 56700). Applicant's Submittal of a Supplement to the AFC, dated May 14, 2010. Submitted to CEC/Docket Unit on May 18, 2010.

TS 2010ag - Tessera Solar/ F. Bellows (tn 57018). Applicant's Submittal of Alternative Site Layout #2 - Engineering Figure with SunCatcher Layout, and Revised Project Boundary with 4000' Desert Tortoise Corridor Figure, dated June 2, 2010. Submitted to CEC/Docket Unit on June 2, 2010.

Wohlfahrt. et. al. 2008. Georg Wohlfahrt, Lynn F. Fenstermaker, and John A. Arnone III. Large annual net ecosystem CO_2 uptake of a Mojave Desert ecosystem. Global Change Biology, 2008 (14).

U.S.EPA 2009c - United States Environmental Protection Agency. Mandatory Reporting of Greenhouse Gases Rule. http://www.epa.gov/climatechange/emissions/ghgrulemaking. 2009.

U.S.EPA 2010 - United States Environmental Protection Agency. Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule. http://www.epa.gov/NSR/documents/20100413final.pdf. Accessed June 2010.

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 staff's analysis and conclusions about the impacts of the Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) and describes feasible mitigation measures for those impacts in accordance with the requirements of the California Environmental Quality Act (CEQA).

The summary provides a general overview of the project impacts to each of the biological resources that are present on the project site, have the potential to be present on the site, or are present off-site and have potential to be indirectly affected by the proposed project. This summary also describes potential mitigation measures that may be employed to avoid or reduce or potentially significant project impacts.

Vegetation and Rare Plants: The Calico Solar Project would have major impacts to the biological resources of the Newberry Springs/Ludlow area of the Mojave Desert, eliminating a broad expanse of relatively undisturbed Mojave Desert habitat and affecting all plant and wildlife species on the site, including special status species. Construction of the project would result in the permanent land use conversion of approximately 6,215 acres of the Mojave Desert to support operation of the solar field and appurtenant structures. The applicant has indicated that the project site includes 5,946 acres of creosote bush scrub (88.6 acres of this has been previously disturbed; this total also includes 3.3 acres of microphyll woodland described below); 242 acres of salt bush scrub; and 28 acres of developed areas (e.g., linear facilities such as unpaved roads).

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), vegetation mowing, introduction of shade and added moisture from mirror 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), power plant 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 native species. To reduce project effects on vegetation communities, staff has proposed Conditions of Certification **BIO-1** through **BIO-9** (Designated Biologist Selection, Designated Biologist Duties, Biological Monitor Qualifications, Biological Monitor Duties, Designated Biologist and Biological Monitor Authority, Worker Environmental Awareness Program, Biological Resources Mitigation Implementation and Monitoring Plan, Impact Avoidance and Minimization Measures, and Compliance Verification), **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 measures proposed by the applicant and has proposed supplemental measures in Condition of Certification **BIO-17** (Desert Tortoise Habitat Compensation).

The Calico Solar Project site supports several 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 on or near the proposed project site. Three of these species would be directly impacted by construction of the Calico Solar Project. Two others occur north of the proposed site boundary, within the previously-proposed project footprint. Staff concludes that the project as analyzed in this SSA would not affect those locations. Several of the special-status plant species reported in 2007 and 2008 were not found on the site during more thorough field surveys in 2010, and the earlier reports may have been based on misidentifications. Staff believes that impacts to small-flowered androstephium and Utah vine milkweed would be less than significant under CEQA, and that potentially significant impacts to white-margined beardtongue can be reduced below a level of significance with the implementation of staff's proposed impact avoidance and minimization measures. These measures are detailed in staff's proposed Conditions of Certification **BIO-1** through **BIO-11, BIO-12** (Special-Status Plant Impact Avoidance and Minimization)**,** and **BIO-17**.

Common Wildlife and Nesting Birds: Construction of the Calico Solar Project would 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 would also exclude many species from the entire 9.7 square mile site, resulting in loss of habitat and disruption of wildlife movement through the area. Noise levels would attenuate to approximately 60 dBA Leq at approximately 850 feet from the project fence line. Staff believes that noise may adversely affect wildlife, on the desert bajada at distance less than 850 feet from the project boundary. To reduce project effects on wildlife, staff has proposed Conditions of Certification **BIO-1** through **BIO-11**. Impacts to habitat loss would be compensated by the application of Condition of Certification **BIO-17** (Tortoise Habitat Compensation), and impacts to nesting birds would be avoided by the application of **BIO-19** (Pre-Construction Nest Surveys and Impact Avoidance Measures for Migratory Birds). 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 bird species. It is unknown how birds 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 bird collisions and mortality associated with these structures. Staff has proposed Condition of Certification **BIO-22** (Avian Protection Plan / Monitoring Bird Impacts from Solar Technology), which would require the applicant to prepare and implement an Avian Protection Plan, including 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 the degree to which the site may be used by native birds. 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. Many avian species avoid developed areas within urban settings; these species would likely also avoid the SunCatchers.

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 6215 acres of occupied desert tortoise habitat (4,075 acres of good quality habitat north of the Burlington Northern Santa Fe (BNSF) Railroad and 2,140 acres of less suitable habitat south of the BNSF tracks). In addition, the applicant has indicated that approximately 57 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 tortoises 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 mitigate impacts as required under the California Endangered Species Act (CESA), and requires a full mitigation finding, which usually contemplates a mitigation ratio greater than 1:1 to compensate for loss of high-value habitat (i.e., acquisition or preservation of more than 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 compensation ratio to meet the CESA full mitigation standard for good quality habitat such as that found on much 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. The BLM typically applies a 1:1 compensation requirement and pursues desert tortoise recovery goals 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 at a 3:1 ratio for loss of desert tortoise habitat north of the BNSF Railroad, and at a 1:1 ratio for habitat south of the railroad, to achieve full mitigation under CESA and to mitigate under CEQA for habitat loss and other significant impacts to desert tortoises. These mitigation ratios include the 1:1 mitigation ratio proposed by the BLM for impacts to desert tortoise habitat as well as additional mitigation proposed by the Energy Commission staff for impacts to the species. Staff has proposed that impacts to the area south of the BNSF Railroad be mitigated at a 1:1 ratio, because this area supports lower-quality habitat for the desert tortoise, and is enclosed to the north and south by the BNFS Railroad and the I-40, respectively. These barriers to tortoise movement in this area reduce effective habitat value.

Based on these ratios, the total acreage of desert tortoise compensation land acquisition and protection would be 14,365 acres. BLM's requirement for mitigation at a 1:1 ratio, which will include funding for BLM to implement desert tortoise habitat enhancement projects on BLM land, will also serve to satisfy a portion of the Energy Commission's compensation lands requirement. However, even with credit for mitigation provided to BLM, no fewer than 8,150 acres of compensation land will be

acquired, permanently protected and managed. Staff estimates total cost of acquisition, protection, and enhancement at $49,223,057.50.

Mojave Fringe-Toed Lizard: The Mojave fringe-toed lizard, a BLM sensitive species and California Species of Special Concern, occurs on the proposed project site, in areas of fine wind-blown (aeolian) sand deposits such as dunes and sandy patches within scrubby vegetation. Mojave fringe-toed lizards 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. 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 January and May 2010, staff noted that suitable habitat for this species was more extensive, and in May, observed several Mojave fringe-toed lizards outside the habitat area as originally reported. Staff estimates total acreage of suitable habitat, including sandy drainages and small patches of aeolian sand deposits and micro-dunes scattered throughout the southern portion of the site, as 164.7 acres. Staff believes that avoidance of habitat on-site would not prevent adverse impacts to Mojave fringe-toed lizards, due to habitat fragmentation, road kill, and increased predation (project facilities would serve as perch sites for foraging raptors, facilitating their ability to find and capture lizards and other ground-dwelling species). Staff has proposed Condition of Certification **BIO-13** (Mojave Fringe-Toed Lizard Mitigation)**,** which requires the acquisition of suitable dune/sand habitat at a 3:1 ratio to mitigate loss of suitable breeding habitat and at a 1:1 ratio for surrounding habitat suitable for foraging and cover. While this mitigation would reduce the project's impacts below a level of significance, a residual adverse impact remains, including a net loss of habitat and interruption of suitable east-west movement habitat.

Burrowing Owl: Construction of the proposed Calico Solar Project would result in direct loss of foraging habitat for the burrowing owl (a BLM sensitive species and a California Species of Special Concern). Two burrowing owls and eleven active burrows were recorded by the applicant north of the project boundary, near the toe of the Cady Mountains. Numerous additional burrows that could support burrowing owls were noted during desert tortoise surveys. Staff's proposed Condition of Certification **BIO-21** (Burrowing Owl Impact Avoidance and Minimization Measures) 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 (i.e., breeding vs. wintering), relocation methods would be implemented 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 also offset burrowing owl habitat loss provided the species occurs on the potential relocation sites.

Golden Eagle: Golden eagle, a BLM sensitive and California Fully Protected species (i.e., may not be taken or possessed as defined under State law), nests within 5 miles of the project site and has been observed foraging over the project area. The large scale land use conversion for the Calico Solar Project would in essence remove approximately 6,215 acres of foraging habitat in the region. This loss could substantially interfere with normal breeding, feeding, or sheltering behavior, by causing golden

eagles to forage more widely and therefore spend less time at or near their nests. This effect could be considered a “take,” pursuant to the federal Bald and Golden Eagle Protection Act. Staff has proposed Conditions of Certification **BIO-20** (Pre- Construction Surveys for Golden Eagles) to avoid impacts to nesting golden eagles and ensure project compliance with federal requirements. 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 Condition of Certification **BIO-22** (Avian Protection Plan / Monitoring Bird Impacts from Solar Technology). This condition requires a monitoring and reporting program that would document and report potential collision mortality from the proposed solar fields, and implementation of adaptive management measures as determined necessary.

Nelson’s Bighorn Sheep: Nelson’s bighorn sheep, a BLM sensitive species, is well known from the Cady Mountains, where its population consists of at least 300 animals (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. The northern boundary of the project area is on the upper bajada of the Cady Mountains, an area generally considered potential spring foraging habitat. The project area as analyzed in this SSA does not include year-around occupied habitat (DW 2010). Direct effects to Nelson’s bighorn sheep would include the loss of approximately 1,078 acres of spring foraging habitat. Indirect effects to habitat would include roughly 400 additional acres of spring foraging habitat that may be within the 850-foot 60 dB noise contour around the northern project boundary. Staff notes, however, that project flood control structures would be sited in this area and that significant noise sources (SunCatchers) may be several hundred feet south of the boundary, thus reducing the potential for off-site noise impacts. Additional indirect project effects would include avoidance of manmade structures and activity and surrounding habitat; increased disturbance from public traffic on a new northern boundary road ; and the introduction or spread of non-native, invasive plants. 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. The applicant has also proposed general monitoring of sheep behavior if Nelson’s bighorn sheep are seen within 200 feet of construction activities. Staff has incorporated the applicant’s proposal into staff’s proposed Condition of Certification **BIO-23** (Nelson’s Bighorn Sheep Mitigation) and recommended additional measures to require construction monitoring and the potential cessation of construction activities should sheep be present within 500 feet of the project area.

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 would cause 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 would 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-24** (American Badger and Desert Kit Fox Impact Avoidance and Minimization Measures) 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-24**. Staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan for desert tortoise habitat, would also offset the loss of habitat for these species and reduce the impact from habitat loss to less-than-significant levels under CEQA.

Jurisdictional Waters: The project would directly or indirectly affect numerous ephemeral washes on the Calico Solar Project site. There are 282.2 acres of State jurisdictional streambeds on the site. All of these streambeds would be directly or indirectly affected by project construction and operation, including upstream interruption and redirection of natural flows. In addition, washes downstream of the project would be subject to impacts from 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.

Staff has proposed Condition of Certification **BIO-26** (Streambed Impact Minimization and Compensation Measures), 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 the compensatory requirements, including replacement of smoke tree and catclaw acacia habitat, 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-26**, impacts to State jurisdictional waters associated with the desert washes would be mitigated to less-than-significant levels under CEQA. In addition, staff has identified Condition of Certification **BIO-28** (Channel Decommissioning and Reclamation Plan), to be implemented upon project termination.

Cumulative Impacts: Staff concludes that without mitigation, the Calico Solar Project will contribute 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 these 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. Even with the implementation of these measures, the project's contribution to cumulative significant impacts to Mojave fringe-toed lizard would be considerable because of the project's effect on habitat isolation and fragmentation, even after implementing staff's recommended conditions of certification.

Staff concludes that, with the incorporation of recommended Conditions of Certification **BIO-1** through **BIO-30**, the proposed Calico Solar Project would be in compliance with applicable Laws, Ordinances, Regulations, and Standards (LORS).

C.2.2 INTRODUCTION

This section of the Supplemental Staff Assessment (SSA) provides the California Energy Commission (Energy Commission) staff 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 identifies potentially significant impacts to biological resources, evaluates the adequacy of mitigation proposed by the applicant to address those impacts, 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. Subsequent to the publication of the SA/DEIS, the applicant submitted additional information that staff has used for the analysis contained within this SSA. This additional information includes a revised project description (Lill 2010; TS 2010d; 2010j), comments on the SA/DEIS (TS 2010h), and the results of 2010 surveys (TS 2010e; 2010f; 2010g; 2010i). In addition, the Energy Commission has completed a sand transport study for the proposed project, included as Appendix A to this SSA.

Changes from Staff Assessment/Draft Environmental Impact Statement:

While much of this section of the SSA is identical to that published in the March 2010 Staff Assessment/Draft Environmental Impact Statement (SA/DEIS), some revisions have been made that reflect changed circumstances and new information. These changes have been made by the Applicant for a variety of reasons including to reduce or avoid impacts to biological resources. **Biological Resources Table 1** provides a summary of the impacts to biological resources identified during the SA/DEIS associated with the original project footprint defined in the AFC; identifies impacts from the project description presented in the SSA; and provides the rationale for modifications. Other project modifications are summarized below:

- Separate CEQA/NEPA Documents. The SA/DEIS was a joint California Environmental Quality Act (CEQA) /National Environmental Policy Act (NEPA) document. The BLM's final NEPA analysis, the Final Environmental Impact Statement, will be published separately from the SSA. The NEPA-specific language from the SA/DEIS has generally been retained in this section. The **Introduction** section of the SSA provides a detailed discussion of the separation of the CEQA and NEPA documents.

- 2010 Survey Results: The SSA incorporates a variety of supplemental data requested by staff in the SA/DEIS. This includes preliminary botany surveys conducted in the spring and early summer of 2010; golden eagle surveys; protocol surveys for desert tortoise of the entire project footprint; and preliminary data of protocol desert tortoise surveys of the proposed translocation sites. The botanical surveys were floristic in nature and followed a wet winter and spring. As a result of these surveys several new rare plant locations were detected in the project footprint.
- Additional biological data was also provided by staff who conducted supplemental surveys of the project site on May 25 and 26, 2010. These surveys resulted in the detection of new Mohave fringe-toed lizard locations and further data that indicate the use of the site by Nelson's bighorn sheep. Staff also developed new data on the fluvial and hydrogeomorphic transport of sediment and fine sands on the project site and a determination of the project's potential to disrupt sand transport to offsite locations.
- New Project Features and Modifications: Major Project changes have been made since the Calico Solar Project SA/DEIS was published (March 2010). Staff has analyzed the impacts of these Project modifications in subsection C.2.4.2. The modifications include:
    - A substantial reduction in the total project footprint area. Most of this reduction is at the northern boundary, where the revised project boundary as analyzed in this SSA is about 4,000 feet south of the toe slopes of the Cady Mountains; and
    - The proposed project water supply has been changed from an off-site source, to be delivered by rail or truck, to an adjacent off-site well and associated pipeline.
- Additional Mitigation Options: Discussion of mitigation options has been added to reflect recent establishment of a Renewable Energy Action Team Account with the National Fish and Wildlife Foundation that may be used by the Applicant to deposit mitigation funding, as well as SBX8 34, legislation recently signed by the Governor that allows qualifying projects like the Calico Solar Project to make use of a new in-lieu fee program.
- New and revised Conditions of Certification: The SSA includes one new condition of certification: **BIO-30** In-Lieu Fee Mitigation Option. Conditions of Certification **BIO-12**, Special-Status Plant Impact Avoidance and Minimization, **BIO-13**, Mojave Fringe-toed Lizard Mitigation, **BIO-17**, Desert Tortoise Compensatory Mitigation, **BIO-18**, Raven Monitoring, Management, and Control Plan, **BIO-20**, Pre-construction Surveys for Golden Eagles, and **BIO-22**, Avian Protection Plan / Monitoring Bird Impacts from Solar Technology, have been extensively revised and expanded to reflect changes to the project design, new information on special-status species occurrence, and updated resource agency guidelines or policies. Revisions have been made in most other conditions of certification to address comments from the applicant and other parties.

Biological Resources Table 1
Comparison of SA/DEIS AND SSA

Impact Type/ Project Feature	SA/DEIS	SSA	Rationale for Change
Project Footprint	8,230 acres	6,215 acres	Reduction based on agency and staff feedback. Reduces impacts to biological resources and increases east-west linkage for wildlife movement (incl. desert tortoises and Nelson's bighorn sheep) north of the project boundary.
Project Water Supply	Cadiz Burlington Northern Santa Fe (BNSF) well, located approximately 64 miles southeast of the Calico Solar site. Brought to the project site via truck or rail.	Water to be obtained from a well adjacent to the Calico Solar Project site; transported to site via a new 0.51-mile water pipeline.	Reduces emissions from rail and/or truck transport of water to site, eliminates need to unload the water at the rail siding, and uses water of a lower quality for plant operations. Adjacent well is also more accessible and less expensive.
Desert Tortoise	Minimum 100 tortoises occur in project footprint and would require relocation/translocation Approximately 8,230 acres of habitat would be directly impacted within the project footprint Linkage along the northern border of the project would be impeded by rough terrain of the Cady Mountain foothills.	Minimum 57 tortoises occur in revised project footprint and would require translocation Approximately 6,215 acres of habitat would be directly impacted within the project footprint Linkage along the northern border of the project would roughly follow 4,000-foot contour interval, below rough terrain of the foothills, and would allow greater movement and use by desert tortoises.	Reduced project footprint and relocation of northern project boundary
Mojave Fringe-Toed Lizard (MFTL)	Applicant mapped 16.9 acres of habitat. Staff believed this was an underestimate of actual habitat on site; recommended mitigation at 5:1 ratio.	Staff estimates that 164.7 acres of MFTL would be directly impacted within the project footprint; recommends mitigation at 3:1 ratio for breeding habitat, 1:1 for surrounding forage/cover habit.	Additional MFTL observations by staff and the applicant after the release of the SA/DEIS and staff's estimated extent of suitable habitat
Nelson's Bighorn Sheep	Original project footprint included year-around bighorn sheep habitat, spring foraging habitat, and restricted movement in the southern Cady Mountains foothills.	Revised project footprint would eliminate impacts to year-around bighorn sheep habitat; reduce impacts to spring foraging habitat and movement	Reduction of project footprint and relocation of northern project boundary based on feedback by staff and the wildlife agencies to reduce impacts to habitat and to provide a linkage above the northern boundary of the site.

Impact Type/ Project Feature	SA/DEIS	SSA	Rationale for Change
Burrowing Owl	Loss of approximately 8,230 acres of habitat	Loss of approximately 6,215 acres of habitat	Revision of project footprint as described above
Golden Eagle	Loss of approximately 8,230 acres of foraging habitat	Loss of approximately 6,215 acres of foraging habitat	Revision of project footprint as described above
Special-Status Plants	Direct and indirect impacts to white-margined beardtongue, Emory's crucifixion thorn; additional unknown impacts due to limited field survey data	Indirect impacts to white-margined beardtongue locations to be protected and designated Environmentally Sensitive Areas; no impacts to Emory's crucifixion thorn	Results of additional botanical surveys Revision of project footprint as described above

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 issued under Section 10 or an incidental take statement, obtained through a Section 7 consultation (between federal agencies).
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 listed threatened, and endangered species, and candidate species. "Take" of a State-listed species is prohibited without an Incidental Take Permit, a Consistency Determination issued under Fish and Game Code, section 2080.1, or coverage in a plan approved under the Natural Community Conservation Planning Act, Fish and Game Code, sections 2800-2835.
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 unless authorized for scientific purposes or other specific 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) or the nest or eggs of those birds.
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 except as provided in federal rules and regulations.
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.

Applicable Law	Description
Streambed Alteration Agreement (Fish and Game Code sections 1600 et seq.)	Regulates activities that may substantially divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake in California. 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.)	Provides for the protection of State-listed 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.

Desert Renewable Energy Conservation Plan – Interim Planning

In addition to the federal, state, and local LORS summarized above, federal and state agencies are currently collaborating to establish joint policies and plans to facilitate development of California's utility-scale renewable energy projects while conserving the State's biological resources. On October 12, 2009, the State of California and the U.S. Department of Interior entered into a Memorandum of Understanding (MOU) on renewable energy, building on existing efforts by California and its federal partners to facilitate renewable energy development in the state. The MOU stems from California and Department of Interior energy policy directives, California's legislative mandate to reduce greenhouse gases to 1990 levels by 2020, and Governor Arnold Schwarzenegger's goal in Executive Order # S-14-08 that 33% of California's electricity production come from renewable energy sources by 2020.

The California-Department of Interior MOU expands on several MOUs issued in 2008 to establish the activities of the California Renewable Energy Action Team (REAT). The REAT was initially formed with California Executive Order S-14-08 (issued November 18, 2008), to "*establish a more cohesive and integrated statewide strategy, including greater coordination and streamlining of the siting, permitting, and procurement processes for renewable generation* …."

The Energy Commission and CDFG are the primary state collaborators in the REAT, operating under a November 18, 2008 MOU between the two agencies to create a "one-stop process" for permitting renewable energy projects under their joint permitting authority. The BLM and the USFWS also participate in the REAT under a separate MOU signed in November 2008, which outlines the state and federal cooperation of the group. The October 12, 2009 MOU between California and the Department of Interior reiterates several tasks of the REAT provided for in S-14-08 and the Energy Commission-Fish and Game MOU.

The REAT's primary mission is to streamline and expedite the permitting processes for renewable energy projects in the Mojave and Colorado Desert ecoregions within the State of California, while conserving endangered species and natural communities at

the ecosystem scale. To accomplish this goal the REAT Agencies are developing a Desert Renewable Energy Conservation Plan (DRECP), a science-based process for reviewing, approving, and permitting renewable energy applications in California. Once the DRECP is complete, anticipated in late 2012, the plan will provide tools to expedite coordination of federal and state endangered species act permitting. The DRECP will also offer a unified framework for state and federal agencies to oversee mitigation actions, including land acquisitions, for listed species.

The REAT Agencies approved a Planning Agreement to guide preparation of the DRECP on May 17, 2010. Section 8.9 of the Planning Agreement http://energy.ca.gov/2009publications/REAT-1000-2009-034/REAT-1000-2009-034-F.PDF provides that the REAT Agencies will work to ensure that permitting for interim projects: be consistent with the preliminary conservation objectives for the DRECP; not compromise successful completion and implementation of the DRECP; facilitate Federal Endangered Species Act, California Endangered Species Act, National Environmental Policy Act, and California Environmental Quality Act compliance; and not be unduly delayed during preparation of the DRECP.

REAT Account

The REAT agencies signed a Memorandum of Agreement (MOA) with the National Fish and Wildlife Foundation (NFWF) to establish a REAT Account managed by NFWF that may be used by project developers as a tool to help implement t specified mitigation for approved renewable energy projects in the Mojave and Colorado Desert region of southern California (the MOA is available at www.energy.ca.gov/33by2020). For each project using the REAT Account an individual subaccount would be established for project specific tracking, compliance and accounting purposes. The subaccount would identify a list of the specific mitigation actions, the cost, and a timeframe for carrying out the actions. NFWF would manage the subaccount on behalf of the REAT agencies, and at their direction would disburse mitigation funding to satisfy mitigation requirements for impacts to biological resources. NFWF is a charitable non-profit corporation established in 1984 by the federal government to accept and administer funds to further the conservation and management of fish, wildlife, plants and other natural resources (http://www.nfwf.org). Use of the REAT Account would not change any of the requirements a project proponent must fulfill in order to comply with applicable State and Federal environmental laws governing the permitting of the projects, but provides the project developer with an option for utilizing NFWF for carrying out the required mitigation. Staff's proposed Conditions of Certification **BIO-12, BIO-13, and BIO-17** would provide the project owner with the option of implementing certain mitigation requirements through use of the REAT Account.

Senate Bill X8 34

Separate from the NFWF MOA, legislation was enacted this year providing a mitigation fee option for qualifying renewable energy projects to meet certain State mitigation obligations, Senate Bill X8 34 (SBX8 34) includes a $10 million State loan that CDFG can use for advanced mitigation habitat purchases. This advanced mitigation can be used by a qualifying solar renewable energy project to receive credit for implemented mitigation in exchange for payments into the Renewable Energy Development Fee

Trust Fund to reimburse the State the cost of the advance purchases. In addition, the legislation establishes a separate mitigation fee program for eligible projects that gives project developers the option of paying fees to have CDFG implement certain project mitigation required under CESA and CEQA. Condition of Certification **BIO-30** is included to reflect the SBX8 34 fee option. At the time the SSA was prepared, advance habitat acquisitions had not occurred and the interim mitigation strategy needed to implement an in-lieu fee program was still under development.

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. The project site is located entirely within designated Solar Energy Study Areas (SESA), which the BLM has identified as areas where sensitive lands, wilderness, and other high-conservation-value lands were excluded (BLM News Release, July 27, 2009). A recent study completed in cooperation between Caltrans and the CDFG has also identified the project area as an essential biological connectivity area between the Bristol and Ord Mountains (Spencer et al. 2010).

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 6,215 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 floodplain that transports runoff from the Cady Mountains to the north. In addition, a collection of small to medium channels intersects the project from the south and east. All of these drainages generally collect and flow in a westerly direction.

Proposed Project

The proposed project consists of an 850-MW facility occupying 6,215 acres of land. This current project design has a smaller footprint than previously identified in the SA/DEIS

and was modified in response to concerns regarding project size, location, and wildlife movement raised by agency and staff. For further clarification regarding the changes to the proposed project, see Section C.2.2 (**Introduction**). The project would be constructed in two phases and would 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 6,215 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). **Biological Resources Figure 1** shows the revised site layout and boundary.

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 previously proposed 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. However, subsequent to the release of the SA/DEIS, the applicant

changed the proposed primary water supply to a well adjacent to the project site. Water from the well will be supplied to the Main Services Complex via a 0.51-mile pipeline. Once operational, project water demand is estimated to be approximately 20.4 acre-feet per year (**Soil & Water Table 5**).

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. Each pond would be approximately 1.0 acre in size (pers. comm., Matt Moore, URS).

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 an 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 project site as analyzed in this RSA would impact three vegetation communities: desert saltbush scrub, Mojave creosote bush scrub, and desert microphyll woodland. In addition, the applicant has identified 28 acres of developed land uses (e.g., roads, railroads, transmission lines, and underground gas pipelines) on the proposed project site These vegetation types (excluding desert microphyll woodland) and land uses were described in the AFC and Biological Resources Technical Report (SES 2008; SES 2009aa), though the acreages have been adjusted to reflect revised project design. 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. The authors 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, and the analysis below incorporates staff’s observations and the applicant’s additional mapping of microphyllous plant species (URS 2010). The mapped lava beds and cinder cone 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.

Mojave creosote bush scrub: The majority of the project site (approximately 5,946 acres) is mapped as Mojave creosote bush scrub (C. Lill, pers. comm.; 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. Catclaw acacia thorn scrub (desert microphyll woodland): 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) support catclaw acacia (*Acacia greggii*) at various densities, sometimes 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). The applicant has provided field data (URS 2010 xx) indicating that 3.3 acres of mapped creosote bush scrub supports catclaw acacia or other microphyllous species in high enough density to warrant mapping and analysis as desert microphyll woodland.

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).

Lower elevation wash and sandfield vegetation: 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 scattered smoke trees. 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 processes toward the southern part of the project site, and redistributed by wind, 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.

Smoke tree is a shrub or small tree characteristic of desert washes and arroyos. In some areas 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, may be 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, and they are more common in lower washes where they are conspicuous, but do not make up a substantial proportion of total cover. 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 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. These areas are too small to map as separate units. 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 242 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).

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. Conversely during the winter, flow within portions of these drainages has 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. However, 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. In response to staff and agency comments, a formal jurisdictional delineation for regulated waters was conducted by the applicant to determine the extent of potential jurisdictional waters of the U.S. and/or waters of the State within the project (2010). This includes waters (and/or wetlands) regulated under the federal Clean Water Act and/or streams and

associated habitat regulated under the California Fish and Game Code. The delineation identified a total of 282.8 acres of State Jurisdictional Waters within the Project Disturbance Area.

All of these drainages are ephemeral and are largely characterized by sparse creosote bush scrub with small associations of microphyll woodland species such as catclaw acacia thorn scrub, smoke tree woodland, and big galleta shrub-steppe. In many locations the channels are largely devoid of vegetation or support scattered populations of annual wildflowers and grasses. 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*). In addition, some mammal variation has been documented in this region including 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 surveys conducted between 2007 and 2010 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; TS 2010d; TS 2010e).

Despite the moderate to low shrub density that occurs on the site 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 have been observed over the project area. Common resident and migratory birds detected in and near the Calico Solar Project site between 2007 and 2010 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 or near the site include red-tailed hawk (*Buteo jamaicensis*), golden eagle, burrowing owl (*Athene cunnicularia*), Swainson's hawk (*Buteo swainsoni*), prairie falcon (*Falco mexicanus*), and turkey vulture (*Cathartes aura*). (SES 2009aa; TS 2010d; TS 2010e; TS 2010f)

Special-Status Species

The project area is known to support a variety of sensitive plant and wildlife species. **Biological Resources Table 3** 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 3**).

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 3
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	Not likely to occur
Astragalus lentiginosus var. *borreganus*	Borrego milk-vetch	CNPS: 4.3	Low
Blepharidachne kingii	King's eyelash grass	CNPS: 2.3	Low
Calochortus striatus	Alkali mariposa lily	BLM S, CNPS: 1B.2	Not likely to occur
Camissonia boothii var. *boothii*	Booth's evening primrose	CNPS: 2.3	Moderate
Cassia – see *Senna*			
Castela emoryi	Emory's crucifixion thorn	CNPS: 2.3	Low
Cleomella brevipes	Short-pedicelled cleomella	CNPS: 4.2	Low
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 (unconfirmed)
Cymopterus deserticola	Desert cymopterus	BLM S, CNPS: 1B.2	Low
Cymopterus multinervatus	Purple-nerve cymopterus	CNPS: 2.2	Low
Cynanchum utahense	Utah vine milkweed	CNPS: 4.2	Present
Eriophyllum mohavense	Barstow woolly-sunflower	BLM S, CNPS: 1B.2	Low
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
Lupinus sp.	Undescribed lupine	n/a	Low
Mentzelia eremophila	Solitary blazing-star	CNPS: 4.2	High
Mentzelia tridentata	Creamy blazing-star	BLM S, CNPS: 1B.3	Low
Mimulus mohavensis	Mojave monkeyflower	BLM S, CNPS: 1B.2	Low
Muilla coronata	Crowned muilla	CNPS: 4.2	Present (unconfirmed)
Nemacaulis denudata var. *gracilis*	Slender woolly-heads	CNPS: 2.2	Low
Pediomelum castoreum	Beaver Dam breadroot	CNPS: 4.3	Low

Scientific Name	Common Name	Status	Potential For Occurrence On-Site
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 (unconfirmed)
Sphaeralcea rusbyi var. *eremicola*	Rusby's desert mallow	BLM S, CNPS: 1B.2	Low
Tripterocalyx micranthus	Small-flowered sand-verbena	CNPS: 2.3	Present (unconfirmed)
Wislizenia refracta ssp. *refracta*	Jackass-clover	CNPS: 2.2	Moderate
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
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	Present (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, SP	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

Scientific Name	Common Name	Status	Potential For Occurrence On-Site

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

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 crucifixion-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.

Biological Resources Figure 2 identifies the locations of rare plants confirmed during the 2010 botanical surveys conducted by the applicant (TS 2010i).

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 indicates that small-flowered androstephium is 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 was reported from 52 locations on the project site and 14 additional occurrences within a 1000-foot 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. In 2010, more than 1,500 locations were documented on the site and it was reported as “ubiquitous” throughout the southern part of the project site (TS 2010i).

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; TS 2010i). 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 feet; USFWS 2004; Charlton 2007) than occur on the site.

The Calico Solar Project site is not within designated critical habitat or areas formerly proposed for designation as Lane Mountain milk-vetch critical habitat. The USFWS (2004) proposed four Critical Habitat Units, all to the north of the proposed project site. In 2005, the USFWS finalized its critical habitat designation rule, 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 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.

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 three locations on the formerly-proposed project site (SES 2009aa; TS 2010i). All three locations are near the toe slopes of the Cady Mountains, outside the project footprint as addressed in this SSA.

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). It 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). It was reported on the Calico Solar Project site at one location during the 2008 surveys for the proposed project, though the occurrence was not mapped in the applicant's Biological Resources Technical Report (SES 2009aa). It was not relocated on-site during the follow-up surveys (TS 2010i). 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). It is an annual herb with grayish foliage that blooms between March and April. It is on CNPS List 4.3. Winged cryptantha was reported in the applicant's list of plant species identified during surveys (SES 2009aa – Appendix D), though its locations were not mapped or quantified in the applicant's Biological Resources Technical Report (SES 2009aa). It was not relocated on-site during the follow-up surveys (TS 2010i). Suitable desert shrubland habitat occurs throughout much of the project site.

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, where it climbing up through shrubs. Utah vine milkweed is on CNPS List 4.2. It in present on the Calico Solar Project site, as the applicant reported one location onsite near I-40 (SES 2009aa). It was also reported in 2010 (TS 2010i) though its locations were not mapped or quantified. Additional suitable habitat is found in washes throughout the project area.

Undescribed Lupine (*Lupinus* spec. nov.)

Several lupine specimens collected near the base of the Cady Mountains, north of the present project boundary, do not appear to match any known species. They are similar to bajada lupine (*Lupinus concinnus*) though they do not match any of the several described varieties of that species. This is an annual species with blue flowers. They are apparently distinct in several characters, particularly the leaflet shape and width. James Andre (pers. comm.) has noted similar plants elsewhere in the central Mojave Desert. In Andre's experience, the plant appears to be sufficiently rare and geographically restricted to warrant inclusion in either CNPS List 1B or List 4, though he has not researched it enough to recommend such listing. During 2010 field surveys (TS 2010i), locations of the undescribed lupine species were mapped throughout the survey area (which corresponded to the project area as proposed in the AFC). All of these locations are north of the project boundary as analyzed in this SSA, and no occurrences were found within the revised project area.

Crowned Muilla (*Muilla coronata*)

Crowned muilla is on CNPS List 4.2. It occurs in Inyo, Kern, Los Angeles, San Bernardino and Tulare Counties, and east into Nevada. It can be found in chenopod scrub, Joshua tree woodland, Mojavean desert scrub, and pinyon and juniper woodlands at elevations of about 2500-6400 feet. It is a bulbiferous herb that blooms between March and April (CNPS 2010). Crowned muilla 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 and was not relocated during 2010 field surveys (TS 2010i)

White-Margined Beardtongue (*Penstemon albomarginatus*)

White-margined beardtongue 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 Fenner Valley in California (Nature Conservancy 2007) though that occurrence apparently is not supported by an herbarium specimen and has not been relocated in numerous follow-up field surveys (J. Andre pers. comm.; C. Rutherford pers. comm.). 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, and another from Lavic Lake on the 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).

White-margined beardtongue habitat is similar in the three disjunct areas where it is found. Its habitat, including soil characteristics, has been described in general by the Nature Conservancy (2007) and in greater detail for the Arizona and Nevada populations (Anderson 2001; Etymesian et al. 2010). In Nevada, it is found in sandy soils, most often in deep, loose to stabilized sand, sometimes on dunes or in washes or alluvium, and often near small dry drainages or wash margins. Scogin (1989) described its habitat similarly for California occurrences east of the project site, though J. Andre (pers. comm.) notes that it also is found away from washes, in open sandfields. In Nevada, there generally is an upwind sand source, though the amounts of sand transported onto occupied habitat is very low (Etymesian et al. 2010). Its occurrences

are consistently on mapped Quaternary alluvial deposits (Nature Conservancy 2007), where windblown sand may overlie bajada or alluvial fan surfaces. In Arizona, it is found on sandy loam alluvial terraces or on sandy wash bottoms (Anderson 2001).

White-margined beardtongue is present at several locations on the Calico Solar Project site (TS 2010i; Figure 2) and numerous other occurrences off-site to the southeast (on lands managed by BLM as the Pisgah Area of Critical Environmental Concern) (SES 2009aa; CDFG 2010a). Staff observed several of the white-margined beardtongue locations on the proposed project site in May 2010. These plants were in stabilized sandy soils along minor dry drainages, consistent with reports of its habitat in Nevada.

White-margined beardtongue appears to require several years of above-average rainfall to become established from seed, and cross-sections of stem bases suggest that individual plants may survive for several decades (Etymesian et al. 2010). There is no known feasible horticultural method to propagate white-margined beardtongue. Scogin (1989) was unable to successfully to transplant it or to propagate it from cuttings. He did not attempt to propagate it from seed, or to use cuttings taken from the bases of plants (i.e., to include part of the original taproot). Further horticultural research may provide a feasible propagation method.

Staff is not aware of long-term white-margined beardtongue population monitoring research. James Andre (pers. comm.) has revisited known locations and noted localized extirpations during or shortly after drought years in the early 2000s. Windblown sand and its associated habitats are naturally variable over time. Habitats include actively moving dunes; relatively stabilized sand flats; areas of sand depletion (deflation plains) and sand sheets overlying other substrates (Danin 1996). Due to varying habitat and rainfall, white-margined beardtongue may exist as “metapopulations,” where local occurrences are extirpated by poor conditions but are replaced by new occurrences when seedlings become established at new sites during favorable conditions. in future years, white-margined beardtongue may have the potential to occur anywhere in the lower elevation wash and sandfield vegetation on the Calico project site. .

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 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. The 2009 report, if valid, would be the first record of Coves’ cassia in the central Mojave Desert. It was not relocated on the site during 2010 field surveys (TS 2010i), and the original report was apparently due to misidentification. Staff concludes that Coves’ cassia is unlikely to occur on the site.

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). Small-flowered sand-verbena was reported on the Calico Solar Project site in the applicant's Biological Resources Technical Report (SES 2009aa – Appendix D), though the locations were not mapped, nor was there an indication of numbers of plants or extent of distribution across the project site. If valid, this report would be the first record of small-flowered sand-verbena in the central Mojave Desert. It was not relocated on the site during 2010 field surveys (TS 2010i), and the original report was apparently due to misidentification. Staff concludes that small-flowered sand verbena is unlikely to occur on the site.

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.

Desert tortoises occur in the project area and are broadly distributed across the proposed project site. Most of the desert tortoises detected during project surveys were noted north of the BNSF railroad, primarily in the bajada near the toe of the Cady Mountains. This area contains good quality habitat for desert tortoise and has less obstructed connectivity to adjacent natural lands. The area between the BNSF railroad and I-40 is isolated by the highway and railroad and portions of the site have been subject to repeated disturbance from pipeline development. Nonetheless, two tortoises were detected in this area and tortoise sign was observed in low density near the center of 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.

The results of the 2010 protocol surveys conducted by the applicant detected 104 tortoises within the original 8,230 acres project footprint (TS 2010e). In response to staff and agency feedback, the applicant reduced the size of the footprint to minimize impacts to desert tortoise linkages. The redesigned project footprint consists of approximately 6,215 acres and avoids large areas of occupied tortoise habitat. Fifty-seven (57) tortoises have been documented within the new proposed project footprint. **Biological Resources Figure 3** shows the locations of desert tortoises detected during the 2010 surveys.

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). Interstate 40 and the BNSF Railroad pose barriers to movement between this critical habitat and the Calico Solar Project area.

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 and the project is avoiding many of the rocky outcrops and lava flows present onsite that 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, within the broader matrix of creosote bush scrub, throughout much of its range (Norris 1958; Jennings and Hayes 1994). It is restricted to habitats where fine, loose, aeolian sand, typically with sand grain size no coarser than 0.375 mm in diameter is available (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 its primary habitat, although it can also be found in the margins of dry lakebeds, washes, and isolated sand habitat, such as scattered hummocks or wind-deposited "sand ramps" against hillsides (BLM et al. 2005).

The most important factor in the Mojave fringe-toed lizard's habitat is the presence of fine sands, but it also uses surrounding desert habitat. For example, while Mojave fringe-toed lizard is the only diurnal lizard in North America that occurs in unvegetated dunes, it also occurs where vegetation is present, including creosote bush scrub (Murphy et al. 2006). A study by Cablk and Heaton (2002) at Marine Corps Air Ground Combat Center at Twentynine Palms (Twentynine Palms) 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 species was also found in what was termed "medium-pack sand" in Lead Mountain during a 2001 survey of Twentynine Palms. 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. Windblown (aeolian) sand originates from hydrological processes (i.e., fluvial transport and sorting from desert mountains onto valley floors) (Lancaster and Tchakerian, 2003). Thus, fine sandy washes also serve as Mojave fringe-toed lizard habitat.

The Mojave fringe-toed lizard is primarily insectivorous, but also eats plant food including leaves, seeds, and buds (Stebbins 1944). It 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, it is active during mid-day; from May to September, it is active in mornings and late afternoon, but seeks 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 occur on small or isolated 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 Mojave fringe-toed lizard and its habitat include land use conversion for agriculture or urban development, off-highway vehicles (OHV),and other direct and indirect impacts of regional development.. Aside from the direct loss of land, development can also affect Mojave fringe-toed lizards by increasing access by predators, such as the common raven and small raptors, to their habitat. Raven numbers tend to increase around developed facilities due to increased availability of water and trash; other predators may increase in numbers due to availability of new perch sites (e.g., fence posts, sign posts, structures) which allow them to hunt for lizards in areas where no perches were previously available. 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 (SES 2008). The applicant identified this site, approximately 16.9 acres, as Mojave fringe-toed lizard habitat. However, staff conducted reconnaissance surveys of the site in January and May 2010, during which times staff inspected the dune complex and adjacent habitats. Four Mojave fringe-toed lizards were detected by staff during the May surveys. These included one lizard within the dune area identified by the applicant; one in soft windblown sand along the large primary drainage west of the delineated habitat; and two in fine accumulated sands on the vegetated windrow that borders the north side of the BNSF railroad. Mojave fringe-toed lizard was also detected along a wash north of the BNSF railroad during the applicant's 2010 desert tortoise surveys. Fine-grained friable sand occurs in many other 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. It is likely that Mojave fringe-toed lizard occurs in low densities across much of the project site south of the BNSR railroad and within and around soft sands associated with the drainages north of the BNSF railroad.

Staff concluded that the 16.9 acres of Mojave fringe-toed lizard habitat on-site as originally reported by the applicant was underestimated. That conclusion was based on observations by staff and the applicant of the animal beyond the habitat originally delineated; the species' known use of heterogeneous soils within and around windblown and fine fluvial sand deposits; and staff's observations of habitat and soils more widely throughout the site. In order to more accurately reflect the extent of occupied and suitable habitat on the site, staff mapped habitat along the primary washes and the BNSF railroad where fine-textured fluvial and windblown sand deposits were observed. Staff surrounded these areas with a 45-meter buffer, based in part on Norris (1958) which indicated that Mojave fringe-toed lizards may be found within 45 meters of their primary aeolian sand habitat. Staff notes that recent work described above (Cablk and Heaton 2002) suggests that the 45-meter buffer area may be an underestimate of this animal's usage of surrounding habitat. Based on this analysis, staff concludes that a minimum of 164.7 acres of suitable and at least partially occupied habitat for Mojave fringe-toed lizard is found on the proposed project site. This estimate includes 21.4 acres of good quality dune or fine sandy wash habitat, and 143.3 acres or surrounding lower-quality habitat (i.e., the 45-meter buffer area described above). **Biological Resources Figure 4** identifies potential habitat on site, as well as recorded observations of individual Mojave fringe-toed lizards on-site.

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 two burrowing owls and eleven burrows with sign were

identified approximately 0.5 miles north of the project boundary near the toe of the Cady Mountains (TS 2010g).

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 observed on the project site during surveys conducted in 2010 and in off-site areas during helicopter surveys for golden eagles (TS 2010f). Nesting habitat for this species 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. comm.)

Golden eagles were observed flying over the project site during both the 2007 and 2008 surveys conducted by the applicant. (SES 2009aa). Staff also observed a golden eagle above the project site during a reconnaissance survey conducted on May 25, 2010. This species is considered present within the project area and nesting was documented by the applicant in the vicinity of the project (within a 10-mile buffer area). Nesting habitat does not occur onsite, and the observed birds 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 on March 11th and 12th, 2010. This survey detected approximately 22 stick nests including eight inactive, but potential golden eagle nests, and one active nest that contained an incubating adult golden eagle. Surveys also detected a variety of other birds including an incubating adult red-tailed hawk (TS 2010f). The active nest is located approximately 3.5 miles east of the proposed project area. **Biological Resources Figure 5** shows the locations of potential and active golden eagle nests identified during the 2010 helicopter survey.

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 loggerhead shrikes were observed in the project area between the BNSF Railroad and the I-40 during the 2008 surveys and near the BNSF railroad during the 2010 surveys (SES 2009aa, TS 2010d). 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. One individual was observed within the project boundary during the 2008 surveys, and three were observed in 2010 (SES 2009aa, TS 2010d). 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 March 2010 observed 62 bighorn sheep (12 rams, 38 ewes, and 12 lambs) within 10 miles of the project site (TS 2010f). In addition, two bighorn sheep horns, two bighorn sheep skeletons and one occurrence of bighorn sheep scat were detected during surveys conducted for desert tortoises and botanical resources between April 5 and April 15, 2010. These occurrences were observed north of the project detention basins between the Cady Mountains and the proposed project. In addition, staff observed bighorn sheep scat on the top of one of the large volcanic rock outcroppings that occur adjacent to the proposed detention basin at the north boundary of the project. It is likely that bighorn sheep use portions of the site for foraging and possibly inter-mountain movement to some degree. **Biological**

Resources Figure 6 shows the locations of bighorn sheep observed during the 2010 helicopter surveys.

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, and three burrows were detected in 2010 (TS 2010d). Suitable foraging habitat and prey items for this species are broadly distributed across the project site.

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) from trapping and hunting. 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. Surveys conducted by the applicant for burrowing owls detected approximately 36 potential kit fox dens within the proposed project area (TS 2010d).

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 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 where staff has concluded that pre-disturbance levels of biomass, cover, density, community structure, and soil characteristics could be achieved within five years. Otherwise, an impact is considered permanent. For example, ongoing vegetation mowing of creosote bush scrub on the project area is considered a permanent impact because it may take decades to functionally recover to pre-construction conditions after mowing ceases. **Biological Resources Table 4** 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 4
Summary of Impacts/Mitigation

Biological Resource	Impact/Mitigation
Mojave Desert Plant Communities and Wildlife Habitat	**Impacts:** Permanent loss and fragmentation of a total of approximately 6,215 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**).

Biological Resource	Impact/Mitigation
Special-Status Plants	**Impacts:** 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	**Impacts:** 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**).
Horses and Burros	**Impacts:** 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	**Impacts:** Permanent impacts to 282.8 acres of waters of the State from the modification of attenuation of flows, sediment disruption and 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-26**); removal of engineered diversion channels upon project closure (**BIO-28**).
Special-Status Wildlife	
Mojave Fringe-Toed Lizard	**Impacts:** 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	**Impacts:** 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**).

Biological Resource	Impact/Mitigation
Golden Eagle	**Impacts:** 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**.
Burrowing Owl	**Impacts:** 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-21**).
Other Migratory/Special-Status Birds • Loggerhead Shrike • Le Conte's Thrasher • Bendire's Thrasher	**Impacts:** 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**); avian protection plan / monitoring bird impacts from solar technology (**BIO-22**); Evaporation Pond Design, Monitoring, and Management Plan (**BIO-27**).
Bird Collisions and Electrocution	**Impacts:** 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**); avian protection plan / monitoring bird impacts from solar technology (**BIO-22**).
Nelson's Bighorn Sheep	**Impact:** Disruption of intermountain movement, loss 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**); work stoppage if bighorn sheep detected within 500 feet of project activities (**BIO-23**)
American Badger and Kit Fox	**Impacts:** 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-24**).

Biological Resource	Impact/Mitigation
Special-Status Bats	**Impacts:** 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-25**).
Wildlife Movement Corridors	**Impacts:** Interference with wildlife movement across project site due to permanent exclusion fencing. **Mitigation:** Avoidance and minimization measures (**BIO-1** through **BIO-9**).

Four of staff's recommended Conditions of Certification would require the Project owner to acquire compensation lands to mitigate the Project's impacts to biological resources. The most significant of these is **BIO-17**, Desert Tortoise Compensatory Mitigation. **BIO-12** (Special-Status Plant Impact Avoidance and Minimization) provides the option of mitigating impacts to rare plants that may be discovered on the site during late-season botanical surveys. **BIO-13** (Mojave Fringe-Toed Lizard Mitigation) would require compensation for Project impacts to this animal. **BIO-26** (Streambed Impact Minimization and Compensation Measures) would require compensation for jurisdictional streambed acreage impacted by the project. Staff recognizes that some potential compensation lands may support more than one of these resources, and staff recommends that, wherever applicable, the Project owner should seek compensation lands meeting selection criteria for more than one of these resources, as described in these Conditions of Certification, below.

Staff has calculated the acreage and estimated costs for desert tortoise compensation lands, as described in Condition of Certification **BIO-17**. Staff provides estimates of acreage and costs for Mojave fringe-toed lizard compensation, pending expert verification of on-site habitat acreage, in **BIO-13**. Any potential compensation acreage for rare plants, pursuant to **BIO-12**, would be determined upon completion of late-season field surveys and cannot be estimated at this time. Staff anticipated that all compensation lands for state-jurisdictional streambeds as required under **BIO-26** would be "nested" within desert tortoise compensation lands, avoiding necessity for additional compensation lands. However, as described in **BIO-26**, further compensation lands may be required dependent upon the extent of state jurisdictional waters on the desert tortoise compensation lands.

Biological Resources Table 5
Summary of Compensation Lands Costs[1]

	Desert Tortoise Compensation	Mojave Fringe-Toed Lizard Compensation	Rare Plant Compensation	Streambed Compensation
Number of acres	14,365	207.5	undetermined	undetermined
Estimated number of parcels to be acquired, at	360	6	n/a	n/a

40 acres per parcel[2]				
Land cost at $1000/acre[3]	$14,365,000.00	$207,500.00	n/a	n/a
Level 1 Environmental Site Assessment at $3000/parcel	$1,080,000.00	$18,000.00	n/a	n/a
Appraisal at no less than $5,000/parcel	$1,800,000.00	$30,000.00	n/a	n/a
Initial site clean-up, restoration or enhancement, at $250/acre[4]	$3,591,250.00	$51,875.00	n/a	n/a
Closing and Escrow Cost at $5000/parcel[5]	$1,800,000.00	$30,000.00	n/a	n/a
Biological survey for determining mitigation value of land (habitat based with species specific augmentation) at $5000/parcel	$1,800,000.00	$30,000.00	n/a	n/a
3rd Party Administrative Costs (Land Cost x 10%)[6]	$1,436,500.00	$20,750.00	n/a	n/a
Agency cost to accept land[7] [(Land Cost x 15%) x 1.17] (17% of the 15% for overhead)	$2,521,057.50	$36,416.25	n/a	n/a
Subtotal – Acquisition and Initial Site Work	$28,393,807.50	$424,541.25	n/a	n/a
Long-term Management and Maintenance Fund (LTMM) fee at $1450/acre[8]	$20,829,250.00	$300,875.00	n/a	n/a
NFWF Fees				
Establish Project Specific Account	$12,000.00			
NFWF Management fee For Acquisition and Enhancement Actions (Subtotal x 3%)	$851,814.23	$12,736.24	n/a	n/a
NWFW Management Fee for LTMM account (LTMM x 1%)	$208,292.50	$3,008.75	n/a	n/a
Subtotal of NFWF Fees	$1,072,106.73	$15,744.99	n/a	n/a
TOTAL Estimated cost for deposit in project specific REAT-NFWF Account	**$50,295,164.23**	**$741,161.24**	n/a	n/a

1 - Estimates prepared in consultation with CDFG, USFWS, and BLM. All costs are best estimates as of summer 2010. Actual costs will be determined at the time of the transactions and may change the funding needed to implement the required mitigation obligation.

2 - For the purposes of determining costs, a parcel is defined at 40 acres, recognizing that some will be larger and some will be smaller, but that 40 acres provides a good estimate for the number of transactions anticipated (based on input from CDD).

3 - Generalized estimate taking into consideration a likely jump in land costs due to demand, and an 18-24 month window to acquire the land after agency decisions are made. If the agencies, developer, or 3rd party has better information on land costs in the specific area where project-specific mitigation lands are likely to be purchased, that data overrides this general estimate. Note: regardless of the estimates, the developer is responsible for providing adequate funding to implement the required mitigation.
4 - Based on information from CDFG.
5 - Two transactions: landowner to 3rd party; 3rd party to agency.
6 - Includes staff time to work with agencies and landowners; develop management plan; oversee land transaction; organizational reporting and due diligence; review of acquisition documents; assembling acquisition acreage, and related tasks)
7 - This amount covers the estimate of BLM's cost to accept the land into the public management system and costs associated with tracking/managing the costs associated with the donation acceptance, includes two physical inspections; review and approval of the Level 1 ESA assessment; review of all title documents; drafting deed restrictions; issue escrow instructions; mapping the parcels, and related tasks.
8 - Estimate for purposes of calculating general costs. The actual long term management costs will be determined using a PAR (Property Assessment Report) tailored to the specific acquisition. Includes land management; enforcement and defense of easement or title [short and long term]; and monitoring.

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 as defined by staff involves impacts that would not recover within 5 years (above). The Calico Solar Project would have 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 continue throughout the life of the project, as well as habitat degradation that would persist for decades following project closure.

Vegetation Impacts

Construction of the Calico Solar Project and associated facilities would result in the permanent loss of native vegetation from the construction of new 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. The applicant indicates that re-mowing treatment would be applied to about 5% of the SunCatcher array area (TS 2010h). Vegetation not within the path of SunCatcher movement or within the access road footprints would be allowed to re-generate. Staff considers mowing to be a permanent impact to native vegetation as mowing would likely result in type conversion of re-mowed areas from creosote bush scrub to more herbaceous vegetation, and degradation of untreated or once-treated vegetation by introduction of new edge effects to remnant desert shrubland throughout the proposed project site.

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). Staff concludes that implementation of these measures would reduce impacts to native plant communities to less-than-significant levels under CEQA by minimizing vegetation impacts to the extent practicable; revegetating temporarily disturbed areas; controlling invasive weeds and preventing infestations by newly introduced weeds; and providing for long-term conservation and management of native vegetation on desert tortoise compensation lands.

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, cheat grass, Mediterranean grass, red-stemmed filaree, and Russian thistle. Other invasive species, particularly Sahara mustard, 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 generally 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). Staff also has provided the applicant with recommended revisions to the Weed Management Plan, to be incorporated before final approval.

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 by limiting ground disturbance to the minimum extent necessary for project implementation; controlling invasive weed species on the site; preventing new infestations of invasive species; and preventing weeds from spreading from the project site into the surrounding land.

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 dust from the proposed

project to biological resources to less than significant levels under CEQA by minimizing and controlling project-related dust sources during construction and operation.

Impacts to Special-Status Plants

Project construction and operation have the potential to cause a variety of direct or indirect effects to special-status plants within or near the project boundary. These include crushing or removing the plants or their habitat during construction or operation of the facility; 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 SSA. 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, 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.

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 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** (Special Status Plant Impact Avoidance and Minimization) 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."

Eight special-status plant species have been reported as present on the proposed project site, and 19 additional special-status plant species of the region have some potential for occurrence but have not been observed during field surveys; see **Biological Resources Table 3** (SES 2009aa; TS 2010i). Four of the special-status plants reported in the Biological Resources Technical Report (SES 2009aa) species list for the project surveys (Appendix D), were not relocated during more thorough 2010 field surveys (TS 2010i) and may have been misidentified during the earlier work. Staff considers these four species as "unconfirmed" on the site (addressed above, Special-Status Species, Section C.2.4.1).

Staff note that the seasonal and irregular nature of most plants' life histories, and below-average rainfall during the 2006-07 and 2007-08 seasons limit staff's ability to interpret the data as submitted. Numbers and locations of special-status plant occurrences reported on-site to date 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.

Staff have concluded that, absent mitigation, proposed construction of the Calico Solar Project as analyzed in this SSA would directly or indirectly impact at least three special-status plant species (white-margined beardtongue, small-flowered androstephium, and Utah vine milkweed; see **Biological Resources Table 3**), and that impacts to one of these —white-margined beardtongue— would be considered significant under CEQA guidelines for reasons explained below. Several other special-status plants were reported on-site during 2008 field surveys, including Coves' cassia and small-flowered sand verbena. Staff now believes that those reports may have been mistaken, and occurrence likelihood is considered low. Staff considers project impacts to the other five special-status species occurring or potentially occurring on-site as many as three of these —small-flowered androstephium, foxtail cactus, Utah vine milkweed, winged cryptantha, and crowned muilla — to be less than significant, as explained below. 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.

Six additional CNPS List 1B and six additional CNPS List 2 plants have some potential to occur on-site, but have not been detected during field surveys to date. In general, these plants are spring-blooming species and would likely have been detected. However, due to limitations of field surveys and unpredictable variations in annual flowering, some species may have gone undetected during field work. Further, some special-status plants flower exclusively or primarily in summer or early fall, and would not have been detected during field surveys conducted to date. If any of these species occur on the site, it would be adversely affected by project development. These species are listed above in **Biological Resources Table 3** (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 two CNPS List 2 species reported, but unconfirmed on the proposed project site (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 land use changes including energy projects, 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

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 staff in this Supplemental 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, 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."

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 List 2 plants potentially occurring 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* (2010) 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 be potentially eligible to meet CEQA's Section 15380 criteria, and evaluates project impacts to each one known from the site, as explained below.

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 occurring in the region. Staff concludes that Lane Mountain milk-vetch is unlikely to occur on or adjacent to the project site because of its distance from known occurrences, no plants were found during field survey (TS 2010i), and unsuitable bajada habitat throughout most of the project site.

CNPS List 1B / BLM Sensitive Taxa

One CNPS List 1B species (white-margined beardtongue) was documented on the project site, and five others could occur there, though their probabilities of occurrence are moderate to low. In Condition of Certification **BIO-12** below, staff recommends follow-up 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.

Five other plant species that are designated BLM sensitive and CNPS List 1B species have low potential to occur within the project area:

- Desert cymopterus (*Cymopterus deserticola*) – Low potential
- Barstow woolly-sunflower (*Eriophyllum mohavense*) – Low potential
- Mojave monkeyflower (*Mimulus mohavensis*) – Low potential
- Creamy blazing-star (*Mentzelia tridentate*) – Low potential
- Rusby's desert mallow (*Sphaeralcea rusbyi* var. *eremicola*) – Low potential

Project impacts to white-margined beardtongue would consist of isolation of some plants and their habitat within the surrounding solar facility during project development and operation. In addition, indirect project impacts to this species could result on-site or off-site, from facility operations (e.g., dust, herbicide overspray, isolation from pollinators or other ecological associations, or alterations to the existing wind and hydrological conditions that transport sand. Proposed project alterations to surface hydrology would avoid or minimize impacts to minor channels where most of the white-margined beardtongue plants on-site are located (Collison 2010) but would alter hydrology at several other locations. 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's review of sand movement in the area indicates transport eastward across the project is unlikely to be important to white-margined beardtongue habitat farther east, where the majority of known occurrences are located (Appendix A; also see Cumulative Impacts, Section C.2.8 below, including **Biological Resources Figure 16**).

Two white-margined beardtongue locations on the project site are near project area boundaries. One of these, where 17 individual plants were counted (TS 2010i), is outside the proposed disturbance area, due to the plants and other resource concerns. Another location, where two plants were mapped, is on the eastern project site boundary, adjacent to the Pisgah Crater ACEC. The proposed project would avoid impacts to these plants and provide a 250-foot buffer area around them. Surface hydrology at both locations would not be altered by proposed project stormwater control structures. The other white-margined beardtongue locations also would be surrounded by 250-foot buffer areas, but would be subject to altered hydrology due to stormwater control as proposed by the applicant.

White-margined beardtongue apparently exists as a local "metapopulation" consisting of scattered small clusters or individual plants at locations that may not persist long-term. Instead, changing environmental conditions such as rainfall, drought, sand movement, or hydrology cause periodic localized extinctions and colonizations. Project development and operation would substantially alter soil, vegetation, and hydrology throughout the project area and would likely prevent new white-margined beardtongue colonizations within the project area.

Based on analysis of its rarity, range and distribution, staff concludes that white-margined beardtongue meets criteria for consideration as rare, threatened or endangered under CEQA Section 15380. 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**, including measures to provide buffer areas around white-margined beardtongue locations; monitor and manage direct and indirect project impacts and plant persistence within these areas; and monitor and manage indirect project impacts to occurrences off-site to the east, in the BLM Pisgah Crater ACEC. By incorporating these measures, staff concludes that adverse impacts to white-margined beardtongue would be reduced to less than significant by minimizing indirect impacts to the plants protected within buffer areas; and by managing potential on-site and off-site impacts, including alterations to sand movement and plant demography.

CNPS List 2 Taxa

Three CNPS List 2 taxa are reported on the project site (SES 2009aa), though only one of these was confirmed by 2010 field surveys (TS 2010i). The other two species remain unconfirmed, and may have been misidentified in the original survey reports. An additional six could occur on the site, with low potential. 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 was reported at 52 locations on the project site and 14 additional occurrences within a 1000-foot buffer surrounding the site (SES 2009aa). Follow-up surveys in 2010 documented more than 1500 additional plants, mapped as one extensive occurrence throughout much of the southern part of the site (TS 2010i). Staff believes that most small-flowered androstephium on-site, would be lost or adversely impacted as described above (except that any plants within white-margined beardtongue set-aside areas would be protected, as described in Condition of Certification **BIO-12**). 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 crucifixion thorn is reported from four individual plants at three locations within the survey area (TS 2010h). All three locations are north of the proposed project area, near the toe slopes of the Cady Mountains. The proposed project as analyzed in this SSA would avoid direct or indirect effects to those occurrences. Emory's crucifixion thorn is a large and distinctive shrub and staff does not expect that additional plants will be found on-site during future surveys.

Coves' cassia and small-flowered sand-verbena were reported on the project site in the Biological Resources Technical Report (SES 2009aa) Appendix D, but were not confirmed during more thorough 2010 field surveys (TS 2010i). Staff believes that the original reports may have been erroneous and no impacts to either species are anticipated. However, if either species is found on-site during follow-up field surveys as recommended by Condition of Certification **BIO-12**, appropriate avoidance or off-site mitigation measures would be required.

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 cymopterus (*Cymopterus multinervatus*) – Low potential.
- Thorny milkwort (*Polygala acanthoclada*) – Low potential.
- Jackass clover (*Wislizenia refracta* ssp. *refracta*) – Moderate potential.

Project impacts to small-flowered androstephium and possibly other 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. Based on analysis of their rarity, range and distribution, staff concludes that Coves' cassia, small-flowered sand verbena,

meet criteria for consideration as rare, threatened or endangered under CEQA Section 15380. Staff concludes that, absent mitigation, adverse impacts to 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 reported 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 known geographic ranges and abundance, absence of any reported unusual morphology among local populations, and local occurrence in typical habitat, 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 white-margined beardtongue and possibly to other special-status plants reported but not verified occurring 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 below a level of significance.

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 future energy projects, staff investigated the possibility of off-setting project losses by placing land use restrictions on or enhancing

BLM lands where one or more of these special-status plants occur and which are not protected, e.g., within the Mojave Preserve or 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 yucca species and most cacti, with the exception of chollas, 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 translocation or 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. The applicant proposes to collect seed and cuttings of CNPS List 1B and List 2 plants on the project site, but provides no further discussion of methods or relocation sites. The applicant states that "seeding areas of suitable habitat in undisturbed sites within and adjacent to the project areas would provide some conservation benefit" (TS 2010h). In consideration of the high rate of failed transplantation and translocation attempts with rare plants, staff believes that the applicant's proposed measures would not provide meaningful conservation benefit, unless proven species-specific feasible methods are specified and adhered to with rigorous performance monitoring. Staff knows of no such methods for white-margined beardtongue or for other CNPS List 1B or List 2 plants potentially occurring on the site. 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 to fund compensatory mitigation for desert tortoise habitat loss would not feasibly or verifiably mitigate the project's impacts to special-status plants, unless the presence of special-status plants affected by the project are verified on the land planned for acquisition and protection and management of the plants is assured and funded in perpetuity. The *in lieu* fee program was not sufficiently developed at the time the SSA was prepared to judge whether it will be able to accommodate mitigation for special-status plants as part of the desert tortoise habitat mitigation. Under limited circumstances, compensation lands for desert tortoise could, however, serve to mitigate adverse impacts to rare plants, as discussed below and in staff's recommended Condition of Certification **BIO-12**.

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 (1) avoid and protect all white-margined beardtongue locations on the project site, (2) determine whether any additional late-season special-status plants occur on the site or would be affected by the project, and (3) mitigate any additional significant adverse impacts to special status plants either on-site, on acquired lands off-site, or through other off-site measures such as habitat improvement or management. Staff recommends on-site protection for all occupied habitat of white-margined beardtongue and on-site or off-site mitigation for any additional CNPS List 1A, 1B, or List 2 plants discovered within the project area or within 250 feet of any project activities 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 by avoiding and protecting all white-margined beardtongue locations on-site, locating and identifying late-season special-status plants that may be affected by the project, and mitigating any significant adverse impacts to them through additional on-site avoidance and protection, or through acquiring and protecting lands off-site, or through other off-site measures such as habitat improvement or management. Staff concludes that this mitigation strategy is both feasible and effective.

<u>Avoiding or minimizing on-site impacts</u>. Staff concludes that configuration of the project footprint to avoid areas that support white-margined beardtongue, as analyzed in this SSA would minimize direct impacts to special-status plant species.

Staff's recommended mitigation approach is to protect and manage all of the individual white-margined beardtongue plants within the project site. Protection would be achieved by avoiding direct and indirect impacts to the plants and a 250-foot buffer area surrounding each protected plant location. Staff concludes that this goal is feasible for white-margined beardtongue because only a few plants are known within the project site and the proposed project design would provide the recommended avoidance areas. Staff would expect a few more individual plants to be discovered during pre-construction

surveys, and that these could be similarly avoided. Staff concludes that this measure would reduce impacts to white-margined beardtongue 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 white-margined beardtongue 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.

Additional Field Surveys. Due to the potential for occurrence of special-status late-season plant taxa on the project site, staff recommends follow-up late-season field surveys in summer and fall 2010. Staff's proposed Condition of Certification **BIO-12, Section B** describes scheduling and other recommendations for these additional surveys; **Section C** describes thresholds for identifying significant impacts to special status plants that may be found during those surveys; and **Section D** would require that the project owner prepare and implement a mitigation plan for any such impacts. **Section D** also describes a series of potential mitigation strategies that would reduce these impacts below a level of significance.

Conclusion

Staff has concluded that implementation of proposed Conditions of Certification **BIO-1** through **BIO-12** and **BIO-17** would be effective and feasible in reducing impacts to special-status plants to less-than-significant levels. Proposed Condition of Certification **BIO-12** would require full protection of white-margined beardtongue on-site; require late-season field surveys to document presently unknown locations of other special-status plants; provides specific thresholds to determine whether impacts to newly discovered plants would be significant; and would require additional mitigation to reduce such impacts below a level of significance.

Impacts to Common Wildlife

Construction of the Calico Solar Project 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).

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 translocated to suitable receptor sites (See impacts to desert tortoise below for a detailed discussion of desert tortoise 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.

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). 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 (see staff's recommended Condition of Certification **BIO-15**).

Construction Noise and Lighting

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. Interestingly, some species of birds and common wildlife do not appear to be as sensitive to noise as other species; however, the long-term ecological consequences from noise exposure may have unseen effects to wildlife. Noise pollution exacerbates the problems posed by habitat fragmentation and wildlife

responses to human presence; therefore, highly fragmented or heavily visited locations are priority candidates for noise management (Barbour et al. 2010).

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.

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.

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 such as erosion and sedimentation control, worker training for avoidance of special-status wildlife, construction monitoring 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 Wildlife Biologist ; **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. Staff concludes that implementation of these measures would reduce impacts of the proposed project to less-than-significant levels under CEQA by requiring a qualified biologist and monitor to review and monitor activities that could affect wildlife; require worker training to minimize likelihood that wildlife would be crushed by vehicles or otherwise affected during project construction and operation; minimizing project impacts to only areas necessary for its

implementation; and preparing and implementing a detailed monitoring and reporting plan to ensure compliance and verification with each project mitigation measure is verified.

Special-Status Wildlife

Habitat in the proposed Calico Solar project area supports 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 3** 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 project site. These include the desert tortoise and Mojave fringe-toed lizard. Gila monsters, which are known to occur in isolated populations in portions of the Mojave 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

Mojave fringe-toed lizards were observed by the applicant and staff at several locations on the project site, and staff estimates that a minimum of 164.7 acres of suitable habitat is found on the site (**Biological Resources Figure 4**). Direct project impacts to Mojave fringe-toed lizards would include direct loss of habitat during site preparation and construction for the SunCatchers, roads, and drainage channels; mechanical crushing during site preparation, grading of access roads, preparation of staging areas, disturbance by noise or vibrations from the heavy equipment and future operations and maintenance activities; fugitive dust; and general disturbance due to increased human activity. The cryptic nature of Mojave fringe-toed lizards increases the likelihood that individuals could be injured or killed during ground-disturbing activities, even if equipment operators have been trained to avoid them.

Indirect project impacts to this species would include habitat degradation due to compaction of soils, introduction or spread of invasive exotic plant species, alterations in

the existing solar regime from shading, modification of prey base and altered species composition. The project would contribute to habitat isolation and fragmentation by preventing east-west movement by Mojave fringe-toed lizards between occupied habitat in the Pisgah Crater ACEC (to the east) and suitable habitat in sandy washes and aeolian sand deposits off-site to the west. Road construction, the placement of SunCatchers, and construction of drainage control structures may also alter the aeolian transport of sand within the site boundaries. The project also could affect sand transport extent eastward into the adjacent Pisgah Crater ACEC, though available information indicates that this impact would be relatively minor and is insufficient to quantify this potential impact. Further, the placement of fencing and the structures of the SunCatchers would provide roosting or hunting perches for avian predators that target lizard prey, including loggerhead shrike, merlin, American kestrel, burrowing owl, greater roadrunner and others.

The proposed project's large scale land use conversion and disruption of native habitat, including sandy washes and scattered patches of sand habitat, would likely disrupt the ability of Mojave fringe-toed lizard to effectively disperse east and west among suitable habitat areas on-site and off-site. Based on the patchy distribution of suitable habitat on the site, staff believes that Mojave fringe-toed lizards probably persist there by dispersing among discontinuous patches of good quality habitat. While small habitat patches may not be large enough to support viable populations, the numerous scattered habitat patches, together, support the population, provide refugia and foraging habitat, and may also play an important role in the linking populations east and west of the site.

Staff concludes that, in combination, the project's effects would seriously degrade Mojave fringe-toed lizard habitat throughout the site and would be likely to cause extirpation of the species on the project site. In the AFC the applicant indicated that to minimize direct effects to this species, the 16.9-acre dune complex would be avoided and preserved in perpetuity (SES 2008; SES 2009aa).

Based on staff's review of the project site, discussion with CDFG, BLM, and USFWS, and review of the Mojave fringe-toed lizard literature, staff considers the applicant's original proposed avoidance and preservation measures on-site to be inadequate to mitigate potential project impacts of the proposed project, described above, below a level of significance. The applicant's revised proposal as analyzed in this SSA does not include the 16.9-acre Mojave fringe-toed lizard set-aside area as proposed earlier. Staff has proposed Condition of Certification **BIO-13** (Mojave Fringe-Toed Lizard Mitigation). This measure requires the acquisition of suitable dune and wash habitat at a 3:1 ratio to compensate for loss on-site of high value habitat; and at a 1:1 ratio to compensate for suitable surrounding habitat.

Staff calculated minimum estimates of dune and wash habitat on site as 21.4 acres, and surrounding suitable habitat (i.e., 45-meter buffer) as 143.3 acres. At minimum, compliance with this measure would require the acquisition and dedication in perpetuity of 207.5 acres of suitable habitat. Staff's proposed Condition of Certification **BIO-13** would require the applicant to provide refined estimates of these acreages, to be verified by an expert in Mojave fringe-toed lizard ecology, as a basis for the final application of compensation requirements. Staff's estimated costs for compensation land are presented in **Biological Resources Table 6,** below.

Biological Resources Table 6
Mojave Fringe-Toed Lizard Compensation Cost Estimate[1]

	Task	Cost
1	Land Acquisition	$1000 per acre[2]
2	Level 1 Environmental Site Assessment	$3000 per parcel[3]
3	Appraisal	$5000 per parcel
4	Initial site work – clean-up, enhancement , restoration	$250 per acre[4]
5	Closing and Escrow Costs – 1 transaction includes landowner to 3rd party and 3rd party to agency	$5000 per transaction
6	Biological survey for determining mitigation value of land (habitat based with species specific augmentation)	$5000 per parcel
7	3rd party administrative costs – includes staff time to work with agencies and landowners; develop management plan; oversee land transaction; organizational reporting and due diligence; review of acquisition documents; assembling acres to acquire….	10% of land acquisition cost (#1)
8	Agency costs to review and determine accepting land donation – includes 2 physical inspections; review and approval of the Level 1 ESA assessment; review of all title documents; drafting deed and deed restrictions; issue escrow instructions; mapping the parcels….	15% of land acquisition costs (#1) × 1.17 (17% of the 15% for overhead)
	SUBTOTAL – *Acquisition & Initial Site Work*	***$424,541.25***
9	Long-term Management and Maintenance (LTMM) Fund – includes land management; enforcement and defense of easement or title [short and long term]; monitoring….	$1450 per acre[5]
	SUBTOTAL *– Acquisition, Initial Site Work, & LTMM*	***$725,416.25***
	NFWF Fees	
10	Establish the project specific account	n/a (presumes establishment of desert tortoise account for project)
11	NFWF management fee for acquisition & initial site work	3% of SUBTOTAL
12	NFWF Management fee for LTMM Fund	1% of LTMM Fund
	TOTAL *for deposit in REAT-NFWF Project Specific Account*	***$741,161.24***

1 - Estimates prepared in consultation with CDFG, BLM, and USFWS. All costs are best estimates as of summer 2010. Actual costs will be determined at the time of the transactions and may change the funding needed to implement the required mitigation obligation. Note: regardless of the estimates, the developer is responsible for providing adequate funding to implement the required mitigation.
2 - Generalized estimate taking into consideration a likely jump in land costs due to demand, and an 18-24 month window to acquire the land after agency decisions are made. If the agencies, developer, or 3rd party has better, credible information on land costs in the specific area where project-specific mitigation lands are likely to be purchased, that data overrides this general estimate. Note: regardless of the estimates, the developer is responsible for providing adequate funding to implement the required mitigation.
3 - For the purposes of determining costs, a parcel is 40 acres (based on input from CDD).
4 - Based on information from CDFG.
5 - Estimate for purposes of calculating general costs. The actual long term management and maintenance costs will be determined using a Property Assessment Report (PAR) tailored to the specific acquisition.

Depending on the location, habitat type, and soil conditions of the proposed desert tortoise mitigation lands (described below) it is possible that some or all of the compensation required under **BIO-13** would be achieved through implementation of tortoise habitat compensation. In general, dune formations are poor or minimally suitable tortoise habitat and most dune lands would be unsuitable as desert tortoise compensation land. However, some suitable Mojave fringe-toed lizard habitat (i.e., sand hummocks, sand ramps, desert washes, or other areas with suitable friable sands) may be found within parcels acquired as desert tortoise habitat in compliance with **BIO-17**, below.

With the implementation of staff's recommended Condition of Certification **BIO-13**, the applicant would not be required to avoid the dune complex and associated mosaic of habitats on-site and could utilize the area for the placement of SunCatchers or other project facilities. Energy Commission, BLM, USFWS, and CDFG staff believe that preservation of appropriate mitigation lands off-site would provide a more viable approach to mitigating project impacts to Mojave fringe-toed lizard then on-site preservation, as originally proposed. 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 by minimizing habitat disturbance to only that necessary for project development, and compensating for habitat loss through off-site habitat acquisition. In addition, the BLM may implement desert tortoise habitat enhancements as a part of the desert tortoise mitigation. These measures also could benefit Mojave fringe-toed lizard habitat so long as they are carried out on land where both species live. Even with implementation of these measures, staff notes that there would be a residual adverse impact to east-west movement habitat and consequent contribution to habitat fragmentation.

Gila Monster

Gila monsters were not observed during biological surveys conducted in 2007, 2008, or 2010 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. Staff's proposed Condition of Certification **BIO-14** requires that concurrent with the desert tortoise clearance surveys, 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 6,215 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 impact 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. Protocol surveys conducted in 2010 detected 104 tortoises within the project footprint identified in the SA/DEIS (**Biological Resources Figure 3**). Using the formula recommended by the USFWS to calculate the total number of tortoises that are likely present but were not identified during the surveys (either because the tortoises were below ground, concealed by vegetation or topography or overlooked by the surveyor), the originally-proposed project footprint is expected to support approximately 176 tortoises.

The highest concentration of tortoises is in the Phase II area of the original footprint, located on the foothills and bajadas of the Cady Mountains. Burrow density was also concentrated in this area; however, burrows were present to some degree in most of the project area. Interestingly, although habitat utilized by desert tortoises is present across most of the site, only eight tortoises were observed in the Phase I area. The high tortoise density in the foothills is likely linked to the microhabitats associated with the bajadas that provide increased foraging opportunities and soil structure for burrowing. Tortoise densities in the Phase II area are considered very high and well over the average tortoise density of (4.7 tortoise/km^2) identified by the West Mojave Plan (BLM et al. 2005). Because of concerns presented by staff and the wildlife agencies regarding the preservation of habitat near the toe of the Cady Mountains to provide a linkage and movement corridor for desert tortoise, the applicant modified the project footprint to provide approximately 4,000 feet between the project boundary and the base of the mountains as a movement corridor, as recommended by the USFWS Desert Tortoise Recovery Office (DTRO). This reduction would avoid some tortoises and would preserve movement areas and occupied habitat for tortoises. Nonetheless, the proposed project would result in the loss of high density tortoise habitat. Based on the new project footprint addressed in this SSA, 57 tortoises were identified during the 2010 surveys within the proposed project area.

Implementation of the proposed project would result in the direct loss of approximately 6,215 acres of occupied desert tortoise habitat: 4,074.7 acres occur north of the BNSF railroad and 2,139.9 are located south of the BNSF railroad. In addition, portions of excluded private lands identified as Not A Part [NAP] areas, see **Biological Resources Figure 1**) would be surrounded on three sides by the Calico Solar facility fencing. One of these areas is located in an area with low tortoise density adjacent to I-40, but the other is in an area of higher value habitat and tortoise density, north of the BNSF railroad tracks.

Habitat north of the railroad constitutes good quality habitat and supports high densities of desert tortoise in some areas. 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 are

numerous corridors for dispersal beneath the many railroad trestles that span drainages.

A site visit conducted by BLM and members of the USFWS DTRO on June 17, 2010 concluded that because of the low tortoise density of the area any remaining tortoises within the excluded property would be able to persist, and that connectivity to adjacent lands is present (via a culvert under Interstate 40). Staff considered these areas for inclusion in the total mitigation requirements however, based on an inspection of the project site these areas were determined to either provide adequate connectivity to occupied lands (NAP area to the north) or provide limited habitat value and have such low tortoise density (NAP area to the south) that mitigation for these areas was not warranted. Two tortoises found in a small exclusion area east of the southern NAP area would be left in place provided the culvert under Interstate 40 can be fenced to prevent tortoises from entering the highway. If the culvert cannot be fenced due to restrictions associated with highway maintenance, the two tortoises would be translocated off the site (see Conditions of Certification **BIO-15** and **BIO-16**).

Impacts to Critical Habitat

There is no federally designated critical habitat for desert tortoise within the proposed development footprint and no direct or indirect impacts to critical habitat would result from the project. The nearest critical habitat is in the Ord-Rodman Mountains Unit, directly south and upslope of the western end of the project site, across Interstate 40 (USFWS 1994b).

Direct Impacts

During construction of the Calico Solar project desert tortoises could 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 tortoises out of construction areas, translocating the resident desert tortoises from the Calico Solar site, reducing construction traffic and speed limits to reduce the incidence of vehicles strikes 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** (Desert Tortoise Clearance Surveys and Exclusion Fencing) would require installation of security and desert tortoise exclusionary fencing around the entire project site and along access roads, and **BIO-16** (Desert Tortoise Translocation Plan) would require that the applicant prepare and implement a desert tortoise translocation plan to move the tortoises currently living in the Calico Solar project area to proposed translocation sites. The applicant has identified several potential translocation sites including areas north, east, and west of the project site. Some of these sites are areas less than 500 meters from the project boundary which would limit the need for disease testing and may allow some tortoises to maintain a portion of their home ranges after translocation. Additional information on the status of the Translocation Plan and potential receptor sites is described below.

Section 6 of staff's proposed **BIO-9** (Compliance Verification) requires written verification that all desert tortoise impact avoidance, minimization, and compensation measures have been implemented. In addition, **BIO-9** would require written documentation any project-related impacts, including incidental take, to listed species; an assessment of the effectiveness of conditions of certification in minimizing and compensating for project impacts with recommendations for future mitigation measures; and any other pertinent information. Staff's proposed **BIO-8** (Impact Avoidance and Minimization Measures) 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. For example, these measures include minimization of construction, road, and traffic impacts; avoidance of vehicle impacts and wildlife entrapment; and monitoring of construction activities.

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 all the tortoises that occur within the proposed project footprint. The translocation of desert tortoise would occur prior to construction and would reduce the potential for construction and operation related mortality. However, the implementation of staff's proposed Conditions of Certification **BIO-15 (**Desert Tortoise Clearance Surveys And Exclusion Fencing) and **BIO-16** (Desert Tortoise Translocation Plan) 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

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 antagonistic behavior with other tortoises, 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 tortoises 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 of translocated desert tortoises 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 tortoises are well recognized in the desert tortoise scientific community. The 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. Current USFWS standards require disease testing and quarantine for any tortoise translocated more than 500 meters (985 feet). This requirement is intended to limit the potential exposure risk to healthy tortoises in adjacent habitat.

To date the applicant has not finalized the Draft Desert Tortoise Translocation Plan. As of June 2010 the USFWS, BLM, CDFG, and staff are still reviewing the information provided by the applicant and working to identify adequate translocation sites and procedures. Potential translocation sites have been surveyed for desert tortoises. Some sites already support high desert tortoise densities, which limit the number of tortoises that can be introduced into them. Staff, USFWS, BLM, and CDFG are still evaluating the number of tortoises that may be translocated to the linkage area north of the site. Staff's proposed Condition of Certification **BIO-16** requires development of a final Desert Tortoise Translocation Plan in consultation with staff, CDFG, BLM, and USFWS to address outstanding concerns that these agencies have regarding the specifics of the plan. The plan, while still under development, would be reviewed by BLM, CDFG, USFWS, and Energy Commission staff, and approved pursuant to **BIO-16**, and would be implemented for the tortoises detected during clearance surveys. The Desert Tortoise Translocation Plan includes the identification and prioritization of potentially suitable locations for translocation; desert tortoise handling and transport considerations (including temperature); animal health considerations; a description of translocation scheduling, site preparation, and management; and specification of monitoring and reporting activities for evaluating success of translocation. With implementation of staff's proposed Condition of Certification **BIO-16**, adverse impacts associated with desert tortoise translocation would be minimized.

Habitat Loss and Compensatory Mitigation

Construction of the proposed Calico Solar facility would result in the direct and permanent loss of 6,215 acres of occupied desert tortoise habitat (TS 2010d). 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 tortoises will survive and reproduce on these lands, thus offsetting over time the decrease in numbers of tortoises 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 it would allow 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 mitigation requirements 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 project's impacts would result in a net loss of desert tortoises and their habitat.

To fully mitigate the loss of desert tortoise habitat under CESA,CDFG usually requires a mitigation ratio greater than 1:1 for compensation lands (i.e., acquisition of more than 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 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 and also pursues desert tortoise recovery goals 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. In consultation with USFWS and CDFG, staff has concluded that a mixed habitat compensation ratio of land acquisitions based on the final construction footprint would mitigate for desert tortoise habitat loss within the Project Disturbance Area. The rationale for the mixed ratio is that tortoise habitat, use of the site, and long term habitat value for tortoise varies within the project footprint.

The highest tortoise densities were observed in the northern portions of the project site where more complex topography provides for better foraging and soils for burrowing than found on the southern portions of the site. The northern areas abut other occupied lands and, while subject to some level of historic disturbance from mining, are more isolated from human activity and provide improved connectivity to other areas of occupied habitat, due in part to their distance from Interstate 40 and the BNSF railroad tracks. Staff proposed mitigation for habitat loss on the portion of the project site north of the BNSF railroad tracks (4,075 acres) at a 3:1 ratio. 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 the Ivanpah Solar Energy Generating Station, and with Incidental Take Permits issued by CDFG for other non-Energy Commission jurisdiction projects in the region.

Conversely, only two tortoises and a scattered assemblage of burrows were observed in the area between the BNSF railroad and Interstate 40. This area has been subject to

repeated anthropogenic disturbance, including construction of the BNSF Railroad, Interstate 40, and pipeline and utilities. The railroad and interstate highway have also modified the hydrology of this area to some degree by intersecting a series of desert washes that flow from the Cady Mountains (SES 2009l), though culverts and railroad trestles continue to convey flow and sediment south of the BNSF Railroad. Because the southern portion of the project site between the railroad and highway (2,140 acres) has been subject to previous and ongoing human disturbance, and provides poor biological connectivity with occupied habitat to the north, staff recommends a 1:1 ratio for this area.

State and Federal Desert Tortoise Mitigation Requirements

To satisfy BLM requirements a 1:1 compensation ratio has been applied for the entire 6,215 acre site. This includes lands both north and south of the BNSF railroad. This has been deemed adequate to mitigate for tortoise because the BLM pursues 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).

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. 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 for habitat acquisition and management.

As specified in staff's proposed Condition of Certification **BIO-17**, acquisition, protection and enhancement of desert tortoise habitat, in combination with the requirements of **BIO-15** and **BIO-16**, would mitigate project impacts to desert tortoise. Acquisition of appropriate mitigation lands as described in **BIO-17** would secure lands that would promote protection of high quality desert tortoise habitat and facilitate biological connectivity in the region.

Staff's proposed Condition of Certification **BIO-17**, Desert Tortoise Compensatory Mitigation, specifies security for acquisition of 14,365 acres and provides an estimate of associated costs. These costs include an acquisition fee of $1,000 per acre, initial habitat improvement costs at $250 per acre, long-term management fund is estimated at $1,450 per acre, and other administrative and acquisition costs (see **Biological Resources Table 7**). The estimated composite mitigation cost to meet staff's recommendation for establishing the security would be $3,501 per acre. This security amount may change with updated appraisals and when a Property Analysis Record is

prepared for the parcels selected for acquisition. It is important to note that these are estimates based on current costs; the requirement is defined in terms of acres, not dollars per acre, and actual costs may vary.

Integrating State and Federal Desert Tortoise Mitigation

Staff from BLM, Energy Commission, USFWS, and CDFG agree that compensatory mitigation at the 3:1 and 1:1 ratios described above is appropriate for the Calico Solar Project's impacts to desert tortoise habitat. However, some differences remain between the federal and state approach to desert tortoise mitigation that currently preclude a complete integration of desert tortoise mitigation requirements. One difference is the state requirement for permanent protection of acquired mitigation lands. Energy Commission staff and CDFG require that mitigation lands acquired for endangered species be maintained and protected in perpetuity for the benefit of those species. The BLM cannot always make the same commitment to protecting acquired mitigation lands because their multiple use mandate restricts their ability to designate lands solely for conservation purposes and to exclude potentially incompatible development and activities.

The Renewable Energy Action Team Agencies (Energy Commission, BLM, CDFG, and USFWS) agree that to address the in perpetuity protection requirement, any lands acquired and subsequently donated to BLM will have either a deed restriction or conservation easement in title that will preclude future development of the land. The REAT Agencies also note that protection could be achieved by buying private in-holdings within designated wilderness or wilderness study areas, being that these areas are congressionally designated and as such preclude any development within them, thus meeting the requirement for in perpetuity protection. The BLM has an established process for accepting lands with deed restrictions or conservation easements and is working on streamlined version of this process. Staff anticipates that the streamlined process for in-perpetuity protection of BLM mitigation lands will be established before the end of 2010 (Fesnock pers. comm., Flint pers. comm.).

Rather than just purchasing compensation lands, BLM may use a portion of the compensation funds to implement desert tortoise habitat enhancement measures. These measures may include, but would not be limited to: Construction of tortoise proof fencing along Hwy 247 to prevent desert tortoises from entering the roadway; installation of barrier fencing (e.g. post and cable) along Camp Rock Road to prevent unauthorized vehicular use of important tortoise habitat; or rehabilitation of administratively closed or undesignated routes within Ord-Rodman DWMA. Additionally, habitat enhancement such as exotic weed control, modifying mine openings to reduce or prevent risk of tortoises falling into them, and funding a headstart program for desert tortoise in coordination with the USFWS's Desert Tortoise Recovery Office may also be implemented with some of these funds.

Staff believes that habitat enhancement measures, in combination with habitat acquisition, would feasibly and effectively mitigate the project's impacts to desert tortoises. The measures outlined above are consistent with the USFWS desert tortoise recovery plan recommendations (USFWS 1994, 2008a), which describe actions in addition to land acquisition that could reduce threats to desert tortoise populations. Some of these recommended actions include habitat restoration and invasive plant

control, eliminating livestock and burro grazing, fencing to exclude livestock and vehicles or reduce the incidence of road strikes, 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. These measures would address specific known threats to desert tortoise as identified in the Recovery Plan (USFWS 1994b), Draft Revised Recovery Plan (2008a) and Spotlight Species Action Plan (USFWS 2009e). These threats, which would be relieved in part through the habitat enhancement measures listed above, include proliferation of roads; off-highway vehicle activity; deliberate maiming, killing, or collecting; habitat invasion by non-native invasive species; and increased frequency of wildfire due to invasion of desert habitats by non-native plant species.

The amount of the security deposit (calculated below) is based upon estimated cost to purchase and protect mitigation land at the ratios described above. BLM may use no more than the portion of the fund that corresponds to staff's estimated purchase and protection cost for 6,215 acres of desert tortoise habitat (i.e., a 1:1 ratio for the entire project site) to implement habitat enhancement measures as described above. The remainder of the mitigation obligation (i.e., the additional 2:1 compensation ratio for the 4,075 project site acres north of the BNSF railroad tracks, amounting to 8,150 acres of compensation land) shall be used only for compensation land acquisition and protection, initial improvement and management.

Calculation of Security for Desert Tortoise Compensatory Mitigation

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 that are not carried out before project impacts occur. 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. Staff's proposed conditions of certification typically specify the dollar amount of the security, and include a provision for adjusting that security amount when parcel-specific information is available. 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) a fund to support long-term management of the acquired lands.

The latter cost for the long-term management fund is typically the largest component of the mitigation fee. Interest from the fund provides enough income to cover annual stewardship costs on the acquired lands and includes a buffer to offset inflation. The amount for the fund is established by a Property Analysis Record (PAR), a computerized database methodology developed by the Center for Natural Lands Management (http://www.cnlm.org/cms) which calculates the costs of land management activities for a particular parcel. These activities include preparation 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 prepared 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 acquisition. When the management plan is completed for the acquired parcel, activities such as these are thereafter funded from the interest produced by the long-term management fund described above.

In contrast to CDFG's mitigation approach, BLM does not require a long-term maintenance and management fee or other funding to manage the acquired desert tortoise mitigation lands To mitigate project impacts on BLM lands, BLM typically requires a cash payment (proffer) prior to initiating ground-disturbing activities, which generally includes a per-acre cost reflecting current land value and recent purchase prices, as well as additional acquisition and indirect costs and funding for appraisals, environmental site assessments, property cleanup, and an inflation contingency. BLM also pursues recovery goals through implementation of region-wide management plans and land use planning as described in the WEMO and the Desert Tortoise Recovery Plan (USFWS 1994) rather than through parcel by parcel acquisition and management. As noted by the REAT Agencies, mitigation methods may be employed which would satisfy both BLM and the State agency legal requirements.

The applicant may elect to purchase and permanently protect compensation lands itself; to fund the acquisition and initial improvement of compensation lands through NFWF by depositing funds for that purpose into NFWF's REAT Account; or to fund the acquisition of compensation lands through to a third party other than NFWF, as outlined in **BIO-17** and **BIO-30**. Further, **BIO-17** would require that the project owner provide financial assurances to guarantee an adequate level of funding to implement the compensation measures described above. Because there are several suitable options available to the applicant to satisfy the compensation requirement, and because mitigation requirements must satisfy the requirements of both state and federal Endangered Species Acts, staff's calculation of the security amount includes estimates of all transaction and management fees described above. These calculations are presented in **Biological Resources Table 7**.

Biological Resources Table 7
Desert Tortoise Compensation Cost Estimate[1]

	Task	Cost
1	Land Acquisition	$1000 per acre[2]
2	Level 1 Environmental Site Assessment	$3000 per parcel[3]
3	Appraisal	$5000 per parcel
4	Initial site work – clean-up, enhancement , restoration	$250 per acre[4]
5	Closing and Escrow Costs – 1 transaction includes landowner to 3rd party and 3rd party to agency	$5000 per transaction

	Task	Cost
6	Biological survey for determining mitigation value of land (habitat based with species specific augmentation)	$5000 per parcel
7	3rd party administrative costs – includes staff time to work with agencies and landowners; develop management plan; oversee land transaction; organizational reporting and due diligence; review of acquisition documents; assembling acres to acquire….	10% of land acquisition cost (#1)
8	Agency costs to review and determine accepting land donation – includes 2 physical inspections; review and approval of the Level 1 ESA assessment; review of all title documents; drafting deed and deed restrictions; issue escrow instructions; mapping the parcels….	15% of land acquisition costs (#1) × 1.17 (17% of the 15% for overhead)
	***SUBTOTAL** – Acquisition & Initial Site Work*	***$28,393,807.50***
9	Long-term Management and Maintenance (LTMM) Fund – includes land management; enforcement and defense of easement or title [short and long term]; monitoring….	$1450 per acre[5]
	***SUBTOTAL** – Acquisition, Initial Site Work, & LTMM*	***$49,223,057.50***
	NFWF Fees	
10	Establish the project specific account	n/a (presumes establishment of desert tortoise account for project)
11	NFWF management fee for acquisition & initial site work	3% of SUBTOTAL
12	NFWF Management fee for LTMM Fund	1% of LTMM Fund
	***TOTAL** for deposit in REAT-NFWF Project Specific Account*	***$50,295,164.23***

1 - Estimates prepared in consultation with CDFG, USFWS, and BLM. All costs are best estimates as of summer 2010. Actual costs will be determined at the time of the transactions and may change the funding needed to implement the required mitigation obligation. Note: regardless of the estimates, the developer is responsible for providing adequate funding to implement the required mitigation.
2 - Generalized estimate taking into consideration a likely jump in land costs due to demand, and an 18-24 month window to acquire the land after agency decisions are made. If the agencies, developer, or 3rd party has better, credible information on land costs in the specific area where project-specific mitigation lands are likely to be purchased, that data overrides this general estimate. Note: regardless of the estimates, the developer is responsible for providing adequate funding to implement the required mitigation.
3 - For the purposes of determining costs, a parcel is 40 acres (based on input from CDD).
4 - Based on information from CDFG.
5 - Estimate for purposes of calculating general costs. The actual long term management and maintenance costs will be determined using a Property Assessment Report (PAR) tailored to the specific acquisition.

Indirect Impacts to Desert Tortoise

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 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. Implementation of the worker environmental awareness training (Condition of Certification **BIO-6**) and restrictions on pets being brought to the site (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 agricultural lands 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.

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 would 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 with increased Calico Solar Project construction and operations traffic, further exacerbating the raven/predator attractions and increasing desert tortoise predation levels. In addition, bird collisions with facility structures or transmission lines may also attract ravens. The Calico Solar area is already subject to elevated raven predation pressure and any 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 reduced recruitment 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** (Impact Avoidance and Minimization Measures) and **BIO-18** (Raven Monitoring, Management, and Control Plan). These conditions would minimize the project's potential to cause increased predation on desert tortoise by ravens and other species in the project area by requiring a variety of impact avoidance and minimization measures to minimize and control trash and other human activities that tend to increase raven activity; and on-site

raven activity management and control, and a per-acre contribution to support the USFWS Regional Raven Management Program (below).

Regional Approach to Raven Control

The USFWS, in cooperation with CDFG and BLM, has developed a comprehensive, regional raven management and monitoring program in the California Desert Conservation Area to address the regional, significant threat that increased numbers of common ravens pose to desert tortoise recovery efforts (USFWS 2010b). The Regional Raven Management Program will implement recommendations in the USFWS E*nvironmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise* (USFWS 2008b). To mitigate the Calico Solar Project's contribution to cumulative and indirect impacts on desert tortoise from raven predation, staff proposes that the applicant contribute toward implementation of the Regional Raven Management Program (USFWS 2010b), as described in staff's proposed Condition of Certification **BIO-18**. To mitigate for the regional effects of ravens on desert tortoise, the applicant shall provide a onetime fee in the amount of $105.00 per acre to the REAT Account held by the National Fish and Wildlife Foundation (NFWF), for 6,215 acres of desert tortoise habitat disturbed by the project. This payment of $652,575 would support the regional raven management plan activities focused within the Mojave Desert Recovery Unit, which would be adversely affected by increases in raven subsidies attributable to the proposed project. The fees contributed by the applicant would fund staff who would implement the raven removal actions, education and outreach efforts, and surveying and monitoring activities identified in the federal Environmental Assessment (USFWS 2008b). Staff has concluded that that implementation of these actions would be an effective means of reducing the project's cumulative contributions to desert tortoise predation from increased raven numbers; would reduce the impacts below a level of significance; and would satisfy the requirements of the CDFG for full mitigation pursuant to CESA.

The applicant's Raven Management Plan would involve identifying and preventing conditions that might attract or support ravens (for example, eliminating food sources such as garbage or roadkill and minimizing creation of structures that could provide ravens perches, nests, or roosts), monitoring the effectiveness of raven management and control measures, and then implementing additional adaptive management measures to make sure that the project does not result in an increase in raven numbers. Implementation of measures in Condition of Certification **BIO-18** would avoid or minimize the contributions of the project to increased desert tortoise predation from ravens to less-than-significant levels.

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. The implementation of measures in **BIO-18** would further reduce subsidies for desert tortoise predators through the collection and management of road kill.

Conclusion – Impacts and Mitigation for Desert Tortoise

Staff's proposed Conditions of Certification **BIO-1** through **BIO-9** describe measures that would avoid and minimize direct impacts to sensitive biological resources, including desert tortoise. Staff's proposed Conditions of Certification **BIO-15** through **BIO-17** would require additional measures specific to desert tortoise, including installation of tortoise exclusion fencing; pre-construction clearance surveys; monitoring; verification that all desert tortoise impact avoidance, minimization, and compensation measures to replace lost habitat are implemented; translocation of tortoises from the project area; and acquisition of compensation lands. Staff's proposed Condition of Certification **BIO-18** would require the preparation and implementation of a Raven Monitoring, Management, and Control Plan which would minimize impacts to desert tortoise resulting from increases in raven populations.

Staff concludes that implementation of these conditions would reduce impacts to desert tortoise to less-than-significant levels under CEQA and would also satisfy the CESA requirements to fully mitigate impacts to desert tortoise under Fish and Game Code Section 2081. The conditions would minimize habitat disturbance to only that necessary for project development; would prevent desert tortoises from entering the project site through installation of exclusion fencing; would require removal and translocation of tortoises now present on the project site; and would compensate for habitat loss through off-site habitat acquisition. All of these measures would be monitored and verified.

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, 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.

Several other species have a moderate to high potential to occur on site, including prairie falcon (*Falco mexicanus*) which was observed during helicopter surveys for golden eagles and black-tailed gnatcatcher (*Polioptila melanura*). Both prairie falcon and golden eagle nest within the Cady Mountains and utilize the project site for foraging to some degree. The project site provides roosting and foraging habitat for a variety of wintering birds such as merlins, sharp-shinned hawks, and ferruginous hawks. In addition, the 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.

A single stick nest was observed in the tamarisk windrow along the BNSF railroad in this location. This nest showed signs of both raven and owl use. During surveys of the site in May 2010 the nest was occupied by a raven and three chicks. 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. Results from the March 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, one 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 6,215 acre 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** (Pre-Construction Nest Surveys

and Impact Avoidance Measures for Migratory Birds). 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., 6,215 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/or 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, to avoid impacts to nesting birds staff recommends conducting preconstruction surveys of the work area 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 Code provisions, 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 compensate for 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.

Information proposed in the Biological Technical Report 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. Surveys conducted in early March 2010 for golden eagles and burrowing owls did not detect any additional Swainson's hawks; however, the timing may have been too early to pick up the birds. No additional observations of Swainson's hawks have been made during a variety of other surveys conducted between February and June 2010. 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 in the region. 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 compensate for 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 and by staff in 2010 (SES 2009aa). Helicopter surveys for this species conducted on March 11th and 12th, 2010 detected approximately eight inactive, but potential golden eagle nests, and one active nest that contained an incubating adult golden eagle within a ten-mile radius of the project (TS 2010f). Golden eagle territories can have up to six nests, but they have been found to contain up to 14 nests in some locations (Kochert et al. 2002). The active nest is located approximately 3.5 miles east of the proposed

project area and does not occur in the line of sight. Nest sites or breeding activity was not observed on the site and the project does not support nesting habitat. However, potential nesting habitat is present within the adjacent Cady Mountains. 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 one 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 disturbance to this species or the abandonment of nest sites.

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 USFWS implemented new rules (74 FR 46835) governing the “take” of golden and bald eagles. 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.

Based on guidance provided by the USFWS (72 FR 31132 [disturbance], June 5, 2007) staff defined disturbance as an activity that would result in injury to an eagle or which would substantially interfere with normal breeding, feeding, or sheltering behavior. For example, a nestling being knocked from the nest by a startled adult would be considered an injury. A nestling fed inadequately because adults were agitated in the vicinity of the nest due to construction-related noise and activity would also be considered substantial interference, as would a situation in which nestlings starve because the adults were excluded from their familiar foraging grounds and could not provide adequate food to their young. Staff concluded that project construction activities could potentially injure or disturb golden eagles if nests were established sufficiently close to project boundaries to be affected by the sights and sounds of construction.

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). A study by Whitfield et al. (2008) found that human activities up to and in some cases exceeding one mile from a nest site have resulted in nest disturbance.

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 6,215 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 and noise generated from the units 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.

Golden eagles are known to nest within 3.5 miles of the project site and there remains a potential for the species to nest within sight of the proposed project. In order to avoid impacts to golden eagle, staff has developed the proposed Condition of Certification **BIO-20** (Golden Eagle Inventory and Monitoring), which recommends that during construction, golden eagle nest surveys be conducted in accordance with USFWS guidelines to verify the status of golden eagle nesting territories within 10 miles of the project boundaries. If active nests are detected, the project owner would establish a disturbance-free buffer around the nest. No construction activities would be authorized within the 1.0-mile buffer pending the successful fledging of the nest. Staff's proposed Condition of Certification **BIO-22** also recommends monitoring guidelines, performance standards, and adaptive management measures to avoid adverse impacts to birds, including golden eagles from project construction. These measures would require the project owner to monitor nest sites within the 10-mile buffer, and if the loss of foraging habitat was determined to result in adverse effects to the birds, to implement management actions such as temporary road closures near nest sites, weed management, or other approved enhancement actions to minimize the potential for take of the species.

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 compensate for this habitat loss by the preservation of similar foraging areas.

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-22** (Avian Protection Plan / 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,** and **BIO-22** which include worker training, implementation of Best Management Practices, pre-construction surveys, biological monitoring, avian protection plan, 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

Burrowing owls are known to occur in the project area. Two burrowing owls were detected in the north-central portion of the original project site, as described in the SA/DEIS. A third burrowing owl was observed approximately 2,500 feet from the eastern project boundary in the adjacent BLM ACEC during the 2008 surveys. Surveys for burrowing owls were not conducted in 2009. Burrowing owl surveys conducted in 2010 covered the 8,230-acre site as originally proposed by the applicant. These surveys identified two additional burrowing owls within the survey area, one in the south-central portion of the area and the other in the east-central portion of the area. Twelve burrows with sign were observed throughout the survey area during these surveys. The revised project boundary as analyzed in this SSA now excludes most if not all of the locations of the owl sightings. However, burrows that could support burrowing owls occur within the project boundary as analyzed here.

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 burrowing owls may be detected in portions of the project site prior to or during the four year development of the proposed project.

Construction of the proposed Calico Solar facility could 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 they utilize 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, seasonal displacement outside the breeding season would be less adverse than loss of breeding habitat. To date the applicant has not detected breeding activity on the project site.

Direct impacts to burrowing owls would include the crushing of any suitable burrows, removal or disturbance of vegetation (including mowing, increased noise levels from heavy equipment and the SunCatcher engines, increased human presence, and exposure to fugitive dust. Indirect impacts could include the loss or degradation of foraging or breeding habitat due to the colonization of noxious weeds, altered plant community composition caused by operation and maintenance, and long term human presence associated with the four-year construction schedule. 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.

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 6,215 acres of habitat, passive relocation may result in the repeated harassment of owls should the owls relocate into areas subject to later project disturbance. While construction of replacement burrows in off-site areas would have some potential benefits to the species, it is likely that burrowing owls would select available, natural burrow sites if available near their previously occupied territories. Because of the timeframe this behavior could necessitate multiple passive relocation events for individual birds. Each relocation event would stress the birds and exposes them to increased predation risk, 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 therefore recommends passive relocation techniques if burrowing owls are detected within the Project Disturbance Area and need to be relocated to avoid direct impacts. Staff requests that the applicant coordinate with CDFG on the approval of the color-banding of any burrowing owls to be passively relocated (in accordance with the guidance provided by USGS bird banding lab (http://www.pwrc.usgs.gov/bbl) in order to document the success of the burrowing owl relocation and monitoring program. Staff would also support a cooperative research effort with the Applicant, CDFG and USFWS to develop a research protocol to assess the efficacy of an active translocation program. The California Burrowing Owl Consortium (CBOC 1993) guidelines state that offsite suitable habitat for use by burrowing owl must be acquired at one of the following ratios:

- Replacement of occupied habitat with occupied habitat at 9.75 acres (6.5 acres times 1.5 acres) per pair or single bird;
- Replacement of occupied habitat with habitat contiguous to currently occupied habitat at 13.0 (6.5 acres times 2) acres per single pair or single bird, or;
- Replacement of occupied habitat with suitable unoccupied habitat at 19.5 (6.5 acres times 3) acres per pair or single bird.

The USFWS notes that the above guidelines were developed for owls nesting in coastal habitats, and their efficacy in desert environments has not been ascertained (Sorenson pers. comm.). No documentation is available to statistically evaluate the success of passive relocation in southern California. Passive relocations in Western Riverside County have not involved banded birds, so information on rates of success and direct/indirect mortality are not available. Reports elsewhere (Trulio 1995; 1997) do not provide long term analyses associated with passive relocation efforts to determine if passively relocated burrowing owls are present in the area after one or more years. The lack of documented success of passive translocations raises concerns regarding the fate of evicted owls.

Acquisition of the appropriate amount of offsite habitat for burrowing owl should take into consideration the number of owls being displaced as a result of the Project, the amount of foraging habitat being impacted by the Project, and the average home ranges and foraging distances of breeding and non-breeding owls. Diurnal home range for owls can be 150 feet on both sides of burrow. Nocturnal home range is much larger, 1 square mile per owl pair, and several owls can overlap in that 1 square mile (Bloom pers. comm.). The mean home range for 11 male burrowing owls in 1998 and 22 males in 1999 was 177 ha (437 acres) and 189 hectares (467 acres), respectively, at naval Air Station in Lemoore, California which is located south of Fresno (Bloom 2003). Male burrowing owls often move greater than 1,000 meters when foraging in the breeding season and home ranges can often times overlap (Bloom 2003).

Staff has reviewed the applicant's proposed mitigation (pre-construction burrowing owl survey; passive relocation if necessary; and provision of replacement burrows) and has incorporated these and additional measures (determination of breeding status; methods and timing of passive displacement; and conformance with CBOC Guidelines, below) to reduce impacts to burrowing owls into staff's proposed Condition of Certification **BIO-21** (Burrowing Owl Impact Avoidance and Minimization Measures).

Condition **BIO-21** prescribes that the applicant must establish the breeding status of the owls on-site and, should it become necessary to destroy an occupied burrow, the applicant would be required to avoid the nest during the breeding season, then implement a passive relocation plan outside the breeding period, construct artificial burrows, and acquire compensatory lands consistent with the California Burrowing Owl Consortium (CBOC 1993) guidelines to offset the loss of foraging habitat. In addition, implementation of staff's proposed Condition of Certification **BIO-17**, the compensatory mitigation plan for desert tortoise, could also serve to offset burrowing owl habitat loss by the preservation of similar habitat off-site, depending upon the specific location of the compensation lands and their occupancy by burrowing owls. There are many areas in the Mojave Desert where desert tortoise and burrowing owls do not co-occur.

With implementation of staff's recommended Conditions of Certification **BIO-1** through **BIO-10** and **BIO-21**, the project's impacts to burrowing owls would be mitigated to less-than-significant under CEQA. The conditions would minimize habitat disturbance and off-site impacts to only that necessary for project development, and would passively relocate any burrowing owls in the project area, removing them from harm's way.

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 in the Cady Mountains ranging from 3.5 to 8 miles from the project site during golden eagle helicopter surveys conducted in March 2010 (TS 2010f). In addition, the applicant observed sheep skulls within 0.5 miles of the project site. Staff also detected sheep scat on one of the large volcanic outcrops that abuts the project site. An occupied year-round use area for the Cady Mountains population of at least 300 Nelson's bighorn sheep is located within 0.5 miles from the project boundary (DW 2010).

Nelson's bighorn sheep are known to occur adjacent to the project site and likely forage along the bajadas that occur near the toe of the Cady Mountains. Direct effects to Nelson's bighorn sheep would avoid the mapped year-round range but would likely result in the loss of foraging opportunities for this species to some degree. Typically this species forages within one mile of the foothills where adequate escape habitat occurs. As designed, the project footprint would avoid most of these areas, but bighorn sheep may avoid foraging close to the fence line. Lambing areas would not be impacted by the proposed project. Lambing areas are typically associated with ledges on steep cliffs where the females can protect the lambs from predation. When the lambs are mobile, the females and lambs stay near steep escape habitat. Nelson's bighorn sheep lambing habitat necessitates proximity to dependable water (within ca. one mile), steep rocky terrain, and high-quality forage (Krausman et al. 1999; Sawyer et al. 2009). These habitat elements allow the female and her lamb daily access to drinking water; ready access to escape habitat; and food quality to support the dietary needs of the lactating female. Desert bajadas and lower alluvial fans, including the project area and adjacent upslope bajada, do not provide ideal lambing habitat due to topography and vegetation. The bajadas are distant from cliffs, talus slopes, or other suitable escape cover. Creosote bush shrublands, dominant on the bajadas, are used proportionately less by bighorn sheep than other habitats. Creosote bush is high in resins, and makes up only a small proportion of bighorn sheep diets (Krausman et al. 1989).

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.). 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), aircraft (Krausman et al. 1998), and mining (Jansen et al. 2007; 2009). 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 sheep 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 (TS 2010f).

Indirect impacts include the degradation of habitat, noise, dust, and lighting. Indirect effects to habitat would occur within the 1,000-foot buffer of the proposed project. Staff estimates that noise levels during operation would attenualte to approximately 60 dBA Leq at approximately 850 feet from the project fence line. Staff believes that noise may adversely affect Nelson's bighorn sheep habitat usage, on the desert bajada at distance to 850 feet from the project boundary. 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. A road proposed to border the facility would provide the public greater access to the foothills of the Cady Mountains. While this area is currently public land, access roads are limited in the region.

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).

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 contact 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).

Staff has concluded that construction and operation of the Calico Solar Project could reduce some foraging opportunities for bighorn sheep on the lower bajadas; however, this is not expected to result in a significant loss of habitat. Because the project footprint has been revised since the SA/DEIS to accommodate movement and foraging, the proposed project is not expected to pose serious restrictions to movements for bighorn sheep. The reduced footprint would also avoid potential lambing areas.

In order to minimize effects of the project on bighorn sheep, the applicant proposed general monitoring of Nelson's bighorn sheep found on-site or within 2,000 feet of the site. Staff has incorporated the applicant's proposal into Condition of Certification **BIO-23** and recommended additional measures to minimize construction disturbance to bighorn sheep. This measure would require construction monitoring and the potential cessation of construction activities should sheep be present within 500 feet of the project area.

In summary, the implementation of staff's proposed Conditions of Certification **BIO-1** through **BIO-9** and **BIO-23,** 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. Surveys completed by the applicant in 2010 indicate approximately three badger dens were located on the site (TS 2010d). Desert kit fox is also present, and over 36 burrows were noted on site (TS 2010d). The desert kit fox (*Vulpes macrotis*), while not a special-status species, is protected under Title 14, California Code of Regulations.

Direct project impacts to American badger and desert kit fox would 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 (6,215 acres divided by 338-acre home ranges) to as few as five home ranges if home ranges are large (6,215 acres divided by 1,549-acre home ranges). Considering the fact that only three badger burrows were noted during the 2010 surveys, the territory size in this region is likely to be fairly large. 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. These include 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 whether the burrow is occupied and, if so, whether it is a maternal den. . 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 would 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. While individual animals could persist within the fenced project area for a time, and perhaps even reproduce, staff concludes that the project area would not support sustainable badger or kit fox populations over the long term and that it eventually would become unoccupied and unavailable to these animals, due to desert tortoise fencing and incompatible land use.

Staff concludes that avoidance of badgers and kit fox alone would not mitigate the direct, indirect, and operational effects of the Calico Solar Project. Staff's proposed Condition of Certification **BIO-24** 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-24**. Implementation of **BIO-24** 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

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 construction 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-25** 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

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 project site is located in an area supporting a complex assemblage of sensitive plant and wildlife species. Because of the project's geographic location, sited between I-40 and the Cady Mountains, the proposed project has the potential to adversely affect wildlife movement by restricting the size and functional value of the existing movement corridor. The amount and distribution of suitable habitat within a movement corridor 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.

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. A recent study completed in cooperation between Caltrans and the CDFG has identified the project region as an essential connectivity area between the Bristol and Ord Mountains (Spencer et al. 2010). This area acts as an important link between wildlife populations in the eastern and western deserts. As proposed, the Calico Solar Project is located within the essential connectivity area and has the potential to adversely affect wildlife movement.

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 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 following corridor functions are important in evaluating impacts to wildlife movement corridors and have been considered in the context of evaluating impacts from the proposed Calico Solar Project:

a. Movement corridors are physical connections that allow wildlife to move between patches of suitable habitat.
b. Dispersal corridors are linear landscape features that link two or more areas of suitable habitat that would otherwise be fragmented and isolated from one another by rugged terrain, changes in vegetation, or human-altered environments (Beier and Noss, 1998). Dispersal corridors provide physical links for genetic exchange and allow animals to access alternative territories as dictated by fluctuating population densities.
c. Landscape habitat linkages (or simply linkages) are relatively large open space areas that contain natural habitat and provide connection between at least two larger adjacent open spaces that can provide for both diffusion and dispersal of many

species (USACE and CDFG 2009). Linkages can be large enough areas to support the complete life history of a target species such as desert tortoise.

d. Wildlife buffers are areas between the urban development edge and an important biological resource. These buffers protect the resource from adverse edge effects such as habitat degradation, increased occurrence of non-native and urban-related species, increased predation from domestic animals and mesopredators (e.g., raccoons, skunks, snakes, foxes), and other edge effects. (USACE and CDFG 2009).

e. Travel routes are usually landscape features, such as ridgelines, drainages, canyons, or riparian corridors within larger natural habitat areas that facilitate movement and provide access to water, food, cover, den sites, or other necessary resources (Meffe and Carroll 1997).

f. Wildlife crossings are small, narrow areas of limited extent that allow wildlife to bypass an obstacle or barrier. Crossings typically are manmade and include culverts, underpasses, drainage pipes, bridges, and tunnels to provide access past roads, highways, pipelines, or other physical obstacles. Wildlife crossings often represent "choke points" along a movement corridor because useable habitat is physically constricted at the crossing by human-induced changes to the surrounding areas (Meffe and Carroll 1997).

Construction of the proposed Calico Solar facility would result in the land use conversion of approximately 6,215 acres of open space. This includes approximately 2,140 acres of open space between the BNSF Railroad and I-40 and approximately 4,075 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 region to function as a wildlife linkage. Depending on the mobility, home range requirements, and dispersal abilities of the species, the project site would have different functional roles in the life history of the target species. For desert tortoise the project site supports live-in habitat and acts as a linkage to adjacent areas for dispersing animals. For Nelson's bighorn sheep the area supports winter forage and likely acts as a movement corridor for intermountain movement. As described in Section C.2.2. (Introduction), in order to address concerns regarding wildlife

movement and to minimize impacts to important linkages for wildlife, substantial project modifications have occurred since the analysis presented in the SA/DEIS. These changes included reducing the project footprint from approximately 8,230 acres to 6,215 acres. One of the most prominent design changes was the alteration of the project footprint to avoid large tracks of densely populated tortoise habitat that occurs on the bajadas of the Cady Mountains. By avoiding this area the proposed project is not expected to pose significant barriers to movement for desert tortoise or Nelson's bighorn sheep.

Bighorn sheep are 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 but is not expected to pose complete barriers to movement. For other wide ranging mammals including coyotes, badgers, and desert kit fox, the project would also pose a barrier but would not prevent passage to adjacent areas.

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 north-south movement for the entire project site. Because of the modified project design, east-west movement will remain available along the northern boundary of the project. As proposed, the project would conform to the 4,000-foot minimum buffer design suggested by the USFWS Desert Tortoise Recovery Office. This would allow for permanent residency for some desert tortoise north of the project site and provide a linkage where dispersing animals could maintain genetic linkages to adjacent populations. In consultation with CDFG, USFWS, BLM, and staff, the applicant has proposed several other design features to reduce corridor and movement concerns along the northern border of the project. This includes relocating the retention basins within the fence line and routinely inspecting fences after each storm event. Staff concurs with these measures and has included them into staff's proposed Condition of Certifications **BIO-8** and **BIO-9**.

Staff considers impacts to wildlife movement from the construction and operation of the Calico Solar Project power plant site and transmission line to be less than significant with mitigation.

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 proposed sediment catchment 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 on the project site and to some degree immediately downstream of

the project. 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.

Direct impacts to State jurisdictional waters include the removal of native vegetation including some areas characterized by microphyll woodland, alterations to the existing topographical conditions, 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 downstream habitat due to altered hydrology or sediment delivery, 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 large linear detention basins along the northern boundary of the site. In addition, several small debris basins and diversion channels would convey flow into the primary drainage channels (TS 2010j). 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. 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 of the ephemeral washes on the project site would be adversely affected by the proposed project. However, an hydrologic and sediment analysis study completed by the Energy Commission found that habitat areas outside the project site will not be affected by the proposed project since they are supplied by sediment that is transported on paths that are unaffected by the project (Appendix A).

Staff considers direct and indirect impacts of the project to approximately 282.2 acres of State jurisdictional waters to be permanent and significant absent mitigation. This impact would include 3.3 acres of microphyll woodland that was mapped in the northeast corner of the site. 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 282.2 acres due to the 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.

To reduce impacts of the proposed project on State jurisdictional waters, staff has proposed Condition of Certification **BIO-26** (Streambed Impact Minimization and Compensation Measures). This condition's requirements are 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 3.3 acres of lost smoke tree and catclaw acacia habitats at a 3:1 ratio. Total streambed comensation required under **BIO-26** would be 288.8 acres, to include at minimum 9.9 acres of microphyll woodland (i.e., 278.9 acres mitigated at 1:1 and 3.3 acres of microphyll woodland mitigated at 3:1). Staff believes that the applicant would likely meet these requirements with the implementation of Condition of Certification **BIO-17,** which requires 14,375 acres of compensatory mitigation lands for desert tortoise. **BIO-26** requires that the applicant verify acreage of state jurisdictional streambed area with the required tortoise mitigation land and, if necessary, acquire additional mitigation lands to achieve total streambed compensation as required by this condition. With implementation of staff's proposed Condition of Certification **BIO-26**, 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-28** (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. Staff concludes that these measures would reduce the project's impacts to state-jurisdictional streambeds below a level of significance by minimizing project impacts to streambeds; protecting sufficient off-site acreage to offset the on-site impacts; and reclaiming on-site streambed upon eventual closure of the Calico Solar Project.

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 bird collisions with structures. The use of evaporation ponds would also provide subsidies for ravens which can lead to increased tortoise predation. These operational impacts were addressed in the preceding analysis of project impacts by species and biological resources, but are discussed in the aggregate below.

Ravens

Human activities have the indirect effect of causing increased raven populations, largely due to increased food and water supplies and increased nesting sites. Although ravens are native to the deserts, their populations have increased dramatically over the past several decades, and they are considered a "subsidized predator" in the biological literature (Boarman 2003). That is, their numbers are unnaturally high due to human resource "subsidies"; these high numbers of ravens result in an increase in raven predation on other native species. The project's potential impacts to raven populations are discussed in more detail above (Impacts to Desert Tortoises).

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** (Raven Monitoring, Management, and Control Plan).

As described in staff's proposed Condition of Certification **BIO-8** (Impact Avoidance and Minimization Measures), 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. Staff's proposed conditions **BIO-8** and **BIO-18**, would minimize the project's potential to cause effects of increased predation on desert tortoise by ravens and other

species in the project area by requiring a variety of impact avoidance and minimization measures to minimize and control trash and other human activities that tend to increase raven activity; and on-site raven activity management and control, and a per-acre contribution to support the USFWS Regional Raven Management Program (below).

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. 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 USFWS has developed a comprehensive, regional raven management and monitoring program in the California Desert Conservation Area to address the regional, significant threat that increased numbers of common ravens pose to desert tortoise recovery efforts (USFWS 2010b). To mitigate for the regional effects of ravens, staff's proposed Condition of Certification **BIO-18** would require the applicant to contribute a one-time fee to support the regional raven management plan activities. The fund and fee are described above (Impacts to Desert Tortoise). The 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.

Other Predators

Feral dogs are significant predators on desert tortoise and other native wildlife. 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**), to be monitored and enforced by the project owner and CPM, would reduce the project's potential to increase numbers of free-roaming or escaped pet dogs below a level of significance by prohibiting pets.

Increased Risk from Roads/Traffic

While many species of wildlife can tolerate human disturbance to some degree; operation 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 threats to wildlife that is trapped within the perimeter fencing is from habitat alteration and mortality from road traffic.

Vehicle traffic would increase on access roads and on maintenance roads throughout the site 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. 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 (6,215 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. Staff concludes that implementation and enforcement of these measures would be effective and feasible; would minimize adverse effects of project roads to biological resources, and would mitigate those effects below a level of significance.

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 (above). Even if they are fenced off from wildlife, evaporation ponds may attract predators and other species, including waterfowl. In addition, small mammals, waterfowl, shorebirds, and other resident or migratory birds that drink or forage at the ponds could 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 where bird numbers are higher than at the Calico site, 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.

Staff considers potential impacts of evaporation ponds to wildlife to be significant absent mitigation. To reduce these impacts the applicant has proposed specific measures identified in a Draft Evaporation Pond Management Plan. Staff has considered these actions and has incorporated them into proposed Condition of Certification **BIO-27** (Evaporation Pond Design, Monitoring, and Management Plan). Staff also recommends that the applicant either cover the ponds with netting or other suitable materials to minimize bird mortality or implement an evaporative pond design that does not allow for large areas of ponded water. This could include the implementation of a dry cooling zero liquid discharge (ZLD) system. In addition, the project owner will 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 SA/DEIS 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-27**. 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. Staff concludes that the measures outlines in **BIO-27** are feasible and would effectively minimize adverse effects of the evaporation ponds to wildlife by preventing animals from accessing the ponds and minimizing the ponds' surface areas, and implementing further management measures as needed. Staff concludes that implementation of **BIO-27** would reduce the ponds' adverse effects below a level of significance.

Noise Impacts

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. Each of the SunCatcher units generates noise levels of 84 dBA Leq at approximately 50 feet. At 850 feet this level attenuates to 60 dBA. These levels would be expected to limit, and in some cases preclude, the use of habitat adjacent to the project site.

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 operations and maintenance activities could disturb nesting birds and other wildlife and adversely affect nesting and other activities. Studies have shown that noise levels over 60 dBA can affect the behavior of certain bird species, but Reijnen et al. (1995) demonstrated that for two species of European warbler (*Phylloscopus* spp.), sound levels between 26 dBA and 40 dBA reduced breeding density by up to 60% compared to areas without disturbance. These data suggest that 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, though staff are not aware of any studies

of noise effects to desert tortoises. Anthropogenic noise associated with Interstate 40, the BNSF railroad, and other human activities (e.g., OHV activity) is present in the project area. Many bird species avoid developed areas within urban settings and, due to the noise level, these species will avoid the SunCatchers.

Ambient noise levels at a nearby residence 1,200 feet south-west of the project site, to the south of Route 66 and west of Hector Road showed ambient noise levels of 63 to 65 dBA, consistent with the site's proximity to the nearby rail lines and highway. Ambient noise at another site, more distant from the highway and railroad, showed ambient noise levels of 38 to 41 dBA, consistent with a rural environment (**Noise Table 4**). Staff estimates that the noise level will be approximately 75 dBA at the project fence line during project operations, about 10-12 dBA above current ambient noise levels in the southern part of the site (near the highway and railroad) and about 35 dBA above current ambient noise more distant from the transportation corridor. One hundred feet offsite, the noise level would attenuate to approximately 72 dBA, and staff estimates that noise levels would attenualte to approximately 60 dBA at approximately 850 feet from the project fence line. The 60 dBA level is often applied as an avoidance threshold for nesting birds. Staff believes that operational noise would adversely affect wildlife at distances up to approximately 850 feet from the solar generators. Staff notes, however, that the southern portion of the site, near the highway and railroad, has high existing ambient noise levels. In some parts of the northern part of the site, project flood control structures would be sited at the northern project boundary, so that significant noise sources (SunCatchers) may be several hundred feet south of adjacent open lands, buffering some off-site habitat from noise impacts. Staff concludes that remaining adverse impacts of noise would be mitigated below a level of significance through staff's recommended Condition of Certification **BIO-17**, which would require habitat compensation at a ratio of 3:1 for project impact acreage north of the BNSF railroad tracks (4,075 acres). This condition would require the project owner to acquire and protect 12,225 acres of off-site desert habitat.

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 6,215 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 pose a collision risk to birds. Depending on the time of day, use of the site by various species, and glare, it is probable 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 would not be 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 would vary greatly by location within the proposed project area. 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) collide with wires (APLIC 2006), particularly during nocturnal migrations or poor weather (Avery et al. 1978).

There is insufficient information available to conclude whether the Calico Solar Project would be a significant 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-22** (Avian Protection Plan / Monitoring Bird Impacts from Solar Technology), would provide the information needed to develop and implement adaptive management measures to mitigate bird collision impacts. If the SunCatchers pose a collision risk for birds, the applicant shall be required to implement measures such as construction of bird diverters, aerial markers, or other units to minimize potential collision risks for birds. Staff concludes that the Avian Protection Plan and bird impact monitoring as recommended in Condition of Certification **BIO-22** would effectively determine rates of bird collisions with project facilities and would result in implementation of further feasible measures as needed to mitigate significant bird collisions, if they should occur, below a level of significance.

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 because the conductors must be relatively far apart. The majority of raptor electrocutions are caused by lines that are energized at voltage levels between 1 kV and 69 kV, which typically have more closely-spaced conductors, and "the likelihood

of electrocutions occurring at voltages greater than 69 kV is extremely low" (APLIC 2006). 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). Staff's proposed Condition of Certification **BIO-8** would require 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. The proposed mitigation addressed in staff's proposed Condition of Certification **BIO-8** provide effective and feasible measures to prevent bird electrocution, and staff concludes that the proposed transmission lines would not pose a significant threat to birds with incorporation of this condition.

Glare

Glare from the reflection of sunlight from the SunCatcher units 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). Further, 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 would be 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 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 not significant. Staff recommends Condition of Certification **BIO-22** (Avian Protection Plan / Monitoring Impacts of Solar Technology on Birds) to monitor and minimize potential bird mortality due to glare. Staff concludes that the Avian Protection Plan and bird mortality monitoring as recommended in Condition of Certification **BIO-22** would effectively determine rates of bird mortality and would result in implementation of further feasible measures as needed to mitigate significant bird collisions, if they should occur, below a level of significance.

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 birds, 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).

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 to safely clean and service the SunCatchers. The project would be operated with a staff of approximately 180 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 per week, 24 hours a day to ensure SunCatcher availability when solar energy is available. Although facility lighting would be shielded, light from these activities is expected to result in ongoing disturbance to wildlife both within the perimeter fencing and in adjacent habitat.

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 toward the site to minimize light or glare off-site. 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**. Staff concludes that implementation of this measure would minimize lighting impacts to wildlife at the Calico Solar Project site and would mitigate this impact below a level of significance.

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 42% 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.

Implementation of the reduced acreage alternative would substantially reduce 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 impacts to Nelson's bighorn sheep by avoiding potential foraging habitat on the lower bajadas 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 further away from the foothills the Alternative would greatly reduce barriers to east-west wildlife movement for desert tortoise, Nelson's bighorn sheep, and other species. 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 58% 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 and bajadas present in the foothills of the Cady Mountains, habitat supporting vegetation consistent with microphyll woodlands would be greatly reduced. However, the construction of the proposed stormwater management system would still occur and these structures would attenuate flows, disrupt sediment transport, and alter the existing morphology of onsite drainages. Vegetation that occurs in these areas would remain subject to long-term effects from the modified flow and sediment 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

Several special-status plant species were detected on or near the site during floristic surveys conducted for the proposed project during the spring 2010. This included large numbers of small-flowered androstephium and several white-margined beardtongue locations not documented previously. In addition, an undescribed lupine was detected north of the project site and several CNPS List 4 species were observed in scattered locations within the development footprint. Implementation of the Reduced Acreage Alternative would reduce impacts to rare plants. Similar to the proposed project this alternative would avoid the mapped occurrences of white-margined beardtongue, crucifixion thorn and the undescribed lupine. However, impacts to small-flowered androstephium and Utah vine milkweed would still occur. While most of these plants are located within the footprint of the Reduced Acreage Alternative, locations of these species would be avoided where they occur south of the BNSF railroad. Impacts to small-flowered androstephium and Utah vine milkweed are not considered significant for the proposed project. This alternative would 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 the Reduced Acreage Alternative's direct, indirect, and cumulative impacts to special-status plants below a level of significance. 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

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 58% 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 benefit common species that inhabit proposed mitigation lands.

Impacts to Special-Status Wildlife

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 lost to development. As shown in **Biological Resources Figure 3**, the highest concentration of tortoises is located in the Phase II area immediately north of the Reduced Acreage Alternative. Under this alternative approximately seven desert tortoises would require translocation. Compared to 57 that would require translocation for the proposed project, this is a 78% reduction in impacts. In addition, the Reduced Acreage Alternative would no longer border the NAP areas that would have been largely 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 potential barriers to east-west movement for desert tortoise.

The Reduced Acreage Alternative would also limit impacts to habitat occupied by the Mojave fringe-toed lizard, including the large washes and existing dune habitat identified in the Biological Resources Technical Report. 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 would still interfere with aeolian and hydrologic sand transport on the project site, which could indirectly impact habitat for this species. However, the project would adversely affect sand transport to offsite habitats and 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 by avoiding the bajadas of the Cady Mountains. 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. The 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 avoid most impacts to Nelson's bighorn sheep, as the boundaries of the alternative site reduce potential impacts to foraging areas for the species. Bighorn sheep would not be constrained from ranging into the southern foothills of the Cady Mountains as they could be 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 58% 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-30**.

Impacts to Wildlife Movement Corridors or Native Wildlife Nursery Sites

The Reduced Acreage Alternative would decrease the project site from the original 6,215 acres to approximately 2,600 acres of land, a 42% 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 1.5 miles back from the foothills of the Cady Mountains and would avoid much of the occupied desert tortoise habitat; this alternative would result in the avoidance of a large documented linkage area for wildlife (Spencer et al. 2010). Therefore, impacts associated to 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 including the bajadas that occur on the foothills of the Cady Mountains. This includes 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 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. However, because of the large watersheds that occur adjacent to the proposed project the effects of this attenuation would not be considered significant (Appendix A).

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-26** (Streambed Impact Minimization and Compensation Measures), and **BIO-28** (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-30**.

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-26,** and **BIO-28**.

C.2.6 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 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.2.7 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.2.7.1 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 8** (SES 2008 – Appendix EE).

Biological Resources Table 8
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

Vegetation Community	Acreage*
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
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 applicant's 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.2.7.2 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.2.7.3 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.2.7.4 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.2.8 CUMULATIVE IMPACT ANALYSIS

C.2.8.1 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)). A project’s contribution to significant cumulative impacts must be addressed if the project’s incremental effect 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 past, current, and reasonably foreseeable future actions that affect each resource;
- Assessed the significance of potential cumulative impacts; and
- For each significant cumulative impact identified, assessed whether this project's contributions to the impact was cumulatively considerable.

C.2.8.2 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.2.8.3 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 (including the western Mojave and northern Colorado desert regions; BLM 2010), with each project contributing to 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 incrementally contribute 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.2.8.4 MAKING CONCLUSIONS ABOUT THE SEVERITY OR SIGNIFICANCE OF THE EFFECT

Mitigating project impacts to biological resources to a level that is less than significant does not necessarily indicate that a project's incremental contribution to cumulative impacts will be less than significant when viewed in connection with the effects of other past, current and future projects. 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 viewed in connection with the effects of past, current and 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.

A cumulative impact can result from past, present and reasonably foreseeable probable future projects that have individually minor impacts that are "collectively significant" over a period of time, according to CEQA Guidelines section 15355. The analysis must assess the collective or combined effect of the projects, and if combined cumulative impacts are determined to be significant, it must also analyze whether the project's incremental contribution is cumulatively considerable within the meaning of CEQA Guidelines section 15065(a)(3). Cumulative impact assessments cannot conclude that a project's contributions to cumulative impacts are not significant or cumulatively considerable merely because the project's 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.

C.2.8.5 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 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 9 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). Projects 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.2.8.6 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 8** 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 9** illustrates the numerous proposed renewable projects on BLM, State, and private land in the WEMO Planning Area. **Biological Resources Table 9** lists the existing and foreseeable future projects (proposed) that were included in the quantitative analysis of cumulative effects.

Biological Resources Table 9
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 9** will complete the environmental review, not all projects will be funded and constructed, and many will not use the entire ROW area.

C.2.8.7 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 10 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 10.** 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. In addition, the USGS maps do not include all waters that would qualify as State jurisdictional drainages. Therefore the total linear miles identified in Table 10 likely underreport the total impact to jurisdictional drainages.

Biological Resources Table 10
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%)	26.6 miles (35.6% of foreseeable future impacts) (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 9**
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 9**

Staff considers cumulative effects to the Newberry Springs watershed streams from future projects to be significant (approximately 14%). Absent mitigation, the project's contribution to cumulative effects within the Newberry Springs watershed comprise 35.6% of those impacts. To mitigate impacts to jurisdictional washes to a level less than significant, staff proposes Condition of Certification **BIO-26** for avoidance and minimization of impacts to State waters and compensation for unavoidable impacts. Staff concludes that, with implementation of on-site protection measures and off-site compensation, the project's contribution to significant cumulative effects will be less than significant when the incremental effects of the project, after mitigation, are viewed in connection with the effects of other projects; therefore the project's impacts on waters of the state are not cumulatively considerable. Condition **BIO-26** requires a series of best management practices and other measures to avoid, minimize and mitigate on-site impacts (i.e., impacts within the watershed), as well as to compensate off-site for impacts to streambeds. With these measures incorporated, the project's contribution to cumulative impacts would not be cumulatively considerable.

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 11** 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. Region-wide, the cumulative impacts of past, present, and foreseeable future large-scale habitat conversions to desert tortoise habitat and connectivity are cumulatively significant, even with these conservation efforts. Such effects can only be addressed through a regional and coordinated effort. 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.

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 11** (and **Biological Resources Figure 11**). 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.

In consultation with other agencies, staff has developed extensive mitigation requirements to fully mitigate impacts to desert tortoise to a level less than significant. Staff concludes that, with implementation of on-site protection measures and off-site compensation, the project's contribution to significant cumulative effects on desert tortoise will be less than significant when the incremental effects of the project, after mitigation, are viewed in connection with the effects of other projects; therefore the project's impacts desert tortoise are not cumulatively considerable. Staff's proposed desert tortoise-specific conditions of certification (**BIO-15 through BIO-17**) and general avoidance and minimization measures (**BIO-1** through **BIO-9**) would reduce the project's direct effects to desert tortoise during construction and operation to a level less than significant. In addition, staff's proposed Condition of Certification **BIO-18** would require a contribution to region-wide raven monitoring and control plan to reduce the cumulative effects of this and other projects throughout the range of the desert tortoise.

Staff concludes that, with implementation of these conditions of certification, the project's contribution to cumulative impacts to desert tortoise would not be considerable because Staff's proposed mitigation would require the applicant to relocate all tortoises from the project area; prevent future on-site impacts to tortoises by fencing the site; monitor and manage raven predation on-site and contribute to regional raven management; and compensate for habitat loss by protecting extensive acreage now presently under conservation management. Further, the project design as analyzed in this SSA significantly reduces the project's impacts to desert tortoises by avoiding much of the most densely populated area in the northern parts of the previous proposed project and providing significant area for east-west tortoise movement between the project boundary and the toe slopes of the Cady Mountains.

Cumulative effects on the desert tortoise may best be addressed through a regional and coordinated effort 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 11
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	833,987 acres	12,547 acres 1.5%	36,678 acres 4.4%	0 acres
0.1	480,311 acres	36,482 acres 7.6%	24,471 acres 5.1%	0 acres
0.2	405,838 acres	43,260 acres 10.7%	26,038 acres 6.4%	0 acres
0.3	406,092 acres	23,107 acres 5.7%	20,339 acres 5.0%	0 acres
0.4–0.5	895,824 acres	68,394 acres 7.6%	38,161 acres 4.3%	0 acres
0.6–0.7	1,359,651 acres	70,201 acres 5.2%	91,920 acres 6.8%	258 acres 0.3%
0.8–0.9	4,881,882 acres	138,505 acres 2.8%	245,203 acres 5.0%	5,953 acres 0.2%
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 9**
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 9**

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 12 and 13** and **Biological Resources Figures 12 and 13**). 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 13 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.

The overall loss of foraging habitat for golden eagles within the region is a cumulatively significant impact. The project contribution to this cumulative effect, however, would be less than significant when the incremental effects of the project, after mitigation, are viewed in connection with the effects of other projects; therefore the project’s impacts desert tortoise are not cumulatively considerable. 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. 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 permanently protecting more habitat lands than are being used for the project and further benefit the species by providing funding for long-term maintenance and management activities on those lands.

Biological Resources Table 12
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%)	5978 acres (11%)
Mixed Desert Scrubs	22.1 acres	0 acres	0 acres	0 acres
Saltbush Scrub	13,038 acres	0 acres	997 acres (7.7%)	233 acres (23%)
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
Riparian Scrub/Forest	139 acres	0 acres	0 acres	0 acres
Lava	8,798 acres	0 acres	15 acres (0.2%)	0.1 acres (0.7%)

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 9**
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 9**
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 13
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%)	5978 acres (1.6%)
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%)	233 acres (1%)
Oak/Juniper/Pine/ Joshua Tree Woodland	320,031 acres	0 acres	14,812 acres (4.6%)	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

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)
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%)	0.11 acres (0.6%)
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 9**
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 9**

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. Burrowing owl is a California Species of Special Concern and is a BLM Sensitive Species. Additionally, it is provided federal protection under the Migratory Bird Treaty Act and is listed as a Bird of Conservation Concern by the USFWS. Threats 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 significant, and the project's contribution to these cumulative effects would be cumulatively considerable without project mitigation. Staff concludes, however, that the project's contribution to significant cumulative effects will be less than significant when the incremental effects of the project, after mitigation, are viewed in connection with the effects of other projects. The project's incremental contribution to the cumulative effects will not be cumulatively considerable because of required avoidance and passive relocation in staff's proposed Condition of Certification **BIO-21** and implementation of staff's proposed Condition of

Certification **BIO-17**, the compensatory mitigation plan for desert tortoise, which will also benefit burrowing owls. The acquisition is expected to prevent future losses of habitat by permanently protecting more habitat lands than are being used for the project and further benefit the species by providing funding for long-term maintenance and management activities on those lands.

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 Le Conte's thrasher in the Mojave Desert would be significant, and the project's contribution to these cumulative effects would be cumulatively considerable without project mitigation, given the threats to this species from future developments. Staff concludes, however, that the project's contribution to significant cumulative effects will be less than significant when the incremental effects of the project, after mitigation, are viewed in connection with the effects of other projects. The project's incremental contribution to the cumulative effects will not be cumulatively considerable because of mitigation 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 habitat for the species. The acquisition is expected to prevent future losses of habitat by permanently protecting more habitat lands than are being used for the project and further benefit the species by providing funding for long-term maintenance and management activities on those lands.

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 will be significant, and the project's contribution to these cumulative effects would be cumulatively considerable without project mitigation, given the threats to these species from future developments. The project's contribution to these cumulative effects will be less than significant when the incremental effects of the project, after mitigation, are viewed in connection with the effects of other projects. The project's incremental contribution to the cumulative effects will not be cumulatively considerable due to mitigation 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-26**, 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. Its primary habitat is windblown sand but it also is found in habitats surrounding dune systems, or other areas with scattered patches of fine sandy habitat. Its ecology and conservation status are described above (Section C.2.4.1, Special-Status Species). 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. These data are misleading, however, because they indicate no habitat in some areas of known Mojave fringe-toed lizard occurrence, and indicate suitable habitat in urban areas including several large desert cities (Palmdale, Barstow, and others).

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.

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 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. While

this mitigation would reduce the project's impacts below a level of significance, a residual adverse impact remains, including a net loss of habitat and interruption of suitable east-west movement habitat.

Current and foreseeable renewable energy developments in the range of the Mojave fringe-toed lizard contribute to the cumulative loss and damage of habitat through development, fragmentation, and disruption of aeolian sand movement. Cumulatively, impacts to the Mojave fringe-toed lizard will be significant and are likely to contribute to the decline of this species. Even with project-specific mitigation, Staff concludes that the project's contribution to the significant cumulative impact, even with staff's recommended Condition of Certification **BIO-13** would be considerable due to the net habitat loss and interruption of suitable breeding and dispersal habitat between occupied Mojave fringe-toed lizard habitat to the east (in the Pisgah Crater ACEC) and west (in sandy washes and aeolian sand deposits in the upper portions of the Mojave River watershed).

Nelson's Bighorn Sheep

Within the WEMO planning area, there are 16 extant or historic bighorn sheep populations. Separate populations are defined by mountain range complexes. Five of these 16 areas no longer contain populations, three ranges have reintroduced populations, 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 Table 14** and illustrated in **Biological Resources Figure 14**.

The GIS analysis of the WEMO bighorn sheep range and connectivity corridors indicates that the effects of past and foreseeable future projects (i.e., land use conversion) to occupied and unoccupied ranges are relatively minor, due largely to their locations, in wilderness areas and at higher elevations. Cumulatively, however, large-scale renewable energy development could significantly impact gene flow and local demographics, decreasing the viability of the regional bighorn sheep metapopulation . The Calico Solar Project would not contribute significantly to the loss of bighorn sheep habitat, as most occupied habitat for Nelson's bighorn sheep within the Cady Mountains does not overlap the northern portion of the project site as it is analyzed in this SSA. Further, while intermountain movement of sheep is poorly understood the project would avoid large open space areas between the Cady Mountains and the project fenceline that could provide connectivity to adjacent mountain ranges. Because of these conditions, project impacts on bighorn sheep are not cumulatively considerable. Because of this, project impacts on bighorn sheep are not cumulatively considerable.

Biological Resources Table 14
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)	0 acres
Occupied Range	1,020,111 acres	548 acres (0.05% of total occupied range)	35,488 acres (3.5% of total occupied range)	0 acres
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
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 9**
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 9**

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 will be significant, and the project's contribution to these cumulative effects would be significant without project mitigation measures, given the threats to these species from future developments. The project's actual incremental contribution to the significant cumulative effects will be less than significant, however, when the incremental effects of the project, after mitigation, are viewed in connection with the effects of other projects. Avoidance and minimization measures in staff's proposed Condition of Certification **BIO-24** combined with Condition of Certification **BIO-17**, the compensatory mitigation plan for desert tortoise, will reduce the impacts of habitat loss by the preservation of habitat for other species. The acquisition is expected to prevent future losses of habitat by permanently protecting more habitat lands than are being used for the project and further benefit the species by providing funding for long-term maintenance and management activities on those lands,

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 significant, and the project's contribution to these cumulative effects would be significant given the threats to these species from future developments, without project mitigation measures. The project's actual incremental contribution to the significant cumulative effects will be less than significant, however, when the incremental effects of the project, after mitigation, are viewed in connection with the effects of other projects. The project contribution to these cumulative effects would not be cumulatively considerable due to 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 habitat to that which is being lost.

Wildlife Movement and Connectivity

Wildlife movement and dispersal habitat on the project site helps 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 significant. The proposed project is located in an essential connectivity area between the Bristol and Ord Mountains (Spencer et al. 2010). This area acts as an important link between wildlife populations in the eastern and western deserts. Because of connectivity concerns raised by staff and the regulatory agencies during the SA/DEIS process; the Applicant redesigned the project to avoid a large area of high value habitat at the toe of the Cady Mountains. As proposed, the project would conform to the 4,000-foot minimum buffer design suggested by the USFWS Desert Tortoise Recovery Office. The revised project design as analyzed in this SSA (Section **C.2.2** and **Biological Resources Table 1**) would substantially reduce impacts to wildlife movement on the upper bajada, north of the project boundary and would preserve east-west movement along the northern boundary of the project. Because of these changes the proposed projects contribution to cumulative impacts would be minimized and considered less than significant. Staff concludes that, the project's incremental contribution to cumulative impacts will not be cumulatively considerable.

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 15**). 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 1.6% of all the Mojave creosote bush scrub affected by future projects, as well as 1% of all the saltbush scrub affected by future projects. The project's contribution to these effects would not be cumulatively considerable because the incremental effects would be reduced by 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 permanently protecting

habitat that could otherwise be converted for urban, agricultural or energy development, and further benefit the plant communities by providing funding for long-term maintenance and management activities on those lands.

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 less than 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 that are not cumulatively considerable.

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%)	5981 acres (1.6%)
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%)	233 acres (1%)
Oak/Juniper/ Pine/Joshua Tree Woodland	320,031 acres	0 acres	14,812 acres (4.6%)	0 acres
Chaparral	194,551 acres	0 acres	11,546 acres (5.9%)	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%)	0.1 acres (0.6%)
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 9**
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 9**

Special-Status Plants

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 among the three disjunct geographic ranges 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 occurs in sandy habitats. Yet there are many extensive dune systems in the California deserts where white-margined beardtongue has never been documented, despite repeated field survey efforts, 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.

The proposed project as analyzed here would avoid direct impacts to white-margined beardtongue and its occupied habitat. Project facilities may indirectly affect white-margined beardtongue populations off-site to the southeast, within the BLM Pisgah ACEC, by interrupting aeolian sand transport systems. However, those effects appear to be minimal. These potential effects are discussed above, in Assessment of Impacts and Discussion of Mitigation (Section C.2.4.2). 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.

As illustrated in **Biological Resources Figure 16**, 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.). Cumulative effects on the California population are therefore significant. Absent mitigation the project's

contribution to cumulative effects to white-margined beardtongue would be cumulatively considerable, particularly in light of the species' highly restricted range in California. However, these significant incremental contributions to the cumulative effects will be minimized to a level less than significant when viewed in connection with the impacts of other projects. Areas within the project boundary that contain the plant will be avoided and protected within Environmentally Sensitive Areas. Further, and measures to avoid or minimize off-site impacts to the BLM Pisgah Crater ACEC, are required 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 will be significant, and, absent mitigation, the project's contribution to cumulative effects would also be significant given the threats to these species from future developments. These significant incremental contributions to the cumulative effects will, however, be minimized at a level less than significant when viewed in connection with the impacts of other projects. Mitigation 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.2.8.8 CUMULATIVE IMPACTS ANALYSIS 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 merely because the contributions represent a small percentage of the overall problem.

Staff considers cumulative impacts to Mohave fringe-toed lizard from this and other foreseeable future projects in the area to be significant, and considers the project's incremental contribution to the impacts to be cumulatively considerable. In combination, this and other foreseeable projects would significantly reduce and fragment habitat for Mojave fringe-toed lizard region-wide. Although this project's contribution to habitat loss would be mitigated with staff's proposed Condition of Certification **BIO-13** which requires the acquisition of suitable dune/sand habitat, the Calico Solar Project would interfere with potential movement east and west between the Pisgah Crater ACEC and the upper Mojave River watershed.

The project's incremental contribution to cumulatively significant impacts to other special-status species and habitats would be mitigated at a level less than significant when viewed in connection with the impacts of other projects, as described above, including avoidance, minimization, and compensation, detailed monitoring, reporting requirements, and funding mechanisms to ensure implementation and accountability, as described in staff's recommended Conditions of Certification **BIO-1** through **BIO-30**.

Some significant cumulative effects to biological resources may remain even after project-specific mitigation is implemented for this and other 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.

C.2.9 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 16 provides a summary of the proposed project's compliance with federal, State, and local LORS.

Biological Resources Table 16
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.'' 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

Applicable Law	Description	Rationale for Compliance
		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.
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.
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.

Applicable Law	Description	Rationale for Compliance
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.
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.
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.

Applicable Law	Description	Rationale for Compliance
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-26 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.
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.2.10 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.2.11 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-28** and **BIO-29** contain measures to ensure that impacts to biological resources are addressed prior to the planned permanent or unexpected permanent closure of the project.

C.2.12 RESPONSE TO PUBLIC AND AGENCY COMMENTS

Staff received comments on the Biological Resources section of the SA/DEIS. Comments on biological resources were received from the following parties during the SA/DEIS comment period:

- Stirling Energy Systems (applicant), April 15, 2010
- Patrick C. Jackson, May 27, 2010
- Western Watersheds Project, June 4, 2010
- San Bernardino County, June 4, 2010
- California Unions For Reliable Energy, June 4, 2010

Energy Commission staff has summarized comments from these letters that raise biological resource issues and have provided the following responses:

Stirling Energy Systems (SES), written comments dated April 15, 2010

SES Comment #1: SES believes that staff's recommended Conditions of Certification for the Calico project are "inconsistent" and "more onerous" than staff's recommendations for other projects, and that these conditions should be consistent among projects and commensurate with levels of impacts.

> Staff response: Staff has recommended Conditions of Certification that are consistent with other projects, insofar as the projects, their impacts, and available documentation are comparable. Staff's recommended Conditions of Certification for the Calico project were prepared with specific reference to the proposed project design; its location; existing conditions at the proposed project site; the impacts to biological resources as determined by staff's analysis; and further documentation provided by the applicant. Staff notes that proposed Condition of Certification **BIO-12** (Special Status Plant Impact Avoidance and Minimization), for example, has been extensively revised in this SSA and is substantially similar in scope and content to a similar Condition of Certification recommended in Staff Assessments for other large solar projects currently under Energy Commission review.

SES Comment #2: SES comments that "wording of many of the Conditions should be revised to focus on the actual mitigation desired and move the details of implementation to the verification section." Elsewhere in its comments, SES suggests reducing several Conditions of Certification to lists of major points, and transferring most supporting text into the verification sections of those recommended Conditions.

> Staff response: Staff recommends retaining the general structure and organization of these Conditions of Certification, as they appear in this SSA. The specific mitigation recommendations as stated in each Condition of Certification are the basis upon which staff concludes whether each impact identified in the SSA would be reduced below a level of significance. The requested revisions would remove some of the substance of the recommendations, including performance criteria and other requirements, postponing the adoption of actual mitigation standards and requirements from the Commission's formal project certification process to the later project compliance phase when there would be no opportunity for public review and comment. Staff believes that adopting SES's requests would improperly defer final decisions on certain details of mitigation to a later date, outside the Committee's certification authority.

SES Comment #3: SES comments that the Project site is in a BLM Solar Energy Study Area (SESA) which excludes any land identified as sensitive, wilderness area, or any other high conservation value lands.

Staff response: Staff agrees with this statement and added text in the introductory section of this SSA.

SES Comment #4: SES requests that the term "special status plant species" as it appears in the SA/DEIS be limited to state and federally listed threatened or endangered species; candidates for listing as threatened or endangered; species proposed or petitioned for listing; and the California Native Plant Society's (CNPS) List 1 and List 2 plants.

Staff response: Throughout the SA/DEIS and the SSA, the term "special-status plants" refers to all plant taxa included in several different compendia of rare, threatened or endangered plants of California, including the California Native Plant Society's *Inventory of Rare and Endangered Plants* (http://cnps.site.aplus.net/cgi-bin/inv/inventory.cgi) and the California Department of Fish and Game's *Special Vascular Plants, Bryophytes, and Lichens List* (http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPPlants.pdf). In addition to the conservation status categories requested by the applicant (listed above) "special status plants" also includes plant taxa ranked by CNPS as List 3 and List 4. By staff's definition, all of these plant taxa have special conservation status by their inclusion in these compendia. However, staff has concluded that none of the project's potential impacts CNPS List 3 or List 4 species would reach a level of significance under CEQA and staff has not recommended mitigation of such impacts in its proposed Conditions of Certification.

SES Comment #5: The applicant proposes to collect seed and cuttings of CNPS List 1B and List 2 plants, and comments that ". . . seeding areas of suitable habitat in undisturbed sites within and adjacent to the project areas would provide some conservation benefit."

Staff response: No conservation benefit could reliably result without using known, feasible methods. Staff is not aware of any known reliable or feasible wildland propagation (by seed, cuttings, or other methods) for white-margined beardtongue or other special status plants that could be affected by the proposed project.

Additional SES comments (not numbered): SES provided numerous additional comments addressing specific wording of the SA/DEIS; describing a then-proposed revision to the project design (which has since then been replaced by the proposed project and analyzed in this SSA); and commenting on portions of the SA/DEIS that have been deleted or replaced in the SSA. Staff has reviewed these comments and revised the SSA as appropriate. None of these comments raised significant environmental issues or issues related to the adequacy of the SA/DEIS.

PATRICK C. JACKSON (PCJ) LETTER DATED MAY 27, 2010

PCJ Comment #1: PCJ states that the SA/DEIS does not comply with the National Environmental Policy Act (NEPA) in that it does not address the impact the Project will have on the sensitive, scenic, natural, ecological, cultural, and biological resources of

the adjacent privately owned lands, some of which the Applicant has acquired or intends to acquire for use in conjunction with the Project.

> Staff Response: Whereas the SA/DEIS was a joint NEPA and CEQA document, this SSA is prepared exclusively to comply with CEQA. The BLM will prepare a separate Final EIS to comply with NEPA. This SSA does address biological resources on private lands insofar as they may be affected by the proposed project.

PCJ Comment #2: PCJ states that the Applicant currently owns 130.05 acres of privately owned lands adjacent to the Project. The *Applicant's Supplement to the Calico Solar (formerly Solar One) Application for Certification (08-AFC-13) May 2010* (Applicant's Supplement) indicates the Applicant intends to acquire another 25 acres of privately owned lands. The Applicant's Supplement indicates the Applicant has permission to conduct water well testing on a 40-acre privately owned parcel identified as assessor parcel number 0530-241-39-0000. Of utmost importance, the SA/DEIS does not address the impact the Project will have on the endangered desert tortoises on the adjacent privately owned lands.

> Staff Response: The Applicant has provided, and the SSA incorporates and analyzes, additional desert tortoise field survey data on the parcels described.

PCJ Comment #3: PCJ states that to comply with NEPA, the SA/DEIS must be supplemented to address the impact the Project will have on the sensitive, scenic, natural, ecological, cultural and biological resources on all the adjacent privately owned lands.

> Staff Response: Please see response to PJC Comment #1, above.

WESTERN WATERSHEDS PROJECT (WWP) LETTER DATED JUNE 4, 2010

WWP Comment #1: WWP states that it cannot provide full comments on the Staff Assessment at this time for several reasons. First, two days prior to the end of the comment period and the submission of this letter, on June 2, 2010, Tessera Solar (the Project Applicant) announced a new alternative layout for the project with a revised project boundary. This alternative had not yet been posted on the Energy Commission webpage as of June 4 (the end of the comment period), so that members of the public, including Western Watersheds Project, have been unable to review it prior to the close of the SA comment deadline. Second, as the Energy Commission Staff note frequently throughout the SA, the materials provided by the Applicant fail to fully cover important resources. For example, Staff references the Applicant's failure to map microphyll woodlands on the site, its failure to document sensitive plant occurrences, and cites other issues of controversy including the inadequacy of the desert tortoise surveys.

> Staff Response: This SSA analyzes the most recent project design as submitted by the Applicant to the Energy Commission in June 2010. This SSA incorporates all additional data provided by the Applicant, including mapped microphyll woodlands and new botanical and desert tortoise field

survey results, as recommended by staff in the SA/DEIS. Staff also notes that the Energy Commission's certification process provides additional future opportunities for public comment on the project as revised and the environmental analysis.

WWP Comment #2: WWP states that the environmental review for this project is being rushed at the expense of public participation and this rush shows in the documentation. To comply with the spirit and intent of CEQA, the Energy Commission Staff should issue a Supplemental Staff Assessment that fully describes the project and the project site, and includes a full analysis of the Applicant's new alternative. Only by doing so can the Energy Commission ensure that the public can review the project and provide informed comment.

Staff Response: Consistent with WWP's recommendation, this SSA (Supplemental Staff Assessment) fully describes the revised project and project site, and includes a full analysis of the proposed project as currently proposed by the Applicant.

WWP Comment #3: WWP notes that the project site includes habitat acquired as compensation for other projects. WWP is extremely concerned about the implications of this to achieving the fully mitigated standard since this requires protection of replacement habitat for CESA listed species in perpetuity.

Staff Response: Upon review of land acquisition history, staff has determined that the project site does not include habitat acquired as compensation for other projects. This SSA is revised to reflect that determination.

WWP Comment #4: WWP notes that the SA estimates over 100 individual desert tortoises may be present on site, but that firm numbers are not available because of the inadequacy of the Applicant's surveys. The SA/DEIS proposes to mitigate for direct impacts to desert tortoises through acquisition of compensation lands. WWP states that at a high enough ratio, this may compensate for the direct loss of habitat. However, although the SA/DEIS recognizes that the project site includes habitat that provides connectivity to adjacent natural lands the mitigations do not address how impacts to this connectivity will be mitigated.

Staff Response: The applicant has provided new desert tortoise field survey results that are incorporated into the analysis in this SSA. The revised project design as analyzed in this SSA substantially reduces project impacts to habitat connectivity from those described in the SA/DEIS. Based on this revised project footprint, staff concludes that impacts to connectivity, with incorporation of staff's recommended conditions of certification, would be less than significant.

WWP Comment #5: WWP notes that, as explained earlier in their scoping comments, the West Mojave Plan ROD signed March 2006 includes "Goal 3: ensures genetic connectivity among tortoise populations, both within the West Mojave Recovery Unit,

and between this and other recovery units." WWP states that the SA/DEIS does not explain how the project and proposed mitigations will meet this biological goal.

> Staff Response: The revised project design as analyzed in this SSA provides for suitable desert tortoise habitat and east-west desert tortoise movement on the upper bajada, north of the project footprint and south of the toe slope of the Cady Mountains. Based on this revised project footprint, staff concludes that impacts to connectivity, including genetic connectivity, with incorporation of staff's recommended conditions of certification, would be less than significant.

WWP Comment #6: WWP states that the SA/DEIS discusses translocation of desert tortoises but provides no information on potential translocation sites, and no translocation protocol is provided for public review. Despite the huge number of tortoises that will be impacted, Staff defer the details to some future translocation plan.

> Staff Response: The applicant has provided a Draft Desert Tortoise Translocation Plan identifying, among other things, potential desert tortoise translocation sites. These sites are under evaluation by staff, CDFG, BLM, and USFWS biologists. Staff's recommended Condition of Certification **BIO-16** requires that the Applicant revise the Draft Desert Tortoise Translocation Plan in consultation with staff, CDFG, and USFWS to address these and other outstanding concerns regarding details of the plan. Staff's recommended Condition of Certification **BIO-16** requires that the Plan, once finalized, must conform to standards and guidelines described in Translocation of Desert Tortoises (Mojave Population) From Project Sites: Plan Development Guidance (USFWS 2010). This document provides guidance including the timing of relocation/translocation, disease testing requirements, and other actions to minimize impacts to desert tortoise.

WWP Comment #7: WWP states that the Cady Mountains WSA has a native population of bighorn sheep that use the project site on a seasonal basis for foraging, drinking, and movement. The West Mojave Plan's conservation strategy calls for protecting springs used by bighorn sheep and calls for providing methods for crossing freeways and other barriers to dispersal. The revised CEQA document should review all direct, indirect, and cumulative impacts to this species including impacts to linkage habitat and connectivity issues, and compliance with the WMP's conservation strategy. It should include mitigation measures such as land bridges to compensate for impacts to connectivity.

> Staff Response: The project design as analyzed in this SSA substantially reduces impacts to seasonal foraging habitat and wildlife movement on the upper bajada, north of the project boundary, from those described in the SA/DEIS for the previous project design. There are no known seeps or springs in the Cady Mountains, and the project would not affect springs. Consistent with this comment, the SSA analyzes direct, indirect, and cumulative impacts to Nelson's bighorn sheep, including impacts to habitat connectivity. Staff concludes that project impacts to habitat connectivity

and wildlife movement would be less than significant with incorporation of staff's recommended mitigation. Staff concludes that land bridges are not necessary to mitigate the project's impacts to biological connectivity, including impacts to bighorn sheep connectivity.

WWP Comment #8: WWP states that the revised CEQA document should fully analyze impacts to Mojave fringe-toed lizard in compliance with the West Mojave Plan's conservation strategy and other applicable governing plans. This analysis requires full documentation of Mojave fringe-toed lizard occurrences. The analysis must include full consideration of blowsand habitat, sand movement in the area, and the impacts of project structures that are required to protect the Pisgah Mojave fringe-toed lizard populations (West Mojave Plan at 2-186).

Staff Response: The SSA substantially expands the analysis of project impacts to Mojave fringe-toed lizard, including an expanded analysis of occupied and potential habitat on the project site; anticipated project impacts to habitat; and sand transport on-site and in the surrounding area. Based on staff's analysis, windblown sand originating on the project site does not contribute substantially to aeolian sand habitat off-site to the east where additional Mojave fringe-toed lizard habitat is located. Staff concludes that project impacts to Mojave fringe-toed lizard would be less than significant with adoption of its recommended Condition of Certification **BIO-13**, as revised in this SSA.

WWP Comment #9: WWP states that the proposed project site provides important habitat for the white-margined beardtongue (*Penstemon albomarginatus*), and other sensitive and at-risk species. The supplemental CEQA document should fully document all occurrences on the site so that the impacts of the project can be determined. The supplemental CEQA document should also provide full documentation of other rare plant species present.

Staff Response: Analysis in this SSA of impacts to special-status plants, including white-margined beardtongue, is based on new botanical field survey data provided by the Applicant. Updated special-status plant occurrence data are described in the Setting and Existing Conditions (C.2.4.1) and Assessment of Impacts and Discussion of Mitigation (C.2.4.2) sections. Special-status plant species occurrence information is fully documented and disclosed in the SSA.

WWP Comment #10: WWP notes that it directly raised these issues and concerns in scoping comments; states that CEQA requires the agencies to address significant issues that are raised not simply recognize them; that relevant and important public comments must be specifically addressed in the supplemental CEQA document. WWP believes that the analyses presented in the SA/DEIS do not provide an adequate basis for the public to make informed comment; that the SA/DEIS does not analyze the Applicant's June 2 revised project; and that Energy Commission Staff should produce a CEQA-compliant supplemental to remedy this situation.

Staff Response: This SSA addresses the issues and concerns raised by WWP's scoping comments and its more recent comments on the SA/DEIS summarized here. This SSA provides a thorough analysis of the proposed revised project as described in the Introduction (C.2.2). Staff also notes that the Energy Commission's certification process provides additional future opportunities for public comment on the project as revised and the environmental analysis.

SAN BERNARDINO COUNTY (SBC) LETTER DATED JUNE 4, 2010

SBC Comment #1: SBC states that regarding mitigation for threatened/endangered species, SBC supports project development in a manner that optimizes future economic opportunity by minimizing land set-asides and instead focusing on funding conservation, habitat restoration, and species recovery efforts. The Staff Assessment is consistent with their approach by requiring avoidance of impacts via several mitigation measures, including rehabilitation in **BIO-28** and invasive plant removal in **BIO-11**. Mitigation measure **BIO-17** discusses compensatory mitigation and sensibly allows financial security for the procurement of land suitable for desert tortoise, as well as funding for the enhancement and long-term management of these lands. SBC strongly supports the option to provide adequate mitigation fees in lieu of providing mitigation land, especially when the replacement involves multiples (e.g. 3 to 1) of the project acreage. They believe that this is a realistic and adequate mitigation strategy for the loss of habitat instead of simply requiring mitigation land to be provided. Further, this is only one of many renewable energy projects being planned for construction within San Bernardino County, presumably all of which will require biological mitigation. The cumulative impacts of requiring mitigation lands are not addressed in terms of economic impacts to the host jurisdiction.

Staff Response: Staff's recommended Condition of Certification **BIO-17** does require the acquisition, permanent protection and long-term management of desert tortoise habitat lands that are not currently protected and management for conservation purposes. Other conditions require smaller acquisitions for other species, and most of these requirements may be satisfied by the acquisitions required by **BIO-17** if the land contains the specified habitat types. Acquisition of habitat land is consistent with state and federal Endangered Species Acts, described in the Biological Resources **Table 2** (Laws, Ordinances, Regulations, and Standards), and with current state and federal policies and guidelines. Staff has coordinated extensively with CDFG, BLM, and USFWS in preparation of this SSA, including Condition of Certification **BIO-17**. Large-scale purchases of desert habitat to mitigate the impacts of renewable energy projects could have some effect on the real estate market in the region, but mitigation land purchases will generally involve the acquisition of large non-agricultural parcels in rural and remote areas. CEQA does not require an analysis of a project's economic impacts, including cumulative economic impacts, unless the economic effect is related to an impact on the physical environment. Staff has not identified such an impact related to a potential change in real estate values.

CALIFORNIA UNIONS FOR RELIABLE ENERGY (CURE) LETTER DATED JUNE 4, 2010

CURE Comment #1: CURE states that the SA/DEIS must be revised and recirculated for public comment; that it does not inform decision makers and the public of the potential significant environmental effects of the project, or avoid or reduce environmental damage when possible. Cure believes that the Applicant provided inadequate information to draft a CEQA-compliant document and, as a result, the SA/DEIS is incomplete with respect to potentially significant impacts and mitigation measures for several resource areas, including biological resources.

Further, CURE states that the SA's deficiencies violate power plant site certification regulations, citing Cal. Code Regs., §§1001-2557. CURE believes that the SA/DEIS lacks considerable information and thus does not completely consider all "significant environmental issues" or notify the public or decision-makers of the "environmental consequences" of the Project.

CURE comments on CEQA and Warren-Alquist Act requirements for public review and comment; re-notice and recirculation when significant new information is added to the EIR; and adequacy of time for intervenors' preparation prior to evidentiary hearings. CURE comments that the Revised [Supplemental] SA will contain new analyses and mitigation measures for biological resources, including desert tortoise, golden eagle, Mojave fringe-toed lizard, and special-status plants.

> Staff Response: The applicant has worked with staff to provide extensive follow-up data in conformance with staff's recommended Conditions of Certification published in the SA/DEIS. These data, in combination with information provided earlier by the applicant, including the AFC and other documents cited in the SA/DEIS, and by staff's additional independent research, provide a suitable basis for CEQA analysis, as presented in this SSA. The applicant's revised project design, as analyzed in this SSA, was prepared in response to staff's Conditions of Certification as recommended in the SA/DEIS and has the effect of substantially reducing several impacts associated with the original proposal. The revisions were the subject of follow-up discussions held in public workshops and are consistent recommendations by BLM, USFWS, and CDFG. Staff also notes that the Energy Commission's certification process provides additional future opportunities for public comment on the project as revised and the environmental analysis. Recirculation of the SA/DEIS is not required.

CURE Comment #2: CURE states that the SA does not provide sufficient detail to analyze the project's impacts, referencing several quotations from the SA. Once the Applicant satisfies its burden to provide Staff with the pertinent information regarding its proposed Project, a revised SA containing additional analyses and mitigation measures must be drafted and circulated for public review and comment.

> Staff Response: The applicant has provided reports of follow-up surveys in conformance with staff's recommended Conditions of Certification published in the SA/DEIS [date]. Those analyses are incorporated into the analyses

and recommended Conditions of Certification in this SSA. See also response to CURE Comment #3.

CURE Comment #3: CURE states that the SA relies on incomplete data and does not establish an adequate environmental baseline; that further field surveys for rare plants, golden eagles, Mojave fringe-toed lizards, Nelson's bighorn sheep, desert tortoises and burrowing owls are required to establish a baseline and to enable an adequate analysis of impacts.

Staff Response: The environmental analysis made use of the best available information and follow-up field survey data have been submitted by the applicant and incorporated into existing (baseline) conditions as analyzed in this SSA.

CURE Comment #4: CURE states that a thorough environmental review of the transmission line's affected environment must be completed to describe its environmental setting, support impacts analysis, and identification of mitigation measures.

Staff Response: Section C.2.8 of the SSA examines the potential impacts of future SCE transmission line project, which would be related to the Calico Solar Project, under the separate jurisdiction of the California Public Utilities Commission. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed, and are discussed in the SSA based on available information. As a separate project under another agency's jurisdiction, the SCE upgrades will also be the subject of a more detailed CEQA analysis in the future, based on a more specific project description that is now available.

CURE Comment #5: CURE states that the SA/DEIS does not disclose and analyze all potentially significant impacts to biological resources. CURE states that analyses in the SA/DEIS of several biological resources (vegetation in jurisdictional drainages, rare plants, desert tortoise, burrowing owl, Nelson's bighorn sheep, golden eagle, and MFTL) may be revised based on results of later field surveys. CURE believes that the analysis in the SA/DEIS may bear little resemblance to the analysis and mitigation recommendations based upon follow-up survey efforts.

Staff Response: For several biological resources, staff's analyses and recommended conditions of certification have been extensively revised, based in part on follow-up field surveys provided by the Applicant. Staff's analysis of the follow-up field data have not resulted in identification of any potentially significant impacts to biological resources beyond those identified in the SA/DEIS. Revisions to existing conditions and impacts analysis also have been made due to revisions to the proposed project, which would substantially reduce its impacts to several resources, including microphyll woodlands, state-jurisdictional streambeds, desert tortoise, bighorn sheep, and Emory's crucifixion thorn. Many of the revisions to staff's recommended conditions of certification in this SSA are

based not on new data or project design, but on interagency communication among Energy Commission staff and CDFG, BLM, and USFWS.

CURE Comment #6: CURE states that the SA/DEIS improperly defers mitigation to future plans, citing the following Conditions of Certification as examples: **BIO-7**, **BIO-10**, **BIO-11, BIO-12, BIO-13, BIO-16, BIO-17, BIO-18, BIO-21,** and **BIO-26.** CURE describes its understanding of mitigation deferral and applicable requirements for CEQA findings.

Staff Response: The comment refers to several Conditions of Certification which would require preparation and implementation of conservation or management plans by the project owner. Each of the cited Conditions of Certification includes performance criteria with verification requirements in a manner that is consistent with CEQA and laws governing the Energy Commission's certification process. While the plans themselves have not been completed to date, staff concludes that the mitigation measures as recommended are feasible, are enforceable through the Energy Commission's compliance requirements, and would mitigate the potentially significant impacts of the project below a level of significance.

CURE Comment #7: CURE states that staff's recommended mitigation measures for impacts to biological resources may not be feasible and that significant impacts to biological resources may remain unmitigated. As an example CURE cites **BIO-13** which would require the Applicant to acquire compensation lands to mitigate impacts to Mojave fringe-toed lizard habitat, and lists specific requirements for compensation lands. CURE indicates that qualifying private lands may not exist and, thus, the mitigation measure may not be feasible. CURE recommends that the compensation lands should be identified now to ensure adequate mitigation. CURE makes a similar argument regarding desert tortoise compensation lands.

Staff Response: Given the project's location in the central Mojave Desert, and the widespread distribution of suitable habitat for Mojave fringe-toed lizard and desert tortoises in the region, staff concludes that since suitable private lands do exist and could be available for purchase, staff believes that its proposed habitat compensation mitigation strategy is feasible.

Staff does not agree that it would be feasible to identify specific mitigation parcels in the SSA. Until the project is certified and further surveys are completed, the final mitigation obligation will not be known. Identification of specific mitigation parcels at this stage of the process would take additional staff resources without ensuring the parcels identified are available for purchase after the project is certified, and the Energy Commission cannot require an applicant to purchase mitigation lands or options on such lands prior to certification. The process that will be used on this project to identify and acquire suitable mitigation land has been successfully used by the Energy Commission, CDFG and other agencies on many other projects.

CURE Comment #8: CURE states that staff's recommended mitigation for impacts to biological resources are vague and uncertain, worded ambiguously, and thus unenforceable. As an example, CURE cites **BIO-12,** asserting that it is vague and uncertain because it only would require avoidance and minimization of disturbance to rare plants "to the extent feasible" and that required delineations of rare plant occurrences could take place during a time of year when each target species may not be identifiable.

> Staff Response: Staff has reviewed its recommended conditions of certification, including **BIO-12**, and made numerous revisions for improved clarity and to ensure enforceability.

CURE Comment #9: CURE provides numerous comments and recommendations relating to changes in for specific wording in staff's recommended conditions of certification to mitigate impacts to biological resources. These comments do not raise significant environmental issues, or issues related to the adequacy of the SA/DEIS, and are not individually summarized.

> Staff Response: Staff has reviewed the recommended revisions and incorporated them as appropriate. Staff also has made numerous other revisions to the conditions of certification, as described in responses to CURE comments #5 and #7, above.

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 and to satisfy mitigation requirements of other relevant laws. The accelerated timing requirements described in these proposed conditions of certification and associated verification requirements 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 (http://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.

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 (http://www.fws.gov/ventura/speciesinfo/protocols_guidelines) and submit it to the USFWS, BLM's Wildlife Biologist, 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-

[1] USFWS <http://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.

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 as soon as possible prior to the termination or release of the 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 Wildlife Biologist, 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 (http://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 Wildlife Biologist , 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 (http://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 Wildlife Biologist, 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, badgers, and white-margined beardtongue, 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;
7. Include printed training materials, including photographs and brief descriptions of desert tortoises, Mojave fringe-toed lizards, burrowing owls, golden eagles, nesting birds, badgers, and white-margined beardtongue, including behavior, ecology, sensitivity to human activities, legal protection, penalties for violations, reporting requirements, and protection measures;
8. Prominently display posters and descriptions in offices, conference rooms, employee break rooms, and other areas where employees may congregate of desert tortoises, Mojave fringe-toed lizards, burrowing owls, golden eagles, nesting birds, badgers, and white-margined beardtongue, including behavior, ecology, sensitivity to human activities, legal protection, penalties for violations, reporting requirements, and protection measures; and

9. 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 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.

Verification: 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 Wildlife Biologist. 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, summarizing all modifications to mitigation measures made during the project's preconstruction site mobilization and construction-related ground disturbance, grading, boring, and trenching, naming any mitigation and monitoring items still outstanding, and providing a timeline for implementing outstanding items. The project owner shall coordinate with the CPM and BLM's Wildlife Biologist to revise and finalize the Construction Termination Report to fulfill its reporting requirements to be outlined in the BRIMP.

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. All measures shall be subject to review and approval by the CPM.

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. Tortoise fencing shall be placed along the outside perimeter of the access road that would provide access to areas north of the project site.

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. Speed limits on paved roads shall be consisted with posted speed limits.
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) S*uggested 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. Avoid Wildlife Entrapment. 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 done, 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.

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-26**.

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 within 24 hours 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. If fence damage occurs during any time of year when tortoises may be active, the project owner shall be responsible for monitoring the site of the damaged fence until it is fully repaired, to prevent a desert tortoise from entering the project area. All incidents of damaged tortoise exclusion fence, including dates of damage and repair; extent of damage; and monitoring summaries (methods and results) shall be reported to the BLM, CPM, CDFG, and USFWS. 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 by the Designated Biologist or Biological Monitor. 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 five 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 revegetated according to the measures described below. 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. For the purpose of this mitigation measure, "temporarily disturbed areas" shall include disturbances that are considered permanent impacts in the analyses above (i.e., would take more than 5 years to recover) but would benefit from the revegetation activities identified here. The following measures shall be implemented for all temporarily disturbed areas, excluding areas immediately around facilities which may be landscaped according to a separate 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) performance standards (see below); 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 Performance Standards. Post-seeding and planting monitoring will be yearly and shall continue for a period of no less than 10 years or until the defined performance standards are achieved (whichever is later). 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 standards after the 10-year maintenance and monitoring period, monitoring and remedial activities shall extend beyond the 10-year period until the performance standards are met, unless otherwise specified by the Energy Commission and BLM. As needed to achieve performance standards, the project owner shall be responsible for replacement planting 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. The following performance standards must be met by the end of the monitoring period: (a) at least 80% of the species and vegetative cover observed within the temporarily disturbed areas shall be native species that naturally occur in desert scrub habitats; (b) absolute cover and density of native plant species within the revegetated areas shall equal at least 60% of the pre-disturbance or reference vegetation cover; and (c) the site shall have gone without irrigation or remedial planting for a minimum of three years prior to completion of monitoring.

   If a fire or flood damages a revegetation area within the 10-year monitoring period, the owner shall be responsible for a one-time replacement. If a second fire or flood occurs, no replanting is required, unless the event is caused by the owner's activity (e.g., as determined by BLM or other firefighting agency investigation).

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 Wildlife Biologist .

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 revise and 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.

The final plan shall include weed control measures with demonstrated records of success, based on the best available information from sources such as: The Nature Conservancy's The Global Invasive Species Team, Cooperative Extension, California Invasive Plant Council http://www.cal-ipc.org/ip/management/plant_profiles/index.php, and the California Department of Food & Agriculture Encycloweedia: http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia_hp.htm. The methods shall meet the following criteria:

1. Manual: well-timed removal of plants or seed heads with hand tools; seed heads and plants must be disposed of in accordance with guidelines from the Riverside County Agricultural Commissioner.
2. Chemical: Herbicides known to have residual toxicity, such as pre-emergents and pellts, shall not be used in natural areas or within the engineered channels. Only the following application methods may be used: wick (wiping onto leaves); inner bark injection; cut stump; frill or hack & squirt (into cuts in the trunk); basal bark girdling; foliar spot

spraying with backpack sprayers or pump sprayers at low pressure or with a shield attachment to control drift, and only on windless days, or with a squeeze bottle for small infestations.

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 on disturbed sites with native seed mixes (measures and performance standards to be consistent with Revegetation Plan, described in Condition of Certification **BIO-10)**.
- Monitoring and timely implementation of control measures to ensure early detection and eradication for weed invasions. Weed infestations must be controlled or eradicated as soon as possible upon discovery, and before they go to seed, to prevent further expansion.
- 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. Mulch or green waste shall be removed from the site in a covered vehicle to prevent seed dispersal, and transported to a landfill or composting facility.
- Indicate where herbicides may be used, which herbicides, and specify techniques to be used to avoid chemical drift or residual toxicity to special-status plants, consistent with guidelines provided by the Nature Conservancy's The Global Invasive Species Team (http://www.invasive.org/gist/products.html).
- Avoid herbicide use or other control methods in or around Environmentally Sensitive Areas (ESAs, see Condition of Certification **BIO-12**) on-site or off-site; prevent any herbicide drift into ESAs.

From the time construction begins and throughout the life of the project , surveying for new invasive weed populations and the monitoring of identified and treated populations shall be required within the project area and surrounding 250-foot buffer area. See also requirements for weed monitoring and treatment in the adjacent Pisgah Crater ACEC described in Condition of

Certification **BIO-12**. 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, average rainfall years, the weed infestation at that site can be considered eradicated and weed control efforts, but not annual monitoring, 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 revised Weed Management Plan. The project owner shall coordinate with the CPM and BLM's Wildlife Biologist to revise and finalize the Weed Management Plan. Any further modifications to the approved Weed Management Plan shall be made only after consultation with the CPM and BLM's Wildlife Biologist , 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 This condition contains the following five sections:

- **Section A: White-margined Beardtongue Avoidance and Minimization Measures** describes measures to protect all white-margined beardtongue plants located within the project area or within 250 feet of its boundaries (including access roads, staging areas, laydown areas, parking and storage areas) from accidental and indirect impacts during construction, operation, and closure.
- **Section B: Conduct Late Season Botanical Surveys** describes guidelines for conducting summer-fall 2010 surveys to detect special-status plants that would have been missed during the spring 2010 surveys.
- **Section C: Avoidance Requirements for Special-Status Plants Detected in the Summer/Fall 2010 Surveys** outlines the level of avoidance required for plants detected during the summer-fall surveys, based on the species' rarity and status codes.
- **Section D: Off-Site Compensatory Mitigation for Special-Status Plants** describes performance standards for mitigation for a range of options for compensatory mitigation through acquisition, restoration/ enhancement, or a combination of acquisition and restoration/enhancement.
- **Section E: Conformance with BLM and San Bernardino County Plant Protection Policies** describes measures to salvage and transplant certain cactu, yucca, and other species in conformance with BLM and San Bernardino County policies.

"Project Disturbance Area" encompasses all areas to be temporarily and permanently disturbed by the Project, including the plant site, linear facilities, and areas disturbed by temporary access roads, fence installation, construction work lay-down and staging areas, parking, storage, or by any other activities resulting in disturbance to soil or vegetation.

The Project owner shall implement the following measures in Section A, B, C, D and E to avoid, minimize, and compensate for impacts to special-status plant species:

Section A: White-margined Beardtongue Avoidance and Minimization Measures

To protect all white-margined beardtongue plants located within the project area or within 250 feet of its boundaries (including access roads, staging areas, laydown areas, parking and storage areas) from accidental and indirect impacts during construction, operation, and closure, the Project owner shall implement the following measures:

1. Designated Botanist. An experienced botanist who meets the qualifications described in Section **B-2** below shall oversee compliance with all special-status plant avoidance, minimization, and compensation measures described in this condition throughout construction, operation, and closure. The Designated Botanist shall oversee and train all other Biological Monitors tasked with conducting botanical survey and monitoring work.
2. White-margined Beardtongue Impact Avoidance and Minimization Plan. The Project owner shall prepare and implement a White-margined Beardtongue Impact Avoidance and Minimization Plan and shall incorporate the Plan into the BRMIMP (**BIO-7**). The Plan shall be designed to prevent direct or indirect effects of project construction and operation to all white-margined beardtongue occurrences within the project boundary, and to any other special status plants including small-flowered androstephium located within Environmentally Sensitive Areas (defined below). The Plan shall include the following elements:
    a. Designate Environmentally Sensitive Areas (ESAs). Before construction, designate ESAs to protect all known white-margined beardtongue locations on the project site or within 250 feet of site boundaries. The locations of ESAs shall be clearly depicted on construction drawings, which shall also include all avoidance and minimization measures on the margins of the construction plans. The boundaries of the ESAs shall be provide a minimum of 250 feet buffer area between plan locations and any ground-disturbing project activity. The ESAs shall be clearly delineated in the field with permanent fencing and signs prohibiting movement of the fence under penalty of work stoppages and additional compensatory mitigation. ESAs shall also be permanently marked (with signage or other markers) to ensure that avoided plants are not inadvertently harmed during construction, operation, or closure.

b. Baseline data. Document baseline conditions, including numbers and areal extent of white-margined beardtongue and any other special-status plant occurrences within the ESAs;

c. Success criteria. Specify success standards for protection of special-status plant occurrences within the ESAs, and identify specific triggers for remedial action (e.g., numbers of plants dropping below a threshold);

d. Literature review. Describe and reference any available information about microhabitat preferences and fecundity, essential pollinators, reproductive biology, and propagation and culture requirements for white-margined beardtongue and any other special-status species within the ESAs;

e. Protection and avoidance measures. Describe measures (e.g., fencing, signage) to avoid direct and indirect construction and operation impacts to special-status plants within the ESAs; these shall include but shall not be limited to: (1) training components specific to protection of white-margined beardtongue and surrounding habitat buffer area, which shall be incorporated into the WEAP described in **BIO-6**; (2) detailed specifications for avoiding herbicide and soil stabilizer drift, and shall include a list of herbicides and soil stabilizers that may be used on the Project with manufacturer's guidance on appropriate use; the Plan shall reference the Weed Management Plan (see Condition of Certification **BIO-11**) and shall be consistent with provisions of that Plan; (3) measures to ensure that erosion and sediment control do not inadvertently impact special-status plants (e.g., by using invasive or non-native plants in seed mixes, introducing pest plants through contaminated seed or straw, etc.). Where applicable, these measures shall be incorporated in the Weed Management Plan and Storm Water Pollution Prevention Plan. Also, designate spoil areas; equipment, vehicle, and materials storage areas; parking; equipment and vehicle maintenance areas, and; wash areas at least 100 feet from boundaries of any ESAs;

f. Monitoring and Reporting Requirements. The Designated Botanist shall conduct weekly monitoring of the ESAs during any construction, operation, or decommissioning activities within 100 feet of the ESAs, and quarterly monitoring for the remainder of construction. The Project owner shall also conduct annual monitoring of the avoided occurrences on-site, and off-site occurrences that are adjacent to the Project, for the life of the Project (see Verification, below).

g. Remedial Action Measures. Specify remedial action measures to be implemented if success standards (above) are not met at any time during the life of the project;

h. Seed Collection. Over the life of the project, the project owner shall collect a small proportion of any seed produced by white-margined beardtongue plants protected on-site within ESAs. The collection technique shall follow seed collection and storage guidelines contained

in (Wall 2009a; Bainbridge 2007). Collection of seed shall be done by the Rancho Santa Ana Botanic Garden (RSABG) Conservation Program staff or other qualified seed or restoration specialist. The Project owner shall be responsible for all costs associated with seed collection and storage. All seed storage shall occur at RSABG or other qualified research institution and at least 40% of the collected seed shall remain in long-term storage at RSABG Seed Conservation Program, San Diego Natural History Museum, or other qualified seed conservation program;

i. Propagation research. The project own shall be responsible for evaluating potential white-margined beardtongue propagation and reintroduction methods for eventual implementation on-site or off-site; a portion of seed (above) shall be made available for propagation research which may at some time inform contingency propagation efforts on the project site or elsewhere; propagation experimentation shall be funded by the project owner and conducted by a qualified research institution such as Rancho Santa Ana Botanic Garden.

j. Off-site sand transport monitoring and management. The White-margined Beardtongue Impact Avoidance and Minimization Plan shall include a sand transport monitoring and management to document and manage project effects to eastward sand transport to occupied white-margined beardtongue aeolian sand habitat off-site to the east. At minimum, the plan shall include the following elements (1) quantify baseline eastward sand transport from the project area into the adjacent BLM Pisgah Crater ACEC, following methods described by Etyemesian et al. (2010); (2) specify methods and schedule for annual sand transport monitoring throughout the first five years of the project's life; (3) identification of thresholds which would trigger remediation requirements; and (4) development of adaptive management strategies to supplement eastward sand transport into the ACEC if needed. These strategies may include revisions to project fencing design, importing sand from off-site, or transporting sand across the project site for further dispersal. No sand transport remediation work would be permitted to cause new land disturbance outside the project area as analyzed in this SSA.

k. Off-site weed monitoring and management. The White-margined Beardtongue Impact Avoidance and Minimization Plan shall include methods and schedule to monitor and manage weed abundance in occupied and suitable white-margined beardtongue habitat to the east. At minimum, the plan shall (1) quantify baseline weed abundance in the portion of the ACEC adjacent BLM Pisgah Crater ACEC, adjacent to and within 500 m of the eastern project boundary, north of the BNSF railroad tracks; (2) weed abundance monitoring schedule and methods to implement throughout that area by collecting and analyzing quantitative weed abundance during every year of average or greater rainfall throughout the life of the project; (3) identify weed abundance thresholds which would trigger remediation requirements; and (4)

specify weed control methods to be implemented as needed in occupied and suitable white-margined beardtongue habitat throughout the area described above.

Section B: Conduct Late-Season Botanical Surveys

The Project owner shall conduct late-summer/fall botanical surveys for late-season special-status plants as described below:

1. Survey Timing. To the extent feasible, surveys shall be timed to detect: a) summer annuals triggered to germinate by the warm, tropical summer storms (which may occur any time between June and October), and b) fall-blooming perennials that respond to the cooler, later season storms that originate in the Pacific northwest (typically beginning in September or October). The survey dates shall be based on plant phenology and the timing of a significant storm (i.e., a 10 mm or greater rain or storm event, as measured at or within 1 mile of the Project site) if an event is recorded. Surveys for summer annuals shall be timed to occur approximately 4 to 7 weeks following a warm, tropical storm. Re-surveys shall occur as many times as necessary to ensure that surveys are conducted during the appropriate identification period for the target taxa, which may be blooms, fruit, seed characteristics, or vegetative characteristics, depending on the taxon. However, due to the undependable nature and scattered patterns of summer and early fall rainfall, it is possible that no suitable rain event will be documented in the area. Nevertheless, the project own shall be responsible for conducting late-season botanical surveys along washes and other lowland areas on-site due to the possibility that rainstorms in the Cady Mountains may go undetected, but may initiate summer or fall blooms.
2. Surveyor Qualifications and Training. Surveys shall be conducted by a qualified botanist knowledgeable in the complex biology of the local flora, and consistent with CDFG (2009) and BLM (2009) protocols. The botanical survey crew shall be prepared to mobilize quickly to conduct appropriately timed surveys. Each field botanist shall be equipped with a GPS unit and record a complete tracklog; these data shall be compiled and submitted along with the Summer-Fall Survey Botanical Report (described below). Prior to the start of surveys, all crew members shall, at a minimum, visit reference sites (where available) and/or review herbarium specimens of all BLM Sensitive plants, CNPS List 1B or 2 (Nature Serve rank S1 and S2) or proposed List 1B or 2 taxa, and any new reported or documented taxa, to obtain a search image. Because range extensions are likely to be found, the list of potentially occurring special-status plants shall include all special-status taxa known from the central portion of the Mojave Desert in California. The list shall also include taxa with bloom seasons that begin in fall and extend into the early spring as many of these are reported to be easier to detect in fall, following the start of the fall rains.
3. Survey Coverage. At a minimum, the Applicant shall conduct comprehensive surveys (i.e., 100% visual coverage) of the washes, dune swales, and

other lowlands within the project site. In the intervening uplands (e.g., bajadas and rock outcrops) surveys shall be conducted to ensure a 25% visual coverage. Other special or unique habitats associated with rare plants (such as dunes, washes, and chenopod scrubs) shall also be surveyed at 100% visual coverage. Transects shall be "intuitive controlled" (per BLM 2009b) to ensure a focus on habitat most likely to support rare plants (such as desert washes or dunes), rather than on pre-defined, evenly-spaced survey grids.

4. Documenting Occurrences. If a special-status plant is detected, the full extent of the population shall be assessed, both onsite and offsite. The number of individuals shall be counted (or sub-sampled and the population size estimated in the event of large populations). The boundaries of all occurrences shall be recorded with hand-held GPS units of one meter or better accuracy and then plotted on aerial photo base maps of a scale similar to that used in the AFC (SES 2008). All but the smallest populations (e.g., a population occupying less than 100 square feet) shall be recorded as area polygons; small populations may be recorded as point features. All GPS-recorded occurrences shall include: the number of plants, phenology, observed threats (e.g., OHV or invasive exotics), and habitat or community type. The map of occurrences submitted with the progress reports and final botanical report shall be prepared to ensure consistency with mapping protocol and definitions of occurrences in CNDDB: occurrences found within 0.25 miles of another occurrence of the same taxon, and not separated by significant habitat discontinuities, shall be combined into a single 'occurrence.' The Project Owner shall also submit the raw GPS shape files and metadata.

5. Reporting. Progress Reports shall be submitted during surveys (as described below in verification), and shall include: a) the raw GPS data and metadata; b) a spreadsheet of the data (from the 'dbf' file), and c) a map of the data showing occurrence locations (labeled with their corresponding occurrence number from the GPS files) and Project features on a USGS topographic base map.

   The Final Summer-Fall Botanical Survey Report shall be prepared consistent with CDFG guidelines (CDFG 2009), and BLM guidelines (Lund pers. comm.) and shall include the following components:

   a. the BLM designation, NatureServe Global and State Rank of each species or taxon found (or proposed rank, or CNPS List);

   b. the number or percent of the occurrence that will be directly affected, and indirectly affected by changes in drainage patterns or altered geomorphic processes;

   c. the habitat or plant community that supports the occurrence and the total acres of that habitat or community type that occurs in the Project Disturbance Area;

   d. an indication of whether the occurrence has any local or regional significance (e.g., if it exhibits any unusual morphology, occurs at the periphery of its range in California, represents a significant range

extension or disjunct occurrence, or occurs in an atypical habitat or substrate);

e. a completed CNDDB field form for every occurrence, and;

f. two maps: one that depicts the raw GPS data (as collected in the field) on a topographic base map with Project features; and a second map that follows the CNDDB protocol for occurrence mapping, which lumps two or more occurrences of the same species within one-quarter mile or less of each other into one occurrence.

Section C: Avoidance Requirements for Special-Status Plants Detected in the Summer/Fall 2010 Surveys

The Project owner shall apply the following avoidance standards to special-status plants that might be detected during late summer/fall season surveys. Avoidance and/or the mitigation measures described in Section D below would reduce impacts to special-status plant species to less than significant levels.

Mitigation for CNDDB Rank 1 Plants (Critically Imperiled) – 75% Avoidance Required: If species with a CNDDB rank of 1 are detected within the Project Disturbance Area or are otherwise directly impacted by discharges from or the diversion of streams around the Project, the Project owner shall implement avoidance measures to protect at least 75% of the local population of this species. The local population shall be measured by the number of individuals occurring on the Project site and within the immediate watershed of the project for wash-dependent species or species of unknown dispersal mechanism, or the within the local sand transport corridor for wind-dispersed species. Avoidance shall include protection of the ecosystem processes essential for maintenance of the protected plant occurrence. Isolated 'islands' of protected plants disconnected by the Project from natural fluvial or aeolian processes shall not be considered to be protected and shall not be credited as contributing to the 75% avoidance requirement because such isolated populations are not sustainable. The Project owner shall provide compensatory mitigation as described below in Section D for Project impacts to CNDDB Rank 1 plants (impacts cannot exceed 25% of the local population) that could not be avoided.

Mitigation for CNDDB Rank 2 Plants (Imperiled) – 75% Avoidance Where Feasible: If species with a CNDDB rank of 2 are detected within the Project Disturbance Area, the Project owner shall implement avoidance measures where feasible to protect 75% of the local population of this species. Avoidance is feasible if avoidance results in 10 percent or less loss of electrical output. The Project owner shall provide compensatory mitigation as described below in Section D for impacts to plants that could not be avoided.

Mitigation for CNDDB Rank 3 Plants (Vulnerable) – No On-Site

Mitigation for CNDDB Avoidance Required Unless Local or Regional Significance: If species with a CNDDB rank of 3 are detected within the Project Disturbance Area, no onsite avoidance or compensatory mitigation shall be required unless the occurrence has local or regional significance, in

which case the plant occurrence shall be treated as a CNDDB 2 ranked plant. A plant occurrence would be considered to have local or regional significance if:

a. It occurs at the outermost periphery of its range in California;

b. It occurs in an atypical habitat, region, or elevation for the taxon that suggests that the occurrence may have genetic significance (e.g., that may increase its ability to survive future threats), or;

c. It exhibits any unusual morphology that is not clearly attributable to environmental factors that may indicate a potential new variety or sub-species.

Pre-Construction Notification for State- or Federal-Listed Species, or BLM Sensitive Species. If a state or federal-listed species or BLM Sensitive species is detected, the Project owner shall immediately notify the CDFG, USFWS, BLM, and the CPM.

Preservation of the Germplasm of Affected Special-Status Plants. For all significant impacts to special-status plants, regardless of whether compensatory mitigation is required, mitigation shall include seed collection from the affected special-status plants on-site prior to construction to conserve the germplasm and provide a seed source for restoration efforts. The seed shall be collected under the supervision or guidance of a reputable seed storage facility such as the Rancho Santa Ana Botanical Garden Seed Conservation Program, San Diego Natural History Museum, or the Missouri Botanical Garden. The costs associated with the long-term storage of the seed shall be the responsibility of the Project owner. Any efforts to propagate and reintroduce special-status plants from seeds in the wild shall be carried out under the direct supervision of specialists such as those listed above and as part of a Habitat Restoration/Enhancement Plan approved by the CPM.

Section D: Off-Site Compensatory Mitigation for Special-Status Plants

Where compensatory mitigation is required under the terms of Section C, above, the Project owner shall mitigate Project impacts to special-status plant occurrences with compensatory mitigation. Compensatory mitigation shall consist of acquisition of habitat supporting the target species, restoration/ enhancement of populations of the target species, or a combination of acquisition and restoration/enhancement as provided within this Condition. Compensatory mitigation shall be at a 3:1 ratio, with three acres of habitat acquired or restored/enhanced for every acre of special-status plant habitat disturbed by the Project Disturbance Area. The Project owner shall provide funding for the acquisition and/or restoration/enhancement, initial improvement, and long-term maintenance and management of the acquired or restored lands. The actual costs to comply with this condition will vary depending on the Project Disturbance Area, the actual costs of acquiring compensation habitat, the actual costs of initially improving the habitat, the actual costs of long-term management as determined by a Property Analysis Record (PAR) report, and other transactional costs related to the use of compensatory mitigation.

The Project owner shall comply with other related requirements in this condition:

I. Compensatory Mitigation by Acquisition: The requirements for the acquisition, initial protection and habitat improvement, and long-term maintenance and management of special-status plant compensation lands include all of the following:

Selection Criteria for Acquisition Lands. The compensation lands selected for acquisition may include any of the following three categories:

1. Occupied Habitat, No Habitat Threats: The compensation lands selected for acquisition shall be occupied by the target plant population and shall be characterized by site integrity and habitat quality that are required to support the target species, and shall be of equal or better habitat quality than that of the affected occurrence. The occurrence of the target special-status plant on the proposed acquisition lands should be viable, stable or increasing (in size and reproduction).
2. Occupied Habitat, Habitat Threats. Occupied compensation lands characterized by habitat threats may also be acquired as long as the population could be reasonably expected to recover with minor restoration (e.g., OHV or grazing exclusion, pest plant removal) and is accompanied by a Habitat Enhancement/Restoration Plan as described in Section D.II, below.
3. Unoccupied but Adjacent. The Project owner may also acquire habitat for which occupancy by the target species has not been documented, if the proposed acquisition lands are adjacent to occupied habitat. The Project owner shall provide evidence that acquisitions of such unoccupied lands would improve the defensibility and long-term sustainability of the occupied habitat by providing a protective buffer around the occurrence and by enhancing connectivity with undisturbed habitat.

Review and Approval of Compensation Lands Prior to Acquisition. The Project owner shall submit a formal acquisition proposal to the CPM describing the parcel(s) intended for purchase. This acquisition proposal shall discuss the suitability of the proposed parcel(s) as compensation lands for special-status plants in relation to the criteria listed above, and must be approved by the CPM.

Management Plan. The Project owner or approved third party shall prepare a management plan for the compensation lands in consultation with the entity that will be managing the lands. The goal of the management plan shall be to support and enhance the long-term viability of the target special-status plant occurrences. The Management Plan shall be submitted for review and approval to the CPM.

Integrating Special-Status Plant Mitigation with Other Mitigation lands. If all or any portion of the acquired Desert Tortoise, Waters of the State, or other required compensation lands meets the criteria above for special-status plant compensation lands, the portion of the other species' or habitat compensation

lands that meets any of the criteria above may be used to fulfill that portion of the obligation for special-status plant mitigation.

Compensation Lands Acquisition Requirements. The Project owner shall comply with the following requirements relating to acquisition of the compensation lands after the CPM, has approved the proposed compensation lands:

a. Preliminary Report. The Project owner, or an approved third party, shall provide a recent preliminary title report, initial hazardous materials survey report, biological analysis, and other necessary or requested documents for the proposed compensation land to the CPM. All documents conveying or conserving compensation lands and all conditions of title are subject to review and approval by the CPM. For conveyances to the State, approval may also be required from the California Department of General Services, the Fish and Game Commission and the Wildlife Conservation Board.

b. Title/Conveyance. The Project owner shall acquire and transfer fee title to the compensation lands, a conservation easement over the lands, or both fee title and conservation easement, as required by the CPM. Any transfer of a conservation easement or fee title must be to CDFG, a non-profit organization qualified to hold title to and manage compensation lands (pursuant to California Government Code section 65965), or to BLM or other public agency approved by the CPM. If an approved non-profit organization holds fee title to the compensation lands, a conservation easement shall be recorded in favor of CDFG or another entity approved by the CPM. If an entity other than CDFG holds a conservation easement over the compensation lands, the CPM may require that CDFG or another entity approved by the CPM, in consultation with CDFG, be named a third party beneficiary of the conservation easement. The Project owner shall obtain approval of the CPM of the terms of any transfer of fee title or conservation easement to the compensation lands.

c. Initial Protection and Habitat Improvement. The Project owner shall fund activities that the CPM requires for the initial protection and habitat improvement of the compensation lands. These activities will vary depending on the condition and location of the land acquired, but may include trash removal, construction and repair of fences, invasive plant removal, and similar measures to protect habitat and improve habitat quality on the compensation lands. The costs of these activities are estimated to be $750 per acre ($250 per acre, using the estimated cost per acre for Desert Tortoise mitigation as a best available proxy, at a 3:1 ratio, but actual costs will vary depending on the measures that are required for the compensation lands). A non-profit organization, CDFG or another public agency may hold and expend the habitat improvement funds if it is qualified to manage the compensation lands (pursuant to California Government Code section 65965), if it meets the approval of the CPM in consultation with CDFG, and if it is authorized to participate in implementing the required activities on the compensation lands. If CDFG takes fee title to the compensation lands, the habitat improvement fund must be paid to CDFG or its designee.

d. Property Analysis Record. Upon identification of the compensation lands, the Project owner shall conduct a Property Analysis Record (PAR) or PAR-like analysis to establish the appropriate amount of the long-term maintenance and management fund to pay the in-perpetuity management of the compensation lands. The PAR or PAR-like analysis must be approved by the CPM before it can be used to establish funding levels or management activities for the compensation lands.

e. Long-term Maintenance and Management Funding. The Project owner shall provide money to establish an account with non-wasting capital that will be used to fund the long-term maintenance and management of the compensation lands. The amount of money to be paid will be determined through an approved PAR or PAR-like analysis conducted for the compensation lands. Until an approved PAR or PAR-like analysis is conducted for the compensation lands, the amount of required funding is initially estimated to be $4,350 for every acre of compensation lands, using as the best available proxy the estimated cost of $1,450 per acre for Desert Tortoise compensatory mitigation, at a 3:1 ratio. If compensation lands will not be identified and a PAR or PAR-like analysis completed within the time period specified for this payment (see the verification section at the end of this condition), the Project owner shall either: (i) provide initial payment equal to the amount of $4,350 multiplied by the number of acres the Project owner proposes to acquire for compensatory mitigation; or (ii) provide security to the Energy Commission under subsection (g), "Mitigation Security," below, in an amount equal to $4,350 multiplied by the number of acres the Project owner proposes to acquire for compensatory mitigation. The amount of the required initial payment or security for this item shall be adjusted for any change in the Project Disturbance Area as described above. If an initial payment is made based on the estimated per-acre costs, the Project owner shall deposit additional money as may be needed to provide the full amount of long-term maintenance and management funding indicated by a PAR or PAR-like analysis, once the analysis is completed and approved. If the approved analysis indicates less than $4,350 per acquired acre (at a 3:1 ratio) will be required for long-term maintenance and management, the excess paid will be returned to the Project owner. The Project owner must obtain the CPM's approval of the entity that will receive and hold the long-term maintenance and management fund for the compensation lands. The CPM will consult with CDFG before deciding whether to approve an entity to hold the Project's long-term maintenance and management funds.

The Project owner shall ensure that an agreement is in place with the long-term maintenance and management fund holder/manager to ensure the following requirements are met:

i. Interest. Interest generated from the initial capital long-term maintenance and management fund 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 that is approved by the CPM and is designed to protect or improve the habitat values of the compensation lands.

ii. Withdrawal of Principal. The long-term maintenance and management fund principal shall not be drawn upon unless such withdrawal is deemed necessary by the CPM or by the approved third-party long-term maintenance and management fund manager, to ensure the continued viability of the species on the compensation lands.

iii. Pooling Long-Term Maintenance and Management Funds. An entity approved to hold long-term maintenance and management funds for the Project may pool those funds with similar non-wasting funds that it holds from other projects for long-term maintenance and management of compensation lands for special-status plants. However, for reporting purposes, the long-term maintenance and management funds for this Project must be tracked and reported individually to the CPM.

f. Other Expenses. In addition to the costs listed above, the Project owner shall be responsible for all other costs related to acquisition of compensation lands and conservation easements, including but not limited to the title and document review costs incurred from other state agency reviews, overhead related to providing compensation lands to CDFG or an approved third party, escrow fees or costs, environmental contaminants clearance, and other site cleanup measures.

g. Mitigation Security. The Project owner shall provide financial assurances to the CPM to guarantee that an adequate level of funding is available to implement any of the mitigation measures required by this condition that are not completed prior to the start of ground-disturbing Project activities. Financial assurances shall be provided to the CPM in the form of an irrevocable letter of credit, a pledged savings account or another form of security ("Security") approved by the CPM. The amount of the Security shall be $10,503 per acre ($3,501 per acre, using the estimated cost per acre for Desert Tortoise mitigation as a best available proxy, at a 3:1 ratio; see **Biological Resources Tables 5** and **7**) for every acre of habitat supporting the target special-status plant species which is significantly impacted by the project. The actual costs to comply with this condition will vary depending on the actual costs of acquiring compensation habitat, the costs of initially improving the habitat, and the actual costs of long-term management as determined by a PAR report. Prior to submitting the Security to the CPM, the Project owner shall obtain the CPM's approval of the form of the Security. The CPM may draw on the Security if the CPM determines the Project owner has failed to comply with the requirements specified in this condition. The CPM may use money from the Security solely for implementation of the requirements of this condition. The CPM's use of the Security to implement measures in this condition may not fully satisfy the Project owner's obligations under this condition, and the Project owner remains responsible for satisfying the obligations under this condition if the Security is insufficient. The unused Security shall be

returned to the Project owner in whole or in part upon successful completion of the associated requirements in this condition.

h. The Project owner may elect to comply with the requirements in this condition for acquisition of compensation lands, initial protection and habitat improvement on the compensation lands, or long-term maintenance and management of the compensation lands by funding, or any combination of these three requirements, by providing funds to implement those measures into the Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF). To use this option, the Project owner must make an initial deposit to the REAT Account in an amount equal to the estimated costs (as set forth in the Security section of this condition) of implementing the requirement. If the actual cost of the acquisition, initial protection and habitat improvements, or long-term funding is more than the estimated amount initially paid by the Project owner, the Project owner shall make an additional deposit into the REAT Account sufficient to cover the actual acquisition costs, the actual costs of initial protection and habitat improvement on the compensation lands, and the long-term funding requirements as established in an approved PAR or PAR-like analysis. If those actual costs or PAR projections are less than the amount initially transferred by the applicant, the remaining balance shall be returned to the Project owner.

i. The responsibility for acquisition of compensation lands may be delegated to a third party other than NFWF, such as a non-governmental organization supportive of desert habitat conservation, by written agreement of the Energy Commission. Such delegation shall be subject to approval by the CPM, in consultation with CDFG, BLM and USFWS, prior to land acquisition, enhancement or management activities. Agreements to delegate land acquisition to an approved third party, or to manage compensation lands, shall be executed and implemented within 18 months of the Energy Commission's certification of the Project.

II. Compensatory Mitigation by Habitat Enhancement/Restoration: As an alternative or adjunct to land acquisition for compensatory mitigation the Project owner may undertake habitat enhancement or restoration for the target special-status plant species. Habitat enhancement or restoration activities must achieve protection at a 3:1 ratio, with improvements applied to three acres of habitat for every acre special-status plant habitat directly or indirectly disturbed by the Project Disturbance Area. Examples of suitable enhancement projects include but are not limited to the following: i) control unauthorized vehicle use into an occurrence (or pedestrian use if clearly damaging to the species); ii) control noxious weeds that infest or pose an immediate threat to an occurrence; iii) exclude grazing by wild burros or livestock from an occurrence; or iv) restore lost or degraded hydrologic or geomorphic functions critical to the species by restoring previously diverted flows, removing obstructions to the wind sand transport corridor above an occurrence, or increasing groundwater availability for dependent species.

If the Project owner elects to undertake a habitat enhancement project for mitigation, the project must meet the following performance standards: The proposed enhancement project shall achieve rescue of an off-site occurrence that is currently assessed, based on the NatureServe threat ranking system (Master et al. 2009; Morse et al. 2004) with one of the following threat ranks: a) long-term decline >30%; b) an immediate threat that affects >30% of the population, or c) has an overall threat impact that is High to Very High. "Rescue" would be considered successful if it achieves an improvement in the occurrence trend to "stable" or "increasing" status, or downgrading of the overall threat rank to slight or low (from "High" to "Very High").

If the Project owner elects to undertake a habitat enhancement project for mitigation, they shall submit a Habitat Enhancement/Restoration Plan to the CPM for review and approval, and shall provide sufficient funding for implementation and monitoring of the Plan. The amount of the Security shall be $10,503 per acre ($3,501 per acre, using the estimated cost per acre for Desert Tortoise mitigation as a best available proxy, at a 3:1 ratio) for every acre of habitat supporting the target special-status plant species which is directly or indirectly impacted by the project. The amount of the security may be adjusted based on the actual costs of implementing the enhancement, restoration and monitoring. The implementation and monitoring of the enhancement/restoration may be undertaken by an appropriate third party such as NFWF, subject to approval by the CPM. The Habitat Enhancement/Restoration Plan shall include each of the following:

1. Goals and Objectives. Define the goals of the restoration or enhancement project and a measurable course of action developed to achieve those goals. The objective of the proposed habitat enhancement plan shall include restoration of a target special-status plant occurrence that is currently threatened with a long-term decline. The proposed enhancement plan shall achieve an improvement in the occurrence trend to "stable" or "increasing" status, or downgrading of the overall threat rank to slight or low (from "High" to "Very High").
2. Historical Conditions. Provide a description of the pre-impact or historical conditions (before the site was degraded by weeds or grazing or ORV, etc.), and the desired conditions.
3. Site Characteristics. Describe other site characteristics relevant to the restoration or enhancement project (e.g., composition of native and pest plants, topography and drainage patterns, soil types, geomorphic and hydrologic processes important to the site or species.
4. Ecological Factors. Describe other important ecological factors of the species being protected, restored, or enhanced such as total population, reproduction, distribution, pollinators, etc.
5. Methods. Describe the restoration methods that will be used (e.g., invasive exotics control, site protection, seedling protection, propagation techniques, etc.) and the long-term maintenance required. The implementation phase of the enhancement must be completed within five years.

6. Budget. Provide a detailed budget and time-line, develop clear, measurable, objective-driven annual success criteria.
7. Monitoring. Develop clear, measurable monitoring methods that can be used to evaluate the effectiveness of the restoration and the benefit to the affected species. The Plan shall include a minimum of five years of quarterly monitoring, and then annual monitoring for the remainder of the enhancement project, and until the performance standards for rescue of a threatened occurrence are met. At a minimum the progress reports shall include: quantitative measurements of the projects progress in meeting the enhancement project success criteria, detailed description of remedial actions taken or proposed, and contact information for the responsible parties.
8. Reporting Program. The Plan shall ensure accountability with a reporting program that includes progress toward goals and success criteria. Include names of responsible parties.
9. Contingency Plan. Describe the contingency plan for failure to meet annual goals.
10. Long-term Protection. Include proof of long-term protection for the restoration site. For private lands this would include conservations easements or other deed restrictions; projects on public lands must be contained in a Desert Wildlife Management Area, Wildlife Habitat Management Area, or other land use protections that will protect the mitigation site and target species.

Section E: Conformance with BLM and San Bernardino County Plant Protection Policies

It is BLM policy to salvage yucca and cactus plants (excluding cholla species, genus *Cylindropuntia*) and transplant them to undisturbed sites within project Rights of Way. 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 subject to BLM and County policies 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 BLM and 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 Replacement measures as approved by the CPM, BLM's State Botanist, and the County.

Verification: The Special-Status Plant Impact Avoidance and Minimization Measures shall be incorporated into the BRMIMP as required under Condition of Certification **BIO-7**.

Implementation of the special-status plant impact avoidance and minimization measures shall be reported in the Monthly Compliance Reports prepared by the Designated Botanist. Within 30 days after completion of Project construction, the Project owner shall provide to the CPM, for review and approval in consultation with the BLM State Botanist, a written construction termination report identifying how measures have been completed.

The Project owner shall submit a monitoring report every year for the life of the project to monitor effectiveness of protection measures for all avoided special-status plants to the CPM and BLM State Botanist. The monitoring report shall include: dates of worker awareness training sessions and attendees, an inventory of the special-status plant occurrences and description of the habitat conditions, an indication of population and habitat quality trends, and description of the remedial action, if warranted and planned for the upcoming year.

Section A. No less than 30 days prior to the start of ground-disturbing activities the Project owner shall submit grading plans and construction drawings depicting the location of Environmentally Sensitive Areas and the Avoidance and Minimization Measures contained in Section A of this Condition. The project owner shall coordinate with the CPM and BLM's Wildlife Biologist to revise and finalize boundaries of the ESAs.

No less than 30 days prior to the start of ground-disturbing activities the Project owner shall submit to the CPM for review and approval, in consultation with the BLM State Botanist, the name and resume of the project's Designated Botanist. If a Designated Botanist needs to be replaced, the specified information of the proposed replacement must be submitted to BLM's Wildlife Biologist and the CPM as soon as possible prior to the termination or release of the 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 Botanist is proposed to BLM's Wildlife Biologist and the CPM and for consideration.

No less than 30 days prior to ground-disturbing activities the Project owner shall submit a draft White-margined Beardtongue Impact Avoidance and Minimization Plan to the CPM for review and approval, in consultation with the BLM State Botanist. Implementation of the white-margined beardtongue impact avoidance and minimization measures shall be reported in the Monthly Compliance Reports prepared by the Designated Botanist. Within 30 days after completion of Project construction, the Project owner shall provide to the CPM, for review and approval in consultation with the BLM State Botanist, a written construction termination report identifying how measures have been completed.

The Project owner shall submit a monitoring report every year for the life of the project to monitor effectiveness of protection measures for all avoided white-margined beardtongue ESAs to the CPM and BLM State Botanist. The monitoring report shall include: dates of worker awareness training sessions and attendees, an inventory of the special-status plant occurrences and description of the habitat conditions, an indication of population and habitat quality trends, and description of the remedial action, if warranted and planned for the upcoming year. The project owner shall coordinate with the CPM and BLM's Wildlife Biologist to revise and finalize monitoring reports and all reports described in this section, and shall specifically report any difficulties in meeting the protection goals and cooperatively develop adaptive measures as needed.

Section B. Raw GPS data, metadata, and CNDDB field forms shall be submitted to the CPM within two weeks of the completion of each survey. A preliminary summary of results for the late summer/fall botanical surveys shall also be submitted to the CPM and BLM's State Botanist within two weeks following the completion of the surveys. If surveys are split into more than one period, then a summary letter shall be submitted following each survey period. The Final Summer-Fall Botanical Survey Report, GIS shape files and metadata shall be submitted to the BLM State Botanist and the CPM no less than 30 days prior to the start of ground-disturbing activities. The Final Report shall include a detailed accounting of the acreage of Project impacts to special-status plant occurrences.

Section C. The Project owner shall immediately provide written notification to the CPM, CDFG, USFWS, and BLM if it detects a State- or Federal-Listed Species, or BLM Sensitive Species at any time during its late summer/fall botanical surveys or at any time thereafter through the life of the Project, including conclusion of Project decommissioning.

Prior to construction, the project owner shall provide verification that seed of any special status plants on the project site have collected and conveyed to a facility (as described in this measure) and that suitable long-term funding has been provided by the project owner.

Section D. If compensatory mitigation is required, no less than 30 days prior to the start of ground-disturbing activities, the Project owner shall submit to the CPM Security adequate to acquire compensatory mitigation lands and/or undertake habitat enhancement or restoration activities, as described in this condition.

No fewer than 90 days prior to acquisition of compensatory mitigation lands, the Project owner shall submit a formal acquisition proposal and draft Management Plan for the proposed lands to the CPM, with copies to CDFG, USFWS, and BLM, describing the parcels intended for purchase and shall obtain approval from the CPM prior to the acquisition. No fewer than 90 days prior to acquisition of compensatory mitigation lands, the Project owner shall submit to the CPM and obtain CPM approval of any agreements to delegate land acquisition to an approved third party, or to manage compensation lands; such agreement shall be executed and implemented within 18 months of the Energy Commission's certification of the Project.

The Project owner or an approved third party shall complete the acquisition and all required transfers of the compensation lands, and provide written verification to the CPM of such completion no later than 18 months after the start of Project ground-disturbing activities. If NFWF or another approved third party is being used for the acquisition, the Project owner shall ensure that funds needed to accomplish the acquisition are transferred in timely manner to facilitate the planned acquisition and to ensure the land can be acquired and transferred prior to the 18-month deadline. If habitat enhancement is proposed, no later than six months following the start of ground-disturbing activities, the Project owner shall obtain CPM approval of the final Habitat Enhancement/Restoration Plan, prepared in accordance with Section D, and submit to the CPM or a third party approved by the CPM Security adequate for long-term implementation and monitoring of the Habitat Enhancement/Restoration Plan.

Enhancement/restoration activities shall be initiated no later than 12 months from the start of construction. The implementation phase of the enhancement project shall be completed within five years of initiation. Until completion of the five-year implementation portion of the enhancement action, a report shall be prepared and submitted as part of the Annual Compliance Report. This report shall provide, at a minimum: a summary of activities for the preceding year and a summary of activities for the following year; quantitative measurements of the Project's progress in meeting the enhancement project success criteria; detailed description of remedial actions taken or proposed; and contact information for the responsible parties.

Within 18 months of ground-disturbing activities, the Project owner shall transfer to the CPM or an approved third party the difference between the Security paid and the actual costs of (1) acquiring compensatory mitigation lands, completing initial protection and habitat improvement , and funding the long-term maintenance and management of compensatory mitigation lands; and/or (2) implementing and providing for the long-term protection and monitoring of habitat enhancement or restoration activities.

Section E. No more than 90 days following the publication of the Energy Commission Decision the project owner shall submit draft versions of the Protected Plant Salvage measures for review by the CPM. The project owner shall also provide a cost estimate for implementation of the measures which shall be subject to approval by the CPM. The final measures shall be submitted for approval by the CPM within 90 days of the publication of the Commission Decision. The final measures shall be incorporated into the BRMIMP. At this time, the project owner shall also provide security sufficient to fund the implementation of the measures.

Throughout project construction, or at any phase during the project when plants covered in Section E of this Condition are to be salvaged, the Designated Biologist or Designated Botanist shall submit quarterly and annual compliance reports to the CPM, BLM wildlife biologist, , and CDFG describing all project activities pertinent to the Protected Plant Salvage measures. Compliance reports shall include summaries of written and photographic records of the plan implementation described above. Upon completion of all plant salvage and replacement, compliance reports shall be submitted annually for a period not less than 5 years to document irrigation, maintenance, and monitoring results, including plant survival. The Designated Biologist shall maintain written and photographic records of the tasks described above, and make these records available to the CPM, County, BLM State Botanist, and CDFG upon request. The project owner shall coordinate with the CPM and BLM's Wildlife Biologist to revise and finalize all plans and reports named in this section.

MOJAVE FRINGE-TOED LIZARD MITIGATION

BIO-13 The project owner shall provide compensatory land to mitigate for habitat loss and direct impacts to Mojave fringe-toed lizards based on revised estimates of suitable Mojave fringe-toed lizard habitat on-site, to be verified by an expert in this animal's ecology. The project owner shall provide compensatory mitigation at a 3:1 ratio for impacts to breeding habitat (i.e., dune, sand ramp, or fine-sandy wash habitat), and at a 1:1 ratio for impacts to adjacent suitable foraging and cover habitat, such as thin aeolian sand overlying bajada surfaces, or foraging habitat surrounding the breeding habitat. Staff estimates breeding habitat on site as 21.4 acres, and surrounding suitable foraging and cover habitat (i.e., 45 meter buffer) as 143.3 acres. Therefore, staff anticipates this condition would require the acquisition and dedication in perpetuity of at a minimum 207.5 acres of habitat. The project owner shall provide funding for the acquisition, initial habitat improvements, and long-term management of the compensation lands, as described below.

Biological Resources Table 17
Mojave Fringe-toed Lizard Compensation Acreage Summary

Habitat Function	Project Impact Acreage	Mitigation Ratio	Compensation Acreage
Foraging and cover	143.3 acres	1:1	143.3 acres
Breeding	21.4 acres	3:1	64.2 acres
Total	164.7 acres		207.5 acres

To more accurately assess the extent of breeding habitat and adjacent foraging and cover habitat on the Project site, the Project owner shall provide a delineation of habitat for Mojave fringe-toed lizards to the CPM. The delineation shall be prepared by an expert on the species' ecology, whose qualifications have been approved by the CPM,

This compensation acreage may be included ("nested") within the acreage acquired and managed as desert tortoise habitat compensation (Condition of Certification **BIO-17**) only if:

- Adequate acreage of qualifying desert tortoise compensation lands also meet the Selection Criteria (below) as habitat for Mojave fringe-toed lizard;
- The desert tortoise habitat compensation lands are acquired and dedicated as permanent conservation lands within 18 months of the start of project construction.

If these two criteria are not met, then the project owner shall provide the required number of acres of Mojave fringe-toed lizard habitat compensation lands, adjusted to reflect the final project footprint and additional delineation of suitable habitat, independent of any compensation land required under other conditions of certification, and shall also provide funding for the initial improvement and long-term maintenance and management of the acquired lands, and shall comply with other related requirements this condition. Costs of these requirements are estimated to be $725,416.25 based on the acquisition of 207.5 acres (see **Biological Resources Tables 5** and **6** for a complete breakdown of estimated costs).

In lieu of acquiring lands itself, the Project owner may satisfy the requirements of this condition by providing funds for the acquisition to the Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF), as described in Section 3.i., below. Funding through the NFWF would require additional administrative costs estimated at $15,744.99, bringing the total required deposit to $741,161.24. See **Biological Resources Table 6**, above. If the Project owner elects to use the REAT Account with NFWF, the Project owner will be responsible for providing sufficient funds to cover actual acquisition costs and fees, even if those costs exceed the estimates in this condition, and will also need to pay NFWF fees to establish and manage the project-specific account for the land transfer and management.

The actual costs to comply with this condition will vary depending on the final footprint of the Project, the number of acres of Mojave fringe-toed lizard breeding and forging or cover habitat identified in the final delineation of suitable habitat, the actual costs of acquiring compensation habitat, the costs of initially improving the habitat, and the actual costs of long-term management as determined by a Property Analysis Report (PAR, 3. d., below). Regardless of actual cost, the project owner shall be responsible for implementing all aspects of this condition.

The requirements for the acquisition, initial improvement, protection, and long term management of the compensation lands shall include the following:

1. <u>Selection Criteria for Compensation Lands</u>. The compensation lands selected for acquisition to meet Energy Commission requirements shall:
    a. 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;
    b. Be biologically contiguous to lands currently occupied by Mojave fringe-toed lizard;

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. Provide quality habitat for Mojave fringe-toed lizard, that has the capacity to regenerate naturally when disturbances are removed;

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;

g. Not contain hazardous wastes;

h. Have water and mineral rights included as part of the acquisition, unless the CPM, in consultation with CDFG, BLM and USFWS, agrees in writing to the acceptability of land without these rights; and

i. Be on land for which long-term habitat management for Mojave fringe-toed lizard and other native biological resources is feasible.

2. Review and Approval of Compensation Lands Prior to Acquisition. The project owner shall submit a formal acquisition proposal to the CPM describing the parcel(s) intended for purchase. This acquisition proposal shall discuss the suitability of the proposed parcel(s) as compensation lands for Mojave fringe-toed lizard in relation to the criteria listed above and must be approved by the CPM. The CPM will share the proposal with and consult with CDFG, BLM, and the USFWS before deciding whether to approve or disapprove the proposed acquisition.

3. Compensation Lands Acquisition Conditions: The project owner shall comply with the following conditions relating to acquisition of the compensation lands after the CPM, in consultation with CDFG, BLM and the USFWS, have approved the proposed compensation lands:

   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 or requested documents for the proposed compensation land to the CPM. All documents conveying or conserving compensation lands and all conditions of title are subject to review and approval by the CPM, in consultation with CDFG, BLM and the USFWS. For conveyances to the State, approval may also be required from the California Department of General Services, the Fish and Game Commission and the Wildlife Conservation Board.

   b. Title/Conveyance: The Project owner shall acquire and transfer fee title to the compensation lands, a conservation easement over the lands, or both fee title and conservation easement as required by the CPM in consultation with CDFG. Any transfer of a conservation easement or fee title must be to CDFG, a non-profit organization qualified to hold

title to and manage compensation lands (pursuant to California Government Code section 65965), or to BLM or other public agency approved by the CPM in consultation with CDFG. If an approved non-profit organization holds fee title to the compensation lands, a conservation easement shall be recorded in favor of CDFG or another entity approved by the CPM. If an approved non-profit holds a conservation easement, CDFG shall be named a third party beneficiary. If an entity other than CDFG holds a conservation easement over the compensation lands, the CPM may require that CDFG or another entity approved by the CPM, in consultation with CDFG, be named a third party beneficiary of the conservation easement. The Project owner shall obtain approval of the CPM, in consultation with CDFG, of the terms of any transfer of fee title or conservation easement to the compensation lands.

c. Initial Habitat Improvement Fund. The Project owner shall fund activities that the CPM, in consultation with the CDFG, USFWS and BLM, requires for the initial protection and habitat improvement of the compensation lands. These activities will vary depending on the condition and location of the land acquired, but may include trash removal, construction and repair of fences, invasive plant removal, and similar measures to protect habitat and improve habitat quality on the compensation lands. The costs of these activities are estimated at $250 an acre, but will vary depending on the measures that are required for the compensation lands. A non-profit organization, CDFG or another public agency may hold and expend the habitat improvement funds if it is qualified to manage the compensation lands (pursuant to California Government Code section 65965), if it meets the approval of the CPM in consultation with CDFG, and if it is authorized to participate in implementing the required activities on the compensation lands. If CDFG takes fee title to the compensation lands, the habitat improvement fund must be paid to CDFG or its designee.

d. Property Analysis Record. Upon identification of the compensation lands, the Project owner shall conduct a Property Analysis Record (PAR) or PAR-like analysis to establish the appropriate amount of the long-term maintenance and management fund to pay the in-perpetuity management of the compensation lands. The PAR or PAR-like analysis must be approved by the CPM, in consultation with CDFG, before it can be used to establish funding levels or management activities for the compensation lands.

e. Long-Term Maintenance and Management Funding. The Project owner shall provide money to establish an account with a non-wasting capital that will be used to fund the long-term maintenance and management of the compensation lands. The amount of money to be paid will be determined through an approved PAR or PAR-like analysis conducted for the compensation lands. The amount of required funding is initially estimated to be $1,450 for every acre of compensation lands.

If compensation lands will not be identified and a PAR or PAR-like analysis completed within the time period specified for this payment (see the verification section at the end of this condition), the project owner shall provide initial payment of $1,450 an acre for the acres identified in the verified and approved delineation of habitat required by this condition, or if the delineation is not completed, shall provide $300,875 calculated at $1,450 an acre for 207.5 acres or as an alternative to initial payment of funds for long-term maintenance and management, the project owner shall include an amount equal to this initial payment in the security that is provided to the Energy Commission under section 3.h. of this condition. The amount of the required initial payment or security for this item shall be adjusted for any change in the Project footprint as described above. If an initial payment is made based on the estimated per-acre costs, the project owner shall deposit additional money as may be needed to provide the full amount of long-term maintenance and management funding indicated by a PAR or PAR-like analysis, once the analysis is completed and approved. If the approved analysis indicates less than $1,450 an acre will be required for long-term maintenance and management, the excess paid will be returned to the Project owner. The project owner must obtain the CPM's approval of the entity that will receive and hold the long-term maintenance and management fund for the compensation lands. The CPM will consult with CDFG before deciding whether to approve an entity to hold the project's long-term maintenance and management funds. The CPM, in consultation with CDFG, may designate another non-profit organization to hold the long-term maintenance and management fee if the organization is qualified to manage the compensation lands in perpetuity. If CDFG takes fee title to the compensation lands, CDFG shall determine whether it will hold the long-term management fee in the special deposit fund, leave the money in the REAT Account, or designate another entity to manage the long-term maintenance and management fee for CDFG and with CDFG supervision.

The Project owner shall ensure that an agreement is in place with the long-term maintenance and management fee holder/manager to ensure the following conditions:

i. Interest. Interest generated from the initial capital 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 designed to protect or improve the habitat values of the compensation lands.

ii. Withdrawal of Principal. The long-term maintenance and management fee principal shall not be drawn upon unless such withdrawal is deemed necessary by the CPM, in consultation with CDFG, or the approved third-party long-term maintenance and

management fee manager to ensure the continued viability of the species on the compensation lands. 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 solely for the purpose to manage lands in perpetuity unless CDFG designates NFWF or another entity to manage the long-term maintenance and management fee for CDFG.

iii. Pooling Funds. A CPM-approved non-profit organization qualified to hold long-term maintenance and management fees solely for the purpose to manage lands in perpetuity, may pool the fund with other funds for the operation, management, and protection of the compensation lands for local populations of desert tortoise. However, for reporting purposes, the long-term maintenance and management fee fund must be tracked and reported individually to the 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.

f. Other expenses. In addition to the costs listed above, the Project owner shall be responsible for all other costs related to acquisition of compensation lands and conservation easements, including but not limited to title and document review costs, expenses incurred from other state agency reviews, and overhead related to providing compensation lands to CDFG or an approved third party; escrow fees or costs; environmental contaminants clearance; and other site cleanup measures.

g. Management Plan. The project owner shall prepare a Management Plan for the compensation lands in consultation with the entity that will be managing the lands. The Management Plan shall reflect site-specific enhancement measures on the acquired compensation lands. The plan shall be submitted for approval of the CPM, in consultation with CDFG, BLM and USFWS.

h. Mitigation Security. The Project owner shall provide financial assurances to the CPM with copies of the document(s) to BLM, CDFG and the USFWS, to guarantee that an adequate level of funding is available to implement any of the mitigation measures required by this condition that are not completed prior to the start of ground-disturbing activities. The CPM may use money from the Security solely for implementation of the requirements of this condition. The CPM's use of the security to implement measures in this condition may not fully satisfy the Project owner's obligations under this condition. Security not used to implement mitigation measures shall be returned to the Project owner upon successful completion of the associated requirements in this

condition. 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"). Prior to submitting the Security to the CPM, the Project owner shall obtain the CPM's approval, in consultation with CDFG of the form of the Security.

Security for the requirements of this condition shall be provided in the amount of $725,416.25 (or ($741,161.24 if the project owner elects to use the REAT Account with NFWF pursuant to paragraph 3.h.i. of this condition, below). The security is calculated in part, from the items that follow but adjusted as specified below (consult **Biological Resources Table 14** for the complete breakdown of estimated costs). However, regardless of the amount of the security or actual cost of implementation, the project owner shall be responsible for implementing all aspects of this condition.

i. land acquisition costs for compensation land, calculated at $1,000/acre;

ii. Site assessments, appraisals, biological surveys, transaction closing and escrow costs, calculated as $18,000 total per parcel (presuming 40-acres per parcel)

iii. Initial site clean-up, restoration, or enhancement, calculated at $250/acre;

iv. Third-party and agency administrative transaction costs and overhead, calculated as percentages of land cost;

v. Long-term management and maintenance fund, calculated at $1,450 per acre;

vi. NFWF fees to establish a project-specific account; manage the sub-account for acquisition and initial site work; and manage the sub-account for long term management and maintenance.

The project owner may elect to comply with the requirements in this condition for acquisition of compensation lands, initial protection and habitat improvement on the compensation lands, or long-term maintenance and management of the compensation lands, or any combination of these three requirements, by providing funds to implement those measures into the Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF). To use this option, the Project owner must make an initial deposit to the REAT Account in an amount equal to the estimated costs (as set forth in the Security section of this condition) of implementing the requirement. If the actual cost of the acquisition, initial protection and habitat improvements, or long-term funding is more than the estimated amount initially paid by the project owner, the project owner shall make an additional deposit into the REAT Account sufficient to cover the actual acquisition costs, the actual costs of initial protection and habitat improvement on the compensation lands, or the long-term funding requirements as established in an approved PAR or PAR-like analysis. If those actual costs or PAR projections are less than the amount initially

transferred by the applicant, the remaining balance shall be returned to the project owner.

The responsibility for acquisition of compensation lands may be delegated to a third party other than NFWF, such as a non-governmental organization supportive of desert habitat conservation, by written agreement of the Energy Commission. Such delegation shall be subject to approval by the CPM, in consultation with CDFG, BLM and USFWS, prior to land acquisition, enhancement or management activities. Agreements to delegate land acquisition to an approved third party, or to manage compensation lands, shall be executed and implemented within 18 months of the Energy Commission's certification of the project.

Verification: The project owner shall provide the CPM with written notice of intent to start ground disturbance at least 30 days prior to the start of ground-disturbing activities on the project site.

If the mitigation actions required under this condition are not completed at least 30 days prior to the start of ground-disturbing activities, the Project owner shall provide the CPM and CDFG with an approved Security (as described above in section 3.h., Mitigation Security) in accordance with this condition of certification no later than 30 days prior to beginning Project ground-disturbing activities. Prior to submitting the Security to the CPM, the project owner shall obtain the CPM's approval, in consultation with CDFG, BLM and the USFWS, of the form of the Security. The project owner, or an approved third party, shall complete and provide written verification to the CPM, CDFG, BLM and USFWS of the compensation lands acquisition and transfer within 18 months of the start of Project ground-disturbing activities.

No later than 12 months after the start of ground-disturbing project activities, the project owner shall submit a formal acquisition proposal to the CPM describing the parcels intended for purchase, and shall obtain approval from the CPM, in consultation with CDFG, BLM and USFWS, prior to the acquisition. If NFWF or another approved third party is handling the acquisition, the project owner shall fully cooperate with the third party to ensure the proposal is submitted within this time period. The project owner or an approved third party shall complete the acquisition and all required transfers of the compensation lands, and provide written verification to the CPM, CDFG, BLM and USFWS of such completion, no later than 18 months after the issuance of the Energy Commission Decision. If NFWF or another approved third party is being used for the acquisition, the project owner shall ensure that funds needed to accomplish the acquisition are transferred in timely manner to facilitate the planned acquisition and to ensure the land can be acquired and transferred prior to the 18-month deadline,

The project owner shall complete and submit to the CPM a PAR or PAR-like analysis no later than 60 days after the CPM approves compensation lands for acquisition. The project owner shall fully fund the required amount for long-term maintenance and management of the compensation lands no later than 30 days after the CPM approves a PAR or PAR-like analysis of the anticipated long-term maintenance and management costs of the compensation lands. Written verification shall be provided to the CPM and CDFG to confirm payment of the long-term maintenance and management funds.

No later than 60 days after the CPM determines what activities are required to provide for initial protection and habitat improvement on the compensation lands, the project owner shall make funding available for those activities and provide written verification to the CPM of what funds are available and how costs will be paid. Initial protection and habitat improvement activities on the compensation lands shall be completed, and written verification provided to the CPM, no later than six months after the CPM's determination of what activities are required on the compensation lands.

The project owner, or an approved third party, shall provide the CPM, CDFG, BLM and USFWS with a management plan for the compensation lands within 180 days of the land or easement purchase, as determined by the date on the title. The CPM, in consultation with CDFG, BLM and the USFWS, shall approve the management plan after its content is acceptable to the CPM.

Within 90 days after completion of all project related ground disturbance, the project owner shall provide to the CPM, CDFG, BLM and USFWS an analysis, based on aerial photography, with the final accounting of the amount of habitat disturbed during Project construction. This shall be the basis for the final number of acres required to be acquired.

If electing to satisfy the requirements of this condition by utilizing the options created by CDFG pursuant to SBX8 34, the Project owner shall notify the Commission that it would like a determination that the Project's in-lieu fee proposal meets CEQA and CESA requirements.

GILA MONSTER MITIGATION

BIO-14 Concurrent with Desert Tortoise Clearance surveys (**BIO-15**, below), 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: Within 30 days after completion of clearance surveys the Designated Biologist shall submit a report to BLM's Wildlife Biologist, the CPM, USFWS, and CDFG describing implementation and results, including description 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. Tortoise exclusion fencing shall also be installed as necessary to prevent tortoises on the southern NAP (not a part) area (between the project site and Interstate 40) to prevent tortoises from entering the highway. If the culvert areas cannot be fenced due to restrictions associated with highway maintenance, the two tortoises would be translocated off the site (see **BIO-16**). 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 along both sides of any construction access roads within tortoise habitat but outside the fenced construction area, and maintained throughout the construction phase of the project, 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 surface flow is detectable within the fenced drainage during the storm, or for which channels on-site show any evidence of newly deposited sediments, bank erosion, or channel reworking following the storm. The project owner shall be responsible for monitoring storm flows and changes to channels to evaluate need for fence inspection. 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 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 translocated as described in the Desert Tortoise 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 and initial memo or verbal completion report to BLM's Wildlife Biologist, the CPM, USFWS, and CDFG (below), 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 translocated as described in the Desert Tortoise 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 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. Immediately upon completion of clearance surveys and desert tortoise removal from the site, the Designated Biologist shall provide an initial memo or verbal report of the results to BLM's Wildlife Biologist, the CPM, USFWS, and CDFG. Within 30 days after completion

of desert tortoise clearance surveys the Designated Biologist shall submit a report to BLM's Wildlife Biologist, the CPM, USFWS, and CDFG describing implementation of each of the mitigation measures listed above and compliance with Gila monster clearance survey (**BIO-14**). 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 TRANSLOCATION PLAN

BIO-16 The project owner shall develop and implement a final Desert Tortoise Translocation Plan (Plan) in conformance with standards and guidelines described in *Translocation of Desert Tortoises (Mojave Population) From Project Sites: Plan Development Guidance* (USFWS 2010), any more current guidance or recommendations as available from CDFG or USFWS, and meets the approval of USFWS, CDFG, 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 translocate them to suitable habitat capable of supporting them, while minimizing stress and potential for disease transmission. Tortoises to be moved farther than 500 meters shall be tested for disease prior to translocation. The Plan shall include written correspondence with Caltrans indicating whether tortoise exclusion fencing may be installed to prevent tortoises on the southern NAP area (between the project site and Interstate 40) to prevent tortoises from entering the highway. If Caltrans does not permit that fencing, then desert tortoises shall be translocated off the NAP site (see **BIO-15**). The final Plan shall be based on the draft Desert Tortoise Translocation Plan prepared by the applicant and shall include all revisions deemed necessary by USFWS, CDFG, BLM'S Wildlife Biologist, 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 (e.g., handling an injured or diseased tortoise).

Verification: Within 30 days of publication of the Energy Commission License Decision or BLM's 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 Translocation Plan that has been reviewed and approved by BLM's Wildlife Biologist 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 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, including the duration of monitoring of translocated tortoises.

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 acreage of 14,365 acres of desert tortoise habitat lands, adjusted to reflect the final project footprint, as specified in this condition. This figure was calculated as follows: a ratio of 1:1 for the entire project area (6,215 acres) and an additional 2:1 ratio for 4,075 acres of the project area north of the BNSF railroad tracks (i.e., a total ratio of 1:1 on 2,140 acres and a total ratio of 3:1 on 4,075 acres). See **Biological Resources Table 18**, below. These impact acreages are to be adjusted to reflect the final project footprint. For purposes of this condition, the Project footprint means all lands disturbed in the construction and operation of the Calico Solar Project, including all linear project components, as well as undeveloped areas inside the Project's boundaries that will no longer provide viable long-term habitat for the desert tortoise.

Biological Resources Table 18
Desert Tortoise Compensation Acreage Summary

Location	Project Impact Acreage	Mitigation Ratio	Compensation Acreage
South of BNSF RR	2,140 acres	1:1	2,140 acres
North of BNSF RR	4,075 acres	3:1	12,225 acres
Total	6,215 acres		14,365 acres

To satisfy this condition, the project owner shall acquire, protect, and transfer no fewer than 14,365 acres of desert tortoise habitat lands (adjusted to reflect the final Project footprint), and shall also provide funding for the initial improvement and long-term maintenance and management of the acquired lands, and comply with other related requirements of this condition, although a portion of the lands requirement may be satisfied with mitigation provided to BLM, as provided below. Costs of these requirements are estimated to be $49,223,057.50 based on the acquisition of 14,365 acres (see **Biological Resources Tables 5** and **7** for a complete breakdown of costs and acreage).

In lieu of acquiring lands itself, the Project owner may satisfy the requirements of this condition by depositing funds into the Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF), as described in Section 3.i., below. If the Project owner elects to use the REAT Account, then the total estimated cost of fulfilling this condition to $50,295,164.23.

Funds that the Project owner provides to satisfy BLM's mitigation requirements for the Project will also partially satisfy the requirements of this condition, up to a maximum of 6,215 acres of the 14,365-acre requirement, adjusted to reflect the final project footprint. Mitigation to BLM is expected to be in the form of payment in the amount of staff's estimated cost for the purchase, protection initial improvement, maintenance, and management of 6,215 acres of desert tortoise habitat, ,which BLM will use to implement habitat enhancement measures and other activities it identifies. The remainder of the mitigation requirement, at least 8,150 acres based on an additional 2:1

compensation ratio for the 4,075 project site acres north of the BNSF railroad tracks (adjusted to reflect the final project footprint), shall be acquired, protected, improved, maintained and managed as specified in this condition.

The actual costs to comply with this condition will vary depending on the final footprint of the Project, the actual costs of acquiring compensation habitat, the costs of initially improving the habitat, and the actual costs of long-term management as determined by a Property Analysis Report (PAR, 3.d., below). The 14,365-acre habitat requirement, and associated funding requirements based on that acreage, will be adjusted up or down if there are changes in the final footprint of the project. Regardless of actual cost, the project owner shall be responsible for implementing all aspects of this condition.

The requirements for the acquisition, initial improvement, protection, and long term management of the 14,365 acres of compensation lands shall include the following:

1. Selection Criteria for Compensation Lands. The compensation lands selected for acquisition to meet Energy Commission and CESA requirements shall be equal to or better than the quality and function of the habitat impacted and:

    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 contiguous and biologically 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 cause future erosional damage or other habitat damage, and 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 that cannot be removed to the extent that the site could not provide suitable habitat; and

    h. have water and mineral rights included as part of the acquisition, unless the CPM, in consultation with CDFG, BLM and USFWS, agrees in writing to the acceptability of land without these rights.

2. Review and Approval of Compensation Lands Prior to Acquisition. The project owner shall submit a formal acquisition proposal to the CPM 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 and must be approved by the CPM. The CPM will share the proposal with and consult with CDFG, BLM and the USFWS before deciding whether to approve or disapprove the proposed acquisition.

3. Compensation Lands Acquisition Conditions: The project owner shall comply with the following conditions relating to acquisition of the compensation lands after the CPM, in consultation with CDFG, BLM and the USFWS, have approved the proposed compensation lands:

   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 or requested documents for the proposed compensation land to the CPM. All documents conveying or conserving compensation lands and all conditions of title are subject to review and approval by the CPM, in consultation with CDFG, BLM and the USFWS. For conveyances to the State, approval may also be required from the California Department of General Services, the Fish and Game Commission and the Wildlife Conservation Board.

   b. Title/Conveyance: The Project owner shall acquire and transfer fee title to the compensation lands, a conservation easement over the lands, or both fee title and conservation easement as required by the CPM in consultation with CDFG. Any transfer of a conservation easement or fee title must be to CDFG, a non-profit organization qualified to hold title to and manage compensation lands (pursuant to California Government Code section 65965), or to BLM or other public agency approved by the CPM in consultation with CDFG. If an approved non-profit organization holds fee title to the compensation lands, a conservation easement shall be recorded in favor of CDFG or another entity approved by the CPM. If an approved non-profit holds a conservation easement, CDFG shall be named a third party beneficiary. If an entity other than CDFG holds a conservation easement over the compensation lands, the CPM may require that CDFG or another entity approved by the CPM, in consultation with CDFG, be named a third party beneficiary of the conservation easement. The Project owner shall obtain approval of the CPM, in consultation with CDFG, of the terms of any transfer of fee title or conservation easement to the compensation lands.

   c. Initial Habitat Improvement Fund. The Project owner shall fund activities that the CPM, in consultation with the CDFG, USFWS and BLM, requires for the initial protection and habitat improvement of the compensation lands. These activities will vary depending on the condition and location of the land acquired, but may include trash removal, construction and repair of fences, invasive plant removal, and

similar measures to protect habitat and improve habitat quality on the compensation lands. The costs of these activities are estimated at $250 an acre, but will vary depending on the measures that are required for the compensation lands. A non-profit organization, CDFG or another public agency may hold and expend the habitat improvement funds if it is qualified to manage the compensation lands (pursuant to California Government Code section 65965), if it meets the approval of the CPM in consultation with CDFG, and if it is authorized to participate in implementing the required activities on the compensation lands. If CDFG takes fee title to the compensation lands, the habitat improvement fund must be paid to CDFG or its designee.

d. Property Analysis Record. Upon identification of the compensation lands, the Project owner shall conduct a Property Analysis Record (PAR) or PAR-like analysis to establish the appropriate amount of the long-term maintenance and management fund to pay the in-perpetuity management of the compensation lands. The PAR or PAR-like analysis must be approved by the CPM, in consultation with CDFG, before it can be used to establish funding levels or management activities for the compensation lands.

e. Long-Term Maintenance and Management Funding. The Project owner shall provide money to establish an account with a non-wasting capital that will be used to fund the long-term maintenance and management of the compensation lands. The amount of money to be paid will be determined through an approved PAR or PAR-like analysis conducted for the compensation lands. The amount of required funding is initially estimated to be $1,450 for every acre of compensation lands. If compensation lands will not be identified and a PAR or PAR-like analysis completed within the time period specified for this payment (see the verification section at the end of this condition), the Project owner shall either provide initial payment of $20,829,250 calculated at $1,450 an acre for 14,365 acres or the Project owner shall include $20,829,250 to reflect this amount in the security that is provided to the Energy Commission under section 3.h. of this condition. The amount of the required initial payment or security for this item shall be adjusted for any change in the Project footprint as described above. If an initial payment is made based on the estimated per-acre costs, the project owner shall deposit additional money as may be needed to provide the full amount of long-term maintenance and management funding indicated by a PAR or PAR-like analysis, once the analysis is completed and approved. If the approved analysis indicates less than $1,450 an acre will be required for long-term maintenance and management, the excess paid will be returned to the Project owner. The project owner must obtain the CPM's approval of the entity that will receive and hold the long-term maintenance and management fund for the compensation lands. The CPM will consult with CDFG before deciding whether to approve an entity to hold the project's long-term maintenance and management funds. The CPM, in consultation with

CDFG, may designate another non-profit organization to hold the long-term maintenance and management fee if the organization is qualified to manage the compensation lands in perpetuity. If CDFG takes fee title to the compensation lands, CDFG shall determine whether it will hold the long-term management fee in the special deposit fund, leave the money in the REAT Account, or designate another entity to manage the long-term maintenance and management fee for CDFG and with CDFG supervision.

The Project owner shall ensure that an agreement is in place with the long-term maintenance and management fee holder/manager to ensure the following conditions:

i. Interest. Interest generated from the initial capital 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 long-term maintenance and management fee principal shall not be drawn upon unless such withdrawal is deemed necessary by the CPM, in consultation with CDFG, or the approved third-party long-term maintenance and management fee manager to ensure the continued viability of the species on the compensation lands. 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 solely for the purpose to manage lands in perpetuity unless CDFG designates NFWF or another entity to manage the long-term maintenance and management fee for CDFG.

iii. Pooling Funds. A CPM- approved non-profit organization qualified to hold long-term maintenance and management fees solely for the purpose to manage lands in perpetuity, may pool the fund with other funds for the operation, management, and protection of the compensation lands for local populations of desert tortoise. However, for reporting purposes, the long-term maintenance and management fee 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.

f. Other expenses. In addition to the costs listed above, the Project owner shall be responsible for all other costs related to acquisition of compensation lands and conservation easements, including but not limited to title and document review costs, expenses incurred from

other state agency reviews, and overhead related to providing compensation lands to CDFG or an approved third party; escrow fees or costs; environmental contaminants clearance; and other site cleanup measures.

g. Management Plan. The project owner shall prepare a Management Plan for the compensation lands in consultation with the entity that will be managing the lands. The Management Plan shall reflect site-specific enhancement measures on the acquired compensation lands. The plan shall be submitted for approval of the CPM, in consultation with CDFG, BLM and USFWS.

h. Mitigation Security. The Project owner shall provide financial assurances to the CPM with copies of the document(s) to BLM, CDFG and the USFWS, to guarantee that an adequate level of funding is available to implement any of the mitigation measures required by this condition that are not completed prior to the start of ground-disturbing activities described in Section A of this condition. The CPM may use money from the Security solely for implementation of the requirements of this condition. The CPM's use of the security to implement measures in this condition may not fully satisfy the Project owner's obligations under this condition. Any amount of the Security that is not used to carry out mitigation shall be returned to the Project owner upon successful completion of the associated requirements in this condition. 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"). Prior to submitting the Security to the CPM, the Project owner shall obtain the CPM's approval, in consultation with CDFG, BLM and the USFWS, of the form of the Security.

Security for the requirements of this condition shall be provided in the amount of $49,223,057.50 or ($50,295,164.23 if the project owner elects to use the REAT Account with NFWF pursuant to paragraph 3.h.i. of this condition, below). The Security is calculated in part, from the items that follow but adjusted as specified below (consult **Biological Resources Tables 5** and **7** for the complete breakdown of estimated costs). However, regardless of the amount of the security or actual cost of implementation, the project owner shall be responsible for implementing all aspects of this condition.

i. land acquisition costs for compensation land, calculated at $1,000/acre;

ii. Site assessments, appraisals, biological surveys, transaction closing and escrow costs, calculated as $18,000 total per parcel (presuming 40-acres per parcel)

iii. Initial site clean-up, restoration, or enhancement, calculated at $250/acre;

iv. Third-party and agency administrative transaction costs and overhead, calculated as percentages of land cost;

v. Long-term management and maintenance fund, calculated at $1,450 per acre;

vi. NFWF fees to establish a project-specific account; manage the sub-account for acquisition and initial site work; and manage the sub-account for long term management and maintenance.

i. The project owner may elect to comply with the requirements in this condition for acquisition of compensation lands, initial protection and habitat improvement on the compensation lands, or long-term maintenance and management of the compensation lands by funding, or any combination of these three requirements, by providing funds to implement those measures into the Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF). To use this option, the Project owner must make an initial deposit to the REAT Account in an amount equal to the estimated costs (as set forth in the Security section of this condition) of implementing the requirement. If the actual cost of the acquisition, initial protection and habitat improvements, or long-term funding is more than the estimated amount initially paid by the project owner, the project owner shall make an additional deposit into the REAT Account sufficient to cover the actual acquisition costs, the actual costs of initial protection and habitat improvement on the compensation lands, or the long-term funding requirements as established in an approved PAR or PAR-like analysis. If those actual costs or PAR projections are less than the amount initially transferred by the applicant, the remaining balance shall be returned to the project owner.

The responsibility for acquisition of compensation lands may be delegated to a third party other than NFWF, such as a non-governmental organization supportive of desert habitat conservation, by written agreement of the Energy Commission. Such delegation shall be subject to approval by the CPM, in consultation with CDFG, BLM and USFWS, prior to land acquisition, enhancement or management activities. Agreements to delegate land acquisition to an approved third party, or to manage compensation lands, shall be executed and implemented within 18 months of the Energy Commission's certification of the project.

Verification: The project owner shall provide the CPM with written notice of intent to start ground disturbance at least 30 days prior to the start of ground-disturbing activities on the project site.

If the mitigation actions required under this condition are not completed at least 30 days prior to the start of ground-disturbing activities, the Project owner shall provide the CPM and CDFG with an approved Security in accordance with this condition of certification no later than 30 days prior to beginning Project ground-disturbing activities. 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"). Prior to submitting the Security to the CPM, the project owner shall obtain the CPM's approval, in consultation with CDFG, BLM and the USFWS, of the form of the Security. The project owner, or an

approved third party, shall complete and provide written verification to the CPM, CDFG, BLM and USFWS of the compensation lands acquisition and transfer within 18 months of the start of Project ground-disturbing activities.

No later than 12 months after the start of ground-disturbing project activities, the project owner shall submit a formal acquisition proposal to the CPM describing the parcels intended for purchase, and shall obtain approval from the CPM, in consultation with CDFG, BLM and USFWS, prior to the acquisition. If NFWF or another approved third party is handling the acquisition, the project owner shall fully cooperate with the third party to ensure the proposal is submitted within this time period. The project owner or an approved third party shall complete the acquisition and all required transfers of the compensation lands, and provide written verification to the CPM, CDFG, BLM and USFWS of such completion, no later than 18 months after the issuance of the Energy Commission Decision. If NFWF or another approved third party is being used for the acquisition, the project owner shall ensure that funds needed to accomplish the acquisition are transferred in timely manner to facilitate the planned acquisition and to ensure the land can be acquired and transferred prior to the 18-month deadline,

The project owner shall complete and submit to the CPM a PAR or PAR-like analysis no later than 60 days after the CPM approves compensation lands for acquisition. The project owner shall fully fund the required amount for long-term maintenance and management of the compensation lands no later than 30 days after the CPM approves a PAR or PAR-like analysis of the anticipated long-term maintenance and management costs of the compensation lands. Written verification shall be provided to the CPM and CDFG to confirm payment of the long-term maintenance and management funds.

No later than 60 days after the CPM determines what activities are required to provide for initial protection and habitat improvement on the compensation lands, the project owner shall make funding available for those activities and provide written verification to the CPM of what funds are available and how costs will be paid. Initial protection and habitat improvement activities on the compensation lands shall be completed, and written verification provided to the CPM, no later than six months after the CPM's determination of what activities are required on the compensation lands.

The project owner, or an approved third party, shall provide the CPM, CDFG, BLM and USFWS with a management plan for the compensation lands within 180 days of the land or easement purchase, as determined by the date on the title. The CPM, in consultation with CDFG, BLM and the USFWS, shall approve the management plan after its content is acceptable to the CPM.

Within 90 days after completion of all project related ground disturbance, the project owner shall provide to the CPM, CDFG, BLM and USFWS an analysis, based on aerial photography, with the final accounting of the amount of habitat disturbed during Project construction. This shall be the basis for the final number of acres required to be acquired.

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. Any subsequent modifications to the approved Raven Plan shall be made only with approval of the CPM in consultation with USFWS and CDFG. The Raven Plan shall include but not be limited to a program to monitor increased raven presence in the Project vicinity and to implement raven control measures as needed based on that monitoring. The purpose of the plan is to avoid any Project-related increases in raven numbers during construction, operation, and decommissioning. The threshold for implementation of raven control measures shall be any increases in raven numbers from baseline conditions, as detected by monitoring to be proposed in the Raven Plan. Regardless of raven monitoring results, the project owner shall be responsible for all other aspects of the Raven Plan, including avoidance and minimization of project-related trash, water sources, or perch/roost sites that could contribute to increased raven numbers. In addition, to offset the cumulative contributions of the Project to desert tortoise from increased raven numbers, the Project owner shall also contribute to the USFWS Regional Raven Management Program. The Project owner shall do all of the following:

1. Prepare and Implement a Raven Management Plan that includes the following:
    a. Identify conditions associated with the Project that might provide raven subsidies or attractants;
    b. Describe management practices to avoid or minimize conditions that might increase raven numbers and predatory activities;
    c. Describe control practices for ravens;
    d. Address monitoring and nest removal during construction and for the life of the Project, and;
    e. Discuss reporting requirements.
2. <u>Contribute to the USFWS Regional Raven Management Program</u>. The project owner shall submit payment to the project sub-account of the REAT Account held by the National Fish and Wildlife Foundation (NFWF) to support the USFWS Regional Raven Management Program. The amount shall be a one-time payment of $105 per acre of permanent disturbance ($652,175).

<u>Verification:</u> No later than 30 days prior to the start of construction, the project owner shall provide written verification to the CPM that NFWF has received and accepted payment into the project's sub-account of the REAT Account to support the USFWS Regional Raven Management Program.

No later than 30 days prior to any construction-related ground disturbance activities, the Project owner shall provide the CPM, USFWS, and CDFG with the final version of a Raven Plan. All modifications to the approved Raven Plan shall be made only with approval of the CPM in consultation with USFWS and CDFG.

Within 30 days after completion of Project construction, the Project owner shall provide to the CPM for review and approval, a written 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.

On January 31st of each year following construction the Designated Biologist shall provide a report to the CPM that includes: a summary of the results of raven management and control activities for the year; a discussion of whether raven control and management goals for the year were met; and recommendations for raven management activities for the upcoming year.

PRE-CONSTRUCTION NEST SURVEYS AND IMPACT AVOIDANCE MEASURES FOR MIGRATORY BIRDS

BIO-19 Pre-construction nest surveys shall be conducted each year during the construction phase of the project if construction activities will occur during the breeding period (from January 1 through August 1). The Designated Biologist or Biological Monitor conducting the surveys shall be experienced bird surveyors who have demonstrated experience conducting nest searches; are knowledgeable of the nesting habitats of species that may nest on the site; and are 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 100-percent coverage surveys shall be conducted of each proposes construction area, 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 the location data provided in completion reports (below) 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. Monitoring shall avoid disturbing the nests or causing an increased risk of predation. 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: Upon completion of the surveys, and prior to initiating any vegetation removal or ground-disturbing activities (i.e., no more than 10 days prior to the start of such activities), the project owner shall provide the CPM and BLM a letter-report

describing the methods and 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 The Project owner shall implement the following measures to avoid or minimize Project-related construction impacts to golden eagles.

1. Annual Inventory During Construction. For each calendar year during which construction will occur an inventory shall be conducted to determine if golden eagle territories occur within one mile of the Project boundaries. Survey methods and surveyor qualifications for the inventory shall be as described in the Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations (Pagel et al. 2010) or more current guidance from the USFWS.
2. Inventory Data: Data collected during the inventory shall include at least the following: territory status (unknown, vacant, occupied, breeding successful, breeding unsuccessful); nest location, nest elevation; age class of golden eagles observed; nesting chronology; number of young at each visit; digital photographs; and substrate upon which nest is placed.
3. Determination of Unoccupied Territory Status: A nesting territory or inventoried habitat shall be considered unoccupied by golden eagles only after completing at least two full surveys in a single breeding season.
4. Monitoring and Adaptive Management Plan: If an occupied nest[2] is detected within one mile of the Project boundaries, the Project owner shall prepare and implement a Golden Eagle Monitoring and Management Plan for the duration of construction to ensure that Project construction activities do not result in injury or disturbance to golden eagles. The monitoring methods shall be consistent with those described in the Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations (Pagel et al. 2010) or more current guidance from the USFWS. The Monitoring and Management Plan shall be prepared in consultation with the USFWS. Triggers for adaptive management shall include any evidence of Project-related disturbance to nesting golden eagles, including but not limited to: agitation behavior (displacement, avoidance, and defense); increased vigilance behavior at nest sites; changes in foraging and feeding behavior, or nest site abandonment. The

[2] An occupied nest is one used for breeding by a pair of golden eagles in the current year. Presence of an adult, eggs, or young, freshly molted feathers or plucked down, or current years' mutes (whitewash) also indicate site occupancy. Additionally, all breeding sites within a breeding territory are deemed occupied while raptors are demonstrating pair bonding activities and developing an affinity to a given area. If this culminates in an individual nest being selected for use by a breeding pair, then the other nests in the nesting territory will no longer be considered occupied for the current breeding season. A nest site is considered occupied throughout the periods of initial courtship and pair-bonding, egg laying, incubation, brooding, fledging, and post-fledging dependency of the young.

Monitoring and Management Plan shall include a description of adaptive management actions, which shall include, but not be limited to, cessation of construction activities that are deemed by the Designated Biologist to be the source of golden eagle disturbance.

Verification: No later than 30 days after completion of the golden eagle inventory the project owner shall submit a report to the CPM, CDFG, and USFWS documenting the results of the inventory.

If an occupied nest is detected within one mile of the Project boundary during the inventory, the Project owner shall contact staff at the USFWS Ventura Office and CDFG within one working day of detection of the nest for interim guidance on monitoring and nest protection. The project owner shall provide the CPM, CDFG, and USFWS with the final version of the Golden Eagle Monitoring and Management Plan within 30 days after detection of the nest. This final Plan shall have been reviewed and approved by the CPM in consultation with USFWS and CDFG.

BURROWING OWL IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-21 The Project owner shall implement the following measures to avoid, minimize and offset impacts to burrowing owls:

1. Pre-Construction Surveys. The Designated Biologist or Biological Monitor shall conduct pre-construction surveys for burrowing owls no more than 30 days prior to initiation of construction activities. Surveys shall be focused exclusively on detecting burrowing owls, and shall be conducted from two hours before sunset to one hour after or from one hour before to two hours after sunrise. The survey area shall include the Project Disturbance Area and surrounding 500 foot survey buffer.
2. Implement Avoidance Measures. If an active burrowing owl burrow is detected within 500 feet from the Project Disturbance Area the following avoidance and minimization measures shall be implemented:
    a. Establish Non-Disturbance Buffer. Fencing shall be installed at a 250-foot radius from the occupied burrow to create a non-disturbance buffer around the burrow. The non-disturbance buffer and fence line may be reduced to 160 feet if all Project-related activities that might disturb burrowing owls would be conducted during the non-breeding season (September 1st through January 31st). Signs shall be posted in English and Spanish at the fence line indicating no entry or disturbance is permitted within the fenced buffer.
    b. Monitoring: If construction activities would occur within 500 feet of the occupied burrow during the nesting season (February 1 – August 31st) the Designated Biologist or Biological Monitor shall monitor to determine if these activities have potential to adversely affect nesting efforts, and shall implement measures to minimize or avoid such disturbance.

3. Passive Relocation of Burrowing Owls. If pre-construction surveys indicate the presence of burrowing owls within the Project Disturbance Area (the Project Disturbance Area means all lands disturbed in the construction and operation of the Genesis Project), the Project owner shall prepare and implement a Burrowing Owl Relocation and Mitigation Plan, in addition to the avoidance measures described above. The final Burrowing Owl Relocation and Mitigation Plan shall be approved by the CPM, in consultation with USFWS, BLM and CDFG, and shall:

    a. Identify and describe suitable relocation sites within 1 mile of the Project Disturbance Area, and describe measures to ensure that burrow installation or improvements would not affect sensitive species habitat or existing burrowing owl colonies in the relocation area;

    b. Provide guidelines for creation or enhancement of at least two natural or artificial burrows per relocated owl, including a discussion of timing of burrow improvements, specific location of burrow installation, and burrow design. Design of the artificial burrows shall be consistent with CDFG guidelines (CDFG 1995) and shall be approved by the CPM in consultation with CDFG, BLM and USFWS;

    c. Passive relocation sites shall be in areas of suitable habitat for burrowing owl nesting, and be characterized by minimal human disturbance and access. Relative cover of non-native plants within the proposed relocation sites shall not exceed the relative cover of non-native plants in the adjacent habitats;

    d. Provide detailed methods and guidance for passive relocation of burrowing owls occurring within the Project Disturbance Area; and

4. Acquire Compensatory Mitigation Lands for Burrowing Owls. The following measures for compensatory mitigation shall apply only if burrowing owls that are detected within the Project Disturbance Area. The Project owner shall acquire, in fee or in easement, 19.5 acres of land for each burrowing owl that is displaced by construction of the Project. This compensation acreage of 19.5 acres per single bird or pair of nesting owls assumes that there is no evidence that the compensation lands are occupied by burrowing owls. If burrowing owls are observed to occupy the compensation lands, then only 9.75 acres per single bird or pair is required, per CDFG (1995) guidelines. If the compensation lands are contiguous to currently occupied habitat, then the replacement ratio will be 13.0 acres per pair or single bird. The Project owner shall provide funding for the enhancement and long-term management of these compensation lands. The acquisition and management of the compensation lands may be delegated by written agreement to CDFG or to a third party, such as a non-governmental organization dedicated to habitat conservation, subject to approval by the CPM, in consultation with CDFG and USFWS prior to land acquisition or management activities. Additional funds shall be based on the adjusted market value of compensation lands at the time of construction to acquire and manage habitat. In lieu of acquiring lands itself, the Project owner may satisfy the requirements of this condition by depositing funds into the

Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF), as described in Section 3.i. of Condition of Certification BIO-17.

a. Criteria for Burrowing Owl Mitigation Lands. The terms and conditions of this acquisition or easement shall be as described in Paragraph 1 of **BIO-17** [Desert Tortoise Compensatory Mitigation], with the additional criteria to include: 1) the mitigation land must provide suitable habitat for burrowing owls, and 2) the acquisition lands must either currently support burrowing owls or be within dispersal distance from an active burrowing owl nesting territory (generally approximately 5 miles). The burrowing owl mitigation lands may be included with the desert tortoise mitigation lands ONLY if these two burrowing owl criteria are met. If the burrowing owl mitigation land is separate from the acquisition required for desert tortoise compensation lands, the Project owner shall fulfill the requirements described below in this condition.

b. Security. If burrowing owl mitigation land is separate from the acreage required for desert tortoise compensation lands 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 by the Project owner to the CPM with copies of the document(s) to CDFG, BLM and the USFWS, to guarantee that an adequate level of funding is available to implement the mitigation measure described in this condition. These funds shall be used solely for implementation of the measures associated with the Project. 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") prior to initiating ground-disturbing Project activities. Prior to submittal to the CPM, the Security shall be approved by the CPM, in consultation with CDFG, BLM and the USFWS to ensure funding. The estimated costs of enhancement and endowment (see subsection C.2.4.2, Desert Tortoise, for a discussion of the assumptions used in calculating the Security, which are based on an estimate of $3501.23 per acre to fund acquisition, enhancement, and long-term management). The final amount due will be determined by the PAR analysis conducted pursuant to **BIO-17**.

Verification: If pre-construction surveys detect burrowing owls within 500 feet of proposed construction activities, the Designated Biologist shall provide to the CPM, BLM, CDFG and USFWS documentation indicating that non-disturbance buffer fencing has been installed at least 10 days prior to the start of any construction-related ground disturbance activities. The Project owner shall report monthly to the CPM, CDFG, BLM and USFWS for the duration of construction on the implementation of burrowing owl avoidance and minimization measures. Within 30 days after completion of construction the Project owner shall provide to the CPM, BLM, CDFG and USFWS a written construction termination report identifying how mitigation measures described in the plan have been completed.

If pre-construction surveys detect burrowing owls within the Project Disturbance Area, the Project owner shall notify the CPM, BLM, CDFG and USFWS no less than 10 days of completing the surveys that a relocation of owls is necessary. The Project owner shall do all of the following if relocation of one or more burrowing owls is required:

a. Within 30 days of completion of the burrowing owl pre-construction surveys, submit to the CPM, CDFG and USFWS a Burrowing Owl Relocation and Mitigation Plan.

b. No less than 90 days prior to acquisition of the burrowing owl compensation lands, the Project owner, or an approved third party, shall submit a formal acquisition proposal to the CPM, CDFG, and USFWS describing the 39-acre parcel intended for purchase. At the same time the Project owner shall submit a PAR or PAR-like analysis for the parcels for review and approval by the CPM, CDFG and USFWS.

c. Within 90 days of the land or easement purchase, as determined by the date on the title, the Project owner shall provide the CPM with a management plan for review and approval, in consultation with CDFG, BLM and USFWS, for the compensation lands and associated funds.

d. No later than 30 days prior to the start of construction-related ground disturbing activities, the Project owner shall provide written verification of Security in accordance with this condition of certification.

e. No later than 18 months after the start of construction-related ground disturbance activities, the Project owner shall provide written verification to the CPM, BLM, CDFG and USFWS that the compensation lands or conservation easements have been acquired and recorded in favor of the approved recipient.

f. On January 31st of each year following construction for a period of five years, the Designated Biologist shall provide a report to the CPM, USFWS, BLM and CDFG that describes the results of monitoring and management of the burrowing owl relocation area. The annual report shall provide an assessment of the status of the relocation area with respect to burrow function and weed infestation, and shall include recommendations for actions the following year for maintaining the burrows as functional burrowing owl nesting sites and minimizing the occurrence of weeds.

AVIAN PROTECTION PLAN / MONITORING BIRD IMPACTS FROM SOLAR TECHNOLOGY

BIO-22 The project owner shall prepare and implement an Avian Protection Plan to monitor bird collisions with facility features (study described below). The Project owner shall use the monitoring data to inform and develop an adaptive management program that would avoid and minimize Project-related avian impacts. Project-related bird deaths or injuries shall be reported to the CPM, CDFG and USFWS. The CPM, in consultation with CDFG and USFWS, shall determine if the Project-related bird deaths or injuries warrant implementation of adaptive management measures contained in the Avian Protection Plan. The study design for the Avian Protection Plan shall be approved by the CPM in consultation with CDFG and USFWS, and, once approved, shall be incorporated into the project's BRMIMP and implemented. 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.

The Avian Protection Plan shall include 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 be based upon prior studies by McCrary et al. (1986) or other applicable literature, and 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 and proposed disposition of dead or injured birds.

Verification: No more than 30 days following the publication of the Energy Commission License Decision or BLM's Record of Decision/ROW Issuance, whichever comes first, the project owner shall submit to the CPM, BLM's Wildlife Biologist, USFWS and CDFG a final Avian Protection Plan. Modifications to the Avian Protection Plan 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 Wildlife Biologist , CPM, CDFG, and USFWS describing the methods, 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 Wildlife Biologist, 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 the CPM, BLM's Wildlife Biologist, CDFG, USFWS, and 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-23 The Designated Biologist or Biological Monitor shall be responsible for daily binocular scans of the project area and surrounding hills and bajadas to search for Nelson's bighorn sheep. At any time bighorn sheep are seen within 2000 feet of any active construction site, the Designated Biologist or Biological Monitor shall monitor their activity until the animals leave the area. If the bighorn sheep approach within 500 feet of any active construction site, then construction 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. In addition, the project owner shall provide resource agency staff and private conservation foundation staff and volunteers permanent access to the Cady Mountains via Hector Road or another suitable route for any activities related to Nelson's bighorn sheep monitoring or management.

Verification: Impact minimization measures and implementation methods for Nelson's bighorn sheep and their implementation methods shall be included in the final BRMIMP and implemented during construction and operation of the project. 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-24 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 90 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.

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 or allowed to escape the project area (e.g., by providing a temporary monitored opening in the tortoise exclusion fence and directing the animal toward the opening with temporary plastic construction fencing). If necessary, dens will be slowly excavated (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. In the event that passive relocation techniques fail for badgers, the Applicant will contact CDFG to explore other relocation options, which may include trapping.

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-25 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. Provision of substitute roosting bat habitat. If a maternity roost will be impacted by the project, and no alternative maternity roosts are in use within 1 mile of 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. Exclude bats prior to demolition of roosts. 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, according to timing and 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-26 The project owner shall implement the following measures to avoid, minimize and mitigate for direct and indirect impacts to jurisdictional waters of the State and to satisfy requirements of California Fish and Game Code sections 1600 and 1607. Throughout this condition, "jurisdictional" refers to streambeds or acreages of streambed meeting CDFG criteria as waters of the State.

Section A: Acquire Off-Site State Waters:

The project owner shall acquire, in fee or in easement, a parcel or parcels of land that includes no fewer than 288.8 acres of State jurisdictional waters. At least 9.9 acres must contain microphyll woodland. Prior to construction the applicant shall map the vegetation with emphasis on desert wash, including mircrophyll woodland, communities within the drainages subject to project disturbance and provide a map to the CPM, CDFG and BLM. Impacts to 3.3 acres of catclaw acacia or smoke tree habitat lost will be mitigated at a minimum 3:1 ratio. The parcel or parcels comprising the 288.8 acres of ephemeral washes shall include the same types of vegetation as mapped in the project footprint.

This compensation acreage may be included ("nested") within the acreage acquired and managed as desert tortoise habitat compensation (Condition of Certification **BIO-17**) only if:

- Adequate acreage of qualifying state-jurisdictional streambed delineated within the desert tortoise compensation lands;
- The desert tortoise habitat compensation lands are acquired and dedicated as permanent conservation lands within 18 months of the start of project construction.

If these two criteria are not met, then the project owner shall provide no fewer than 288.8 acres of state-jurisdictional streambed compensation lands independent of any compensation land required under other conditions of certification (adjusted to reflect the final project footprint and expert's delineation of streambed on the compensation lands), and shall also provide funding for the initial improvement and long-term maintenance and management of the acquired lands, and to comply with other related requirements this condition. Costs of these requirements cannot be estimated in advance because jurisdictional streambed would make up only a small portion of any acquired parcel and might vary widely among available parcels. In general, however, staff anticipates that total costs would include per-acre cost of the land itself at approximately $1,000, pre-acquisition liability surveys, appraisal fees, and other transaction costs, , appraisal fees at $3,000 per parcel, $250 per acre for initial habitat improvement, BLM internal costs for transfer of land, and $1,450 per acre for long-term management, and (if applicable) NFWF management fees. See **Biological Resources Tables 5** and **7**. 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.

The project owner may elect to comply with the requirements in this condition for acquisition of compensation lands, initial protection and habitat improvement on the compensation lands, or long-term maintenance and management of the compensation lands by funding, or any combination of these three requirements, by providing funds to implement those measures into the Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF). To use this option, the Project owner must make an initial deposit to the REAT Account in an amount equal to the estimated costs of implementing the requirement. If the actual cost of the acquisition, initial protection and habitat improvements, or long-term funding is more than the estimated amount initially paid by the project owner, the project owner shall make an additional deposit into the REAT Account sufficient to cover the actual acquisition costs, the actual costs of initial protection and habitat improvement on the compensation lands, or the long-term funding requirements as established in an approved PAR or PAR-like analysis. If those actual costs or PAR projections are less than the amount initially transferred by the applicant, the remaining balance shall be returned to the project owner.

The responsibility for acquisition of compensation lands may be delegated to a third party other than NFWF, such as a non-governmental organization supportive of desert habitat conservation, by written agreement of the Energy Commission. Such delegation shall be subject to approval by the CPM, in consultation with CDFG, BLM and USFWS, prior to land acquisition, enhancement or management activities. Agreements to delegate land acquisition to an approved third party, or to manage compensation lands, shall be executed and implemented within 18 months of the Energy Commission's certification of the project.

Management Plan for Acquired Lands: The project owner shall prepare and 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. Where applicable, the management plan should be integrated with desert tortoise compensation land habitat management planning requirements as described in **BIO-17**.

Section B: On-site Measures:

1. Copies of Requirements, Stop Work Authority: The project owner shall provide a copy of the Streambed Impact Minimization and Compensation Measures 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 after giving notice to the project owner, if the CPM, in consultation with CDFG, determines that the project owner is not in compliance with any of the requirements of this condition, including but not limited to the existence of any of 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 the Energy Commission at the time of project certification; or

    c. The project or project activities as described in the Supplemental Staff Assessment/Final Environmental Impact Statement have changed.

2. Best Management Practices: The project owner shall 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 Wildlife Biologist, and CPM shall be notified immediately by the project owner of any spills and shall be consulted regarding clean-up procedures.

3. Non-Native Vegetation Removal. The owner shall remove any non-native vegetation (Consistent with the Weed Management Plan, see Condition of Certification **BIO-11**) from any on-site portion of any drainage that requires the placement of a bridge, culvert or other structure. Removal shall be done at least twice annually (Spring/Summer) throughout the life of the Project.

4. 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 http://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 Wildlife Biologist, and the CPM.

5. Notification: 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. 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 in this condition. 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 of the acreage of state jurisdictional streambeds on the compensation lands (to be delineated using methodology identical to the delineation of on-site jurisdictional streambeds), a draft Management Plan for review and approval by the CPM and CDFG, and verification on ongoing enhancement techniques, and a summary of all modifications made to the existing channels on the project site.

EVAPORATION POND DESIGN, MONITORING, AND MANAGEMENT PLAN

BIO-27 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) to be based upon the draft Evaporation Pond Plan submitted by the applicant. The Plan shall meet the approval of the USFWS, CDFG, BLM's Wildlife Biologist, and the CPM. 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 for selenium and other Title 20 compounds, management

actions such as bird deterrence/hazing and water level management, triggers for those management actions; and annual 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 evaporation pond 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. Throughout the life of the project, the project owner shall provide annual reports on results of the previous year's evaporation plan monitoring, including but not limited to description and summary of wildlife mortality, water quality, and management actions taken or proposed.

CHANNEL DECOMMISSIONING AND RECLAMATION PLAN

BIO-28 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. The plan and cost estimate 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 than 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, pursuant to 43 CFR 3809.550 et seq.

CLOSURE PLAN MEASURES

BIO-29 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; components of the revegetation plan, including performance standards and monitoring, shall be as described in Condition of Certification **BIO-10**;
5. A cost estimate to complete closure-related activities, to be based upon decommissioning costs required under 43 CFR 3809.550 et seq.
6. An implementation and monitoring plan to ensure successful and satisfactory completion of every element of the Facility Closure Plan.

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). 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.

Verification: Prior to initiating ground-disturbing project activities, the project owner shall provide financial assurances (as described in this condition, above) 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.

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 Wildlife Biologist.

In the event of an unplanned permanent closure, or an indeterminate suspension of operations, the project owner shall notify the CPM and BLM Wildlife Biologist , 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 Wildlife Biologist.

IN-LIEU FEE MITIGATION OPTION

BIO-30 The Project owner may choose to satisfy certain compensatory mitigation obligations identified in this Decision by paying an in lieu fee to the Department of Fish and Game pursuant to Fish and Game code sections 2069 and 2099, to the extent the in-lieu fee provision is found by the Commission to be in compliance with CEQA and CESA requirements.

Verification: If electing to use this provision, the Project owner shall notify the Commission that it would like a determination that the in-lieu fee proposal meets CEQA and CESA requirements.

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. Draft White-margined Beardtongue Impact Avoidance and Protection Plan b. Final Summer-Fall Botanical Survey Report d. Draft Special-Status Plant Mitigation Plan e. Draft Protected Plant Salvage measures	a. No more than 30 days following the publication of the Energy Commission Decision b. No less than 30 days prior to the start of ground-disturbing activities d. No less than 30 days prior to ground-disturbing activities e. 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
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

Condition of Certification	Plan/Report to be Submitted	Timing
BIO-16	a. Desert Tortoise Translocation Plan b. Report identifying which items of the 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
BIO-21	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-22	Avian Protection Plan / 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

Condition of Certification	Plan/Report to be Submitted	Timing
BIO-23	a. Draft Bighorn Sheep Mitigation Plan b. Final Bighorn Sheep Mitigation Plan	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-24	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-25	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-26	Written verification (i.e., through incorporation into the BRMIMP) that the best management practices outlined in BIO-26 will be implemented	No fewer than 30 days prior to the start of work potentially affecting waters of the State
BIO-27	Evaporation Pond Design, Monitoring, and Management Plan	At least 30 days prior to the start of any project-related ground disturbance activities
BIO-28	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 Decommis-sioning 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-29	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.

Abella, S. R., J. E. Spencer, J. Hoines, C. Nazarchyk. 2008 – Assessing an exotic plant surveying program in the Mojave Desert, Clark County, Nevada, USA. In *Environ-mental* Monitoring *and Assessment.* Springer Netherlands. DOI 10.1007/ s10661-008-0263-0.

Ahlborn, G. 2000 – Species Account for Kit Fox (*Vulpes macrotis*). California Wildlife Habitat Relationships System, California Department of Fish and Game, California Interagency Wildlife Task Group.

Allen, Edith B., L. E. Rao, R.J. Steers, G.S. Tonnesen, and Robert F. Johnson. 2010 – Impacts of Anthropogenic Nitrogen Deposition on Invasive Species and Fire Risk in California Deserts. 35th Annual Meeting and Symposium of the Desert Tortoise Council. Ontario, California.

Anderson, J. 2001 – White-margined penstemon, a rare Mojave Desert species, and the Hualapai Mountains land exchange in Mojave County, Arizona. Pages 27-37 in J. Machinski and L. Holter, tech. eds., Southwestern Rare and Endangered Plants: Proceedings of the Third conference. RMRS-P-23. USDA Forest Service, Rocky Mountains Research Station, Fort Collins Colorado. 250 pp.

APLIC 2004 – Avian Power Line Interaction Committee. Mitigating Bird Collisions with Power Lines: the State of the Art in 1994. Edison Electric Institute, Washington, DC.

APLIC 2006 – Avian Power Line Interaction Committee. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Edison Electric Institute, and the California Energy Commission, Washington, D.C. and Sacramento, CA.

Arjo, W. M.; Bennett, T. J.; and A. J. Kozlowski. 2003 – Characteristics of current and historical kit fox (*Vulpes macrotis*) dens in the Great Basin Desert. USDA National Wildlife Research Center – Staff Publications. University of Nebraska, Lincoln.

Arizona Rare Plant Committee. 2004 – Arizona Rare Plant Field Guide. Collaboratively prepared and published by local, State, federal and private organizations. Tucson Arizona.

Averill-Murray, R. C. 2001 – *Program MARK survival analysis of tortoises voiding their bladders during* handling, Proceeding of the 2001 Desert Tortoise Council Symposium. p. 48.

Avery, H. W. 1997 – Effects of cattle grazing on the desert tortoise, Gopherus agassizii: Nutritional and behavioral interactions. Pages 13-20 in J. Van Abbema (ed.), Proceedings of the International Conference on Conservation, Restoration, and Management of Tortoises and Turtles. New York Turtle and Tortoise Society, New York.

Avery, M. L., P. F. Spring, and N. S. Dailey 1978 – Avian mortality at man-made structures: an annotated bibliography. U.S. Fish and Wildlife Service, Biological Services Program, National Power Plant Team. FWS/OBS-75/58. 108 pp.

Baldwin, B., S. Boyd, B. J. Ertter, R. W. Patterson, T. J. Rosatti, D. H. Wilken, and M. Weatherwax (eds.) 2001 – The Jepson Desert Manual: Vascular Plants of Southeastern California. University of California Press, Berkeley, California. 624 pp.

Barber, J.R, Crooks, K.R., and Fristrup, K.M., 2010. The costs of chronic noise exposure for terrestrial organisms. Trends in Ecology and Evolution Vol.25 No.3

Barbour, R. W. and W. H. Davis 1969 – *Bats of America*. Louisville: University of Kentucky Press.

Barrows, C. 1996 – An ecological model for the protection of a dune ecosystem. Conserv. Biol. 10(3):888-891.

Beacham, W. 2000 – Peninsular Bighorn Sheep. In Beacham, W., Castronova, F. V., and Sessine, S., eds. Beacham's Guide to the Endangered Species of North America. Beacham Publishing Corp. Osprey, FL.

Beatley, J. C. 1966 – Ecological status of introduced brome grasses (*Bromus* spp.) in desert vegetation of southern Nevada. *Ecology*, 47, 548–554.

Beatley, T. 1994 – Habitat conservation planning: endangered species and urban growth. Univ. Texas Press, Austin, Texas.

Beier, P. and R. F. Noss 1998 – Do habitat corridors provide connectivity? Conservation Biology. 12(6): 1241-1252.

Berry, K. 2001 (revised 2003). Salvaging Injured, Recently Dead, Ill, and Dying Wild, Free-roaming Desert Tortoises (*Gopherus agassizii*). USGS Western Ecological Research Center. [online]: http://www.werc.usgs.gov/tortoise/salvaging_protocol.htm

Berry et al. 1996 – Berry KH, FG Hoover, and M Walker. The effects of poaching desert tortoises in the western Mojave Desert: Evaluation of landscape and local impacts. In Proceedings of the 1996 Desert Tortoise Council Symposium.

Bertolero, A., D. Oro, and A. Besnard 2007 – Assessing the efficacy of reintroduction programmes by modeling adult survival: the example of Hermann's tortoise. Animal Conservation 10:360–368.

Bleich, V. C., J. D. Wehausen, and S. A. Holl 1990 – Desert-dwelling mountain sheep: conservation implications of a naturally fragmented distribution. Conservation Biology. 4:383-390.

Bleich, V. C., J. D. Wehausen, R. R. Ramey II, and J. L. Rechel 1996 – Metapopulation theory and mountain sheep: implications for conservation. pp. 453-473, In: D. R. McCullough, (ed.), Metapopulations and wildlife conservation management. Island Press, Washington, D.C.

Bleich, V. C., R. T. Bowyer, and J. D. Wehausen 1997 – Sexual segregation in mountain sheep: resources or predation? *Wildlife Monographs* No. 134. 50 pp.

BLM 1980 (Amended 1999) – California Desert Conservation Area Plan. Prepared by the Bureau of Land Management, Sacramento Office. August 17, 1980.

BLM 1990 – Draft raven management plan for the California Desert Conservation Area. Prepared by U.S. Bureau of Land Management, California Desert District, Riverside, California. April 1990.

BLM 2001 – Bureau of Land Management. Lane Mountain Milk Vetch. Pages 38-46 in Biological Evaluation on Effects of CDCA Plan as Amended and Proposed to be Amended by the NEMO and NRCO Preferred Alternatives and with Other Interim Measures on Ten T & E Plants. Bureau of Land Management, California Desert District, Riverside, California.

BLM 2006 – Bureau of Land Management. Record of Decision: West Mojave Plan, Amendment to the California Desert Conservation Area Plan. March 2006. California Desert District.

BLM 2009a – (tn 52620) Letter from J. Abbott, BLM, California State Office, to K. Hunting, CDFG, regarding coordination of mitigation for BrightSource solar development. Dated July 23, 2009. Submitted to California Energy Commission Docket Unit on July 23, 2009.

BLM 2009b – Bureau of Land Management. Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plants.

BLM 2010 – Geospatial Data Downloads. U.S. Department of the Interior, Bureau of Land Management, California. [online]: http://www.blm.gov/ca/gis/index.html#lands [accessed February 15, 2010]

BLM et al. 2005 – Bureau of Land Management, County of San Bernardino, and City of Barstow. Final Environmental Impact Report and Statement for the West Mojave Plan, A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment. January 2005. California Desert District.

Bloom, P. H. 1980 – The status of the Swainson's Hawk in California 1979. Wildlife Management Branch, Nongame Wildl. Invest. Job II-80.0. California Department of Fish and Game.

Bloom 2003 – Letter to California Fish and Game Commission. 2 December 2003. [online]: http://www.biologicaldiversity.org/species/birds/western_burrowing_owl/pdfs/bloom-comment.pdf.

Bloom 2009- Electronic communications between Peter Bloom and Amy Golden, California Energy Commission, on December 10, 2009, regarding western burrowing owl relocation.

Bloom 2010 – Personal communication between Chris Huntley and Pete Bloom in February 2010 regarding the status of Swainson's hawk in the Mojave Desert, including the Daggett area and Ivanpah Valley.

Boarman, W. I. 2002 – Threats to desert tortoise populations: A critical review of the literature. U.S. Geological Survey, Western Ecological Research Center, Sacramento, California.

Boarman, W. I., 2003 – Managing a Subsidized Predator Population: Reducing Common Raven Predation on Desert Tortoises. Environmental Management. V32:2 p. 205-217.

Boarman, W. I., and M. Sazaki 2006 – A highway's road-effect zone for desert tortoises (*Gopherus agassizii*). Journal of Arid Environments 65:94-101.

Brown, W. M. 1993 – Avian collisions with utility structures: biological perspectives. EPRI, Proceedings: avian interactions with utility structures, international workshop. Palo Alto, CA.

BRW 2009 – Basin & Range Watch/L. Cunningham/K. Emmeric (tn 54278) Basin & Range Watch Data Request, dated November 25, 2009. Submitted to CEC/Docket Unit on November 30, 2009.

Busch, S. E., and S. S. Smith 1995 – Mechanisms associated with decline of woody species in riparian ecosystems of the southwestern U.S. Ecological Monographs Vol. 65. pp. 374-370.

Bury, R. B., R. A. Luckenbach, and S. D. Busack 1977 – The effects of off-road vehicles on vertebrates in the California desert. Wildlife Res. Repts., No. 8, U.S. Fish and Wildlife Service, Washington, DC.

Cablk, M. E. and J. S. Heaton 2002 – Nov. Mojave fringe-toed lizard surveys at the Marine Corps Air Ground Combat Center at Twentynine Palms, California and nearby lands administered by the Bureau of Land Management. California: Marine Corps Air Ground Combat Center. Report M67399-00-C-0005. 115 p.

Cal-IPC 2006 – California Invasive Plant Inventory. Cal-IPC Publication 2006-02. Berkeley: California Invasive Plant Council.

CBOC 1993 – California Burrowing Owl Consortium. Burrowing Owl Survey Protocol and Mitigation Guidelines. April 1993.

CDFA (California Department of Food and Agriculture) 2007 – List of noxious weeds. [online]: http://www.cdfa.ca.gov/phpps/ipc/noxweedinfo/noxweedinfo_hp.htm

CDFG (California Department of Fish and Game) 1995 – Staff Report on Burrowing Owl Mitigation. Memorandum dated October 17, 1995.

CDFG 2003 – California Department of Fish & Game. List of California Terrestrial Natural Communities Recognized by the California Natural Diversity Database. Unpublished report, CDFG Wildlife and Habitat Data Analysis Branch, Sacramento.

CDFG 2005 – California Department of Fish & Game. California Wildlife: Conservation Challenges (California's Wildlife Action Plan). Prepared by the UC Davis Wildlife Health Center. [online]: http://www.dfg.ca.gov/wildlife/WAP/report.html. Accessed 25 January 2010.

CDFG 2007 – California Department of Fish & Game. "List of California Vegetation Alliances." Biogeographic Data Branch – Vegetation Classification and Mapping Program. October 22, 2007.

CDFG 2009 – California Department of Fish & Game. Protocols for surveying and evaluating impacts to special-status native plant populations and natural communities. November 24, 2009. (Revision of 2000 guidelines). Sacramento, CA, 7 pp. [online]: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/Protocols_for_Surveying_and_Evaluating_Impacts.pdf

CDFG 2009a (tn 53264) – California Department of Fish and Game Recent Land Acquisition Comparables. Submitted to California Energy Commission Docket Unit on September 21, 2009.

CDFG 2010a – California Department of Fish & Game. California Natural Diversity Database (CNDDB), Rarefind, Version 3.1.1.

CDFG 2010b – California Department of Fish & Game. Special vascular plants, bryophytes, and lichens list. California Natural Diversity Database. January 2010. Quarterly publication. 71 pp.

CEC 2009a – California Energy Commission/C. Meyer (tn 52052). CEC and BLM Staff Data Requests Set 1, dated June 17, 2009. Submitted to CEC/Docket Unit on June 17, 2009.

CEC 2009b – California Energy Commission/C. Meyer (tn 52460). CEC and BLM Staff Data Request Set 1, Part 2, dated July 20, 2009. Submitted to CEC/Docket Unit on July 20, 2009.

CEC 2009c – California Energy Commission/C. Meyer (tn 54376). Memo to Applicant Regarding Transmission Line Upgrades, dated October 21, 2009. Submitted to CEC/Docket Unit on December 9, 2009.

CEC 2009d – California Energy Commission/C. Meyer (tn 53729). CEC and BLM Staff Data Requests Set 2, Part 1 (#s 128-141), dated October 22, 2009. Submitted to CEC/Docket Unit on October 22, 2009.

Channell, R. and M. V. Lomolino 2000 – Dynamic biogeography and conservation of endangered species. Nature 403:84–86.

Charlton, D. 2007 – Determining the population boundaries of a narrowly endemic perennial plant, Lane Mountain milk-vetch, in San Bernardino County, California, pp. 24-31 *in* P. Barlow-Irick, J. Anderson, and C. McDonald, tech eds. Southwestern rare and endangered plants: Proceedings of the fourth conference; March 22-26, 2004, Las Cruces, New Mexico. Proceedings RMRS-P-48CD, USDA Forest Service Rocky Mountain Research Station, Fort Collins, Colorado.

Cheatham, N. H., and J. R. Haller 1975 – An annotated list of California habitat types. Unpublished report. University of California, Berkeley, California. Clark, H. O. Jr. & Plumpton, D. L. 2005. A simple one-way door design for passive relocation of Western Burrowing Owls. California Fish and Game 91: 286-289.

CNPS 1992 – California Native Plant Society. CNPS Policy on Appropriate Application of Ex Situ Conservation Techniques. Conservation Policy dated September 1992. [online]: http://www.cnps.org/cnps/conservation/policies.php

CNPS 1998 – California Native Plant Society. Statement Opposing Transplantation as Mitigation for Impacts to Rare Plants. Conservation Policy dated July 9, 1998. [online]: http://www.cnps.org/archives/transplanting2.htm

CNPS 1998a – Policy on Mitigation Guidelines Regarding Impacts to Rare, Threatened, and Endangered Plants. California Native Plant Society Rare Plant Scientific Advisory Committee (February 1991, revised April 1998). [online]: http://www.cnps.org/cnps/archive/mitigation.phpCNPS

CNPS 2001 – California Native Plant Society. *Inventory of Rare and Endangered Plants of California (6th edition)*. Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society. Sacramento, California.

CNPS 2010 – California Native Plant Society. Inventory of Rare and Endangered Plants (online edition, v7-10a). California Native Plant Society. Sacramento, CA. Accessed January and February 2010. [online]: http://www.cnps.org/inventory

Conservation Biology Institute 2000 – Review of potential edge effects on the San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*). Unpublished

report prepared for Ahmanson Land Company, West Covina, California, by CBI, San Diego California.

Consortium of California Herbaria 2010 – [online]: http://ucjeps.berkeley.edu/consortium/. Site visited Jan-Feb 2010.

Coulombe, H. N. 1971 – Behavior and Population Ecology of the Burrowing Owl, Speotyto cunicularia, in the Imperial Valley of California. The Condor 73:162-176.

Croft 2008 – Telephone conversation between Brian Croft, US Fish and Wildlife Service biologist, Ventura, California, and Susan Sanders, California Energy Commission. November 12, 2008.

Cronquist, A., A. H. Holmgren, N. H. Holmgren, J. L. Reveal, and P. K. Holmgren 1977 – Intermountain Flora: Vascular Plants of the Intermountain West, USA, vol. 6. Columbia University Press, New York, NY. 584 pp.

CURE 2009a – Adams, Broadwell, Joseph & Cardozo/L. Miles (tn 52177). CURE's Data Requests Set 1, dated June 26, 2009 – Submitted to CEC/Docket Unit on June 26, 2009.

CURE 2009b – Adams, Broadwell, Joseph & Cardozo/L. Miles (tn 52381). CURE's Data Requests, Set Two, dated July 13, 2009. Submitted to CEC/Docket Unit on July 13, 2009.

CURE 2009c – Adams, Broadwell, Joseph & Cardozo/B. Heeley (tn 53674). CURE's Data Requests Set 3 (Nos. 276-380), dated October 15, 2009. Submitted to CEC/Docket Unit on October 15, 2009.

CURE 2009d – Adams, Broadwell, Joseph & Cardozo/L. Miles (tn 53983). CURE's Data Request Set 4, dated November 2, 2009. Submitted to CEC/Docket Unit on November 2, 2009.

CWMW 2009 – California Wetlands Monitoring Workgroup. Using CRAM (California Rapid Assessment Method) to assess wetland projects as an element of regulatory and management programs. Technical Bulletin. October 13, 2009.46 pp.

DW 2009a – Defenders of Wildlife/J. Basofin/J. Aardahl (tn 52473). Scoping Comments from Defenders of Wildlife, dated July 7, 2009. Submitted to CEC/Docket Unit on July 20, 2009.

DW 2009b – Defenders of Wildlife/J. Basofin (tn 54036). Defenders of Wildlife Data Requests Set One, November 5, 2009. Submitted to CEC/Docket Unit on November 5, 2009.

DW 2010 – Defenders of Wildlife/J. Basofin (tn 55789). Defenders of Wildlife's Status Report No. 1, dated February 22, 2010. Submitted to CEC/Docket Unit on March 8, 2010.

Danin, A 1996 – Plants of Desert Dunes. Springer-Verlag, Berlin, Germany. 177 pp.

Dixon, J. B. 1937 – The golden eagle in San Diego County, California. Condor 39:49-56.

Dodd, C. K., and R. A. Seigel 1991 – Relocation, repatriation, and translocation of amphibians and reptiles — Are they conservation strategies that work? Herpetologica 47:336–350.

Dooling R. J. 2006 – Estimating effects of highway noise on the avian auditory system. *In:* Proceedings of the 2005 International Conference on Ecology and Transportation, Eds. Irwin CL, Garrett P, McDermott KP. Center for Transportation and the Environment, North Carolina State University, Raleigh, NC: pp. 30-31.

DTRO 2009 – Desert Tortoise Recovery Office. Science Advisory Committee Meeting Summary, March 13, 2009, [online]: http://www.fws.gov/nevada/desert_tortoise/documents/sac/20090313_SAC_meeting_summary.pdf. Accessed August 22.

Epps, C. W., P. J. Palsbøll, J. D. Wehausen, G. K. Roderick, R. R.Ramey, D. R. McCullough 2005 – Highways block gene flow and cause a rapid decline in genetic diversity of desert bighorn sheep. Ecology Letters, (2005) 8: 1029–1038.

Erickson, W. P., G. D. Johnson, M. D. Strickland, D. P. Young, Jr., K. J. Sernka, and R. E. Good 2001 – Avian Collisions with Wind Turbines: A summary of existing studies and comparisons to other sources of avian collision mortality in the United States. National Wind Coordinating Committee (NWCC) Resource Document. August.

Estep, J. A. 1989 – Biology, movements, and habitat relationships of the Swainson's hawk in the Central Valley of California, 1986-87. California Department of Fish and Game Unnumbered Report.

Etymesian, V., J. King, S. Zitzer, G. Nikolich, J. Gillis, J. Mason, and W. Nickling 2010 – Sediment transport to white-margined penstemon habitat (*Penstemon albomarginatus*). 2005-NSHE-502A-P. Dept. of Air Quality and Environmental Management, Desert Conservation Program, Las Vegas, Nevada.

Evans, R. 2001 – Free-roaming dog issues at the United States Marine Corps Air Ground Combat Center, Twentynine Palms, California. Proceedings of the 2001 Desert Tortoise Council Symposium. p. 61.

Fiedler, P. L. 1991 – Mitigation-related transplantation, relocation and reintroduction projects involving endangered and threatened, and rare plant species in California. California Department of Fish and Game Contract No. FG-8611. Pgs. 144. [online]: rm.dfg.ca.gov/FileHandler.ashx?DocumentVersionID=3689

Field, K. J., C. R. Tracy, P. A. Medica, R. W. Marlow, and P. S. Corn 2007 – Return to the wild: Translocation as a tool in conservation of the desert tortoise (Gopherus agassizii). Biological Conservation 136:232–245.

Findlay, C. S. and J. Bourdages 2000 – Response time of wetland biodiversity to road construction on adjacent lands. Conservation Biology. 14(1): 86-94.

Fitton, S. 2008 – LeConte's Thrasher (*Toxostoma lecontei*). *In* Shuford, W. D., and T. Gardali, eds. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Germano, J. M., and P. J. Bishop 2009 – Suitability of amphibians and reptiles for translocation. Conservation Biology 23:7–15.

Gervais, J. A., D. K. Rosenberg, and L. A. Comrack 2008 – Burrowing Owl (*Athene cunicularia*). In. Shuford, W. D., and Gardali, T., eds. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Gibson. A. C., M. R. Sharifi and P. W. Rundel 2004 – Resprout characteristics of creosote bush (*Larrea tridentata*) when subjected to repeated vehicle damage. Journal of Arid Environments Volume 57, Issue 4, June 2004, Pages 411-429.

Gowan, Tim and Kristin Berry 2010 – Health, Behavior, and Survival of 158 Tortoises Translocated from Ft. Irwin: Year 2. 35th Annual Meeting and Symposium of the Desert Tortoise Council. Ontario, California.

Grinnell, J., and A. H. Miller 1944 – The Distribution of the Birds of California. Pac. Coast Avifauna No. 27. 608 pp.

Haas, C. D. 2000 – Distribution, relative abundance, and roadway underpass responses of carnivores throughout the Puente-Chino Hills. Unpubl. M.S. Thesis. California State Polytechnic University, Pomona, CA. 110 pp.

Hamilton, K., S. A. Holland C. L. Douglas 1982 – An evaluation of the effects of recreational activity on bighorn sheep in the San Gabriel Mountains, California. Desert Bighorn Council Transactions 26:50-55.

Hanly, T. A. 1982 – The nutritional basis for food selection by ungulates. *Journal of Range Management*. 35:146-151.

Haskell, D. G. 2000 – Effects of forest roads on macroinvertebrate soil fauna of the southern Appalachian Mountains. Conservation Biology. 14(1): 57-63.

Haug, E. A., B. A. Millsap, and M. S. Martell 1993 – Burrowing Owl (*Athene cunicularia*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online. [online]: http://bna.birds.cornell.edu/bna/species/061

Hermanson, J. W., and T. J. O'Shea 1983 – *Antrozous pallidus*. Mammalian Species, No. 213, (Dec. 15, 1983), pp. 1-8

Hickman, J. C., ed. 1993 – The Jepson Manual: Higher Plants of California. Berkeley: University of California Press. 1400 pp.

Hicks, L. L., and J. M. Elder 1979 – Human disturbances of Sierra Nevada bighorn sheep. J. Wildl. Manage. 43:909-915.

Hoff, K. S. and R. W. Marlow 2002 – Impacts of vehicle road traffic on Desert Tortoise populations with consideration of conservation of tortoise habitat in southern Nevada. *Chelonian Conservation and Biology* 4:449–456.

Holl, S. A. and V. C. Bleich 1987 – Mineral lick use by mountain sheep in the San Gabriel Mountains, California. Journal of Wildlife Management 51(2):381–383.

Holland, R. F. 1986 – Preliminary Description of the Terrestrial Natural Communities of California. California Department of Fish & Game.

Horesji, B. 1976 – Some thoughts and observations on harassment and bighorn sheep. P. 1-12. In: Proc. Northern Wild Sheep Conf. (Jackson, Wyo. Feb 10-12).

Howald, A. M. 1996 – Translocation as a mitigation strategy: lessons from California. In: D. A. Falk, C. I. Millar, and M. Olwell eds. Restoring Diversity: Strategies for Reintroduction of Endangered Plants. Island Press, Washington, DC.

Humple, D. 2008 – Loggerhead Shrike (*Lanius ludovicianus*). In. Shuford, W. D., and Gardali, T., eds. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Hunting, K. 2002 – A Roadmap for PIER Research on Avian Collisions with Power Lines in California. Energy Commission. P500-02-071F. December.

Jacobson 1992 – E. Jacobson, D.V.M., Ph.D. The desert tortoise and upper respiratory tract disease. A Special Report Prepared for the Desert Tortoise Preserve Committee. [online]: http://www.tortoise-tracks.org/publications/jacobson.html. Accessed January 2010.

Jaeger, E. J. 1941 – Desert Wild Flowers, 2nd ed. Stanford University Press, Stanford, California. 322 pp.

Jansen, B.D., P.R. Krausman, J.R. Heffelfinger, and J.C. De Vos, Jr. 2007. Influence of mining on behavior of bighorn sheep. Southwestern Naturalist 52:418-423.

Jansen, B.D., P.R. Krausman, K.D. Bristow, J.R. Heffelfinger, and J.C. De Vos, Jr. 2009. Surface mining and ecology of desert bighorn sheep. Southwestern Naturalist 54:430-438.

Jennings, W. B. 1997 – Habitat use and food preferences of the desert tortoise, Gopherus agassizii, in the western Mojave Desert and impacts of off-road vehicles. Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles – An International Conference. pp. 42-45.

Jennings, M. R., and M. P. Hayes 1994 – Amphibians and reptile species of special concern in California. Contract 38023, report to the California Department of Fish and Game, Inland Fisheries Division. Sacramento, CA. 255 pp.

Johnson, W. C., R. L. Burgess, and W. R. Keammerer 1976 – Forest overstory vegetation and environment on the Missouri River floodplain in North Dakota. Ecological Monographs 46:59-84.

Johnston, D. S. and M. B. Fenton 2001 – Individual and population-level variability in diets of pallid bats (*Antrozous pallidus*). Journal of Mammalogy 82:362-373.

Jones, J. A.; Swanson, F. J.; Wemble, B. C.; and K. U. Snyder 2000 – Effects of roads on hydrology, geomorphology, and disturbance patches in stream networks. Conservation Biology. 14(1): 76-85.

Karl, A. 1989 – Investigations of the desert tortoise at the California Department of Health Services' proposed low-level radioactive waste facility site in Ward Valley, California. Proceedings of the Desert Tortoise Council Symposium, 1989:190.

Kerlinger, P. 2004 – Attraction of Night Migrating Birds to FAA and Other Types of Lights. Proc. Onshore Wildlife Interactions with Wind Developments: Research Meeting V, Lansdowne, Virginia, November 3–4, 2004, prepared for the Wildlife Subcommittee of the National Wind Coordinating Committee by RESOLVE, Inc., Washington, D.C.

Keator, G. 1993 – *Androstephium.* Page 1170 *in* J. Hickman (ed.) The Jepson Manual: Higher Plants of California. University of California Press, Berkeley, California.

Keator, G. 2001 – *Androstephium.* Page 547 *in* B. Baldwin, et al. (eds.) The Jepson Desert Manual: Vascular Plants of Southeastern California. University of California Press, Berkeley, California.

Keeler-Wolf, T. 2007 – Mojave Desert scrub vegetation. Pages 609-656 *in* M. G. Barbour, T. Keeler-Wolf, and A. A. Schoenherr, eds. Terrestrial Vegetation of California, 2nd ed. University of California Press, Berkeley.

Kochert, M. N., K. Steenhof, C. L. Mcintyre and E. H. Craig 2002 – Golden Eagle (*Aquila chrysaetos*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online. [online]: http://bna.birds.cornell.edu/bna/species/684doi:10.2173/bna.684.

Kovach, S. D. 1979 – An ecological survey of the White Mountain bighorn. Desert Bighorn Council Transactions 23:57-61.

Krausman, P.R., B.D. Leopold, R.K. Seegmiller, and S.G. Torres. 1989 – Relationships between desert bighorn sheep and habitat in western Arizona. Wildlife Monographs 102:1-66.

Krausman, P.R., A.V. Sandoval, and R.C. Etchberger. 1999 – Natural history of desert bighorn sheep. Pages 139-191 in R. Valdez and P. Krausman (eds.), Mountain Sheep of North America. University of Arizona Press, Tucson. 353 pp.

Krausman, P R., M.C. Wallace, C.L. Hayes, and D. W. DeYoung 1998 – Effects of jet aircraft on mountain sheep. *The Journal of Wildlife Management* 62(4): 1246-1254.

Krutzsch, P. H. 1948 – Ecological study of bats in San Diego County, California. M.S. Thesis. University of California, Berkeley. 184 pp.

Lancaster, N., Tchakerian, V.P., 2003 – Late Quaternary aeolian dynamics, Mojave Desert, California. In: Enzel, Y., Wells, S.G., Lancaster, N. (Eds.), Paleoenvironments and Paleohydrology of the Mojave and Southern Great Basin Deserts. Geological Society of America Special Paper 368, pp. 231–249.

Lathrop, E. W., and E. F. Archibald 1980 – Plant responses to utility right of way construction in the Mojave Desert. Environmental Management 4:215–226.

Laudenslayer, W. F., Jr., A. S. England, S. Fitton, and L. Saslaw 1992 – The *Toxostoma* Thrashers of California: Species at Risk? *In* 1992 Transactions of the Western Section of the Wildlife Society 28:22-29. [online]: http://www.fs.fed.us/psw/publications/laudenslayer.psw_1992_laudenslayer_wildlife.pdf. Accessed 07/01/09.

Leppig, G. and J. W. White 2006 – Conservation of peripheral plant populations in California. Madrono, Vol. 53, No. 3, pp. 264–274 (2006).

Lieberman, M and D. Lieberman 1969 – The evolutionary dynamics of the desert woodrat, *Neotoma lepida*. Evolution. 24(3): 560-570.

Light, J. T. 1971 – An ecological view of bighorn habitat on Mt. San Antonio. Transactions of the North American Wild Sheep Conference 1:150-157.

Lill, C. 2010 – Email from Camille Lill (URS Corporation) to Scott White regarding vegetation impacts within revised Calico Solar Project boundary. June 4, 2010.

Long, C. A. 1973 – *Taxidea taxus*. Mammalian Species 26:1-4. American Society of Mammalogists.

Longcore, T. and Rich, C. 2004 – Ecological light pollution. Frontiers in Ecology and the Environment 2: 191–198.

Lovich, J. E. 1998 – Human-induced changes in the Mojave and Colorado Desert ecosystems: recovery and restoration potential. Pages 529–531 in M. J. Mac, P. A. Opler, C. E. Puckett Haecker, and P. D. Doran (eds.). Status and trends of the nation's biological resources. U.S. Department of the Interior, U.S. Geological Survey, Reston, VA.

Lovich et al. 1996.

Lovich, J. E., J. Randall, and M. Kelly 1997 – Proceedings California Exotic Pest Plant Council Symposium '96. California Exotic Pest Plant Council, 110 pp.

Lovich, J. E., and D. Bainbridge 1999 – Anthropogenic Degradation of the Southern California Desert Ecosystem and Prospects for Natural Recovery and Restoration. Environmental Management Vol. 24, No. 3, pp. 309–326.

Lovich, J. E. and K. R. Beaman 2007 – A history of the Gila monster (*Heloderma suspectum cinctum*) records from California with comments on factors affecting their distribution. *Bull.* Southern *California Acad. Sci.* 106(2): 39-58.

Luz (Luz Solar Partners VIII & IX, Ltd.) 2007 – Biological Resources Mitigation Implementation Plan (BRMIP) Third Quarter 2007 Compliance Report for the SEGS VIII and IX Project Area Harper Lake, California dated 10/19/07. Submitted to the California Energy Commission.

Mack, R. N. 2002 – Natural barriers to plant naturalizations and invasion in the Sonoran Desert. Pages 63-76 *in* B. Tellman (ed.), Invasive Exotic Species in the Sonoran Region. University of Arizona Press and Arizona-Sonora Desert Museum, Tucson Arizona.

MacKay, P. No date. White-margined beardtongue. Unpublished report prepared for the Bureau of Land Management, Riverside, California.

MacKay, P. 2003 – Mojave Desert Wildflowers. Falcon Press, Guilford, Connecticut.

Mahoney, J. M. and Rood S. B. 1998 – Streamflow requirements for cottonwood seedling recruitment: an integrative model. Wetlands 18: 634-45.

Manville, A. M. II 2001 – The ABCs of avoiding bird collisions at communication towers: Next steps. Pp. 85–103 in Avian Interactions with Utility and Communication Structures, Proceedings of a workshop held in Charleston, South Carolina, December 2–3, 1999. R. L. Carlton, ed. Concord, California: Electric Power Research Institute.

Martin, D. C. 1973 – Selected Aspects of Burrowing Owl Ecology and Behavior. The Condor 75(4): 446-456.

Martin, T. E. and G. R. Geupel 1993 – Nest monitoring plots: methods for locating nests and monitoring success. J. Field Ornithology 64: 507-519. [online]: http://www.umt.edu/MCWRU/.../Martin%20&%20Geupel%201993.pdf.

Master, L., D. Faber-Langendoen, R. Bittman, G. A., Hammerson, B. Heidel, J. Nichols, L. Ramsay, and A. Tomaino. 2009. NatureServe Conservation Status Assessments: Factors for Assessing Extinction Risk. NatureServe, Arlington, VA. http://www.natureserve.org/publications/ConsStatusAssess_StatusFactors.pdf.

Mayhew, W. W. 1964 – Photoperiodic responses in three species of the lizard genus Uma. Herpetologica 20, pp. 95-113.

McCrary, M. D., R. L. McKernan, R. W. Schreiber, W. D. Wagner and T. C. Sciarrotta 1986 – Avian Mortality at a Solar Energy Power Plant. *Journal of Field Ornithology,* Vol. 57, No. 2 pp. 135-141.

McGahan, J. 1968 – Ecology of the golden eagle. Auk 85:1-12.

McMinn, H. E. 1939 – Illustrated manual of California shrubs. University of California Press, Berkeley.

Meffe, G. and C.R. Carroll (eds.). 1997. Principles of conservation biology, 2nd ed. Sinauer Associates, Inc., Sunderaland, MA. 729 pp.

Miner, K. L., and D. C. Stokes 2005 – Bats in the South Coast Ecoregion: Status, Conservation Issues, and Research Needs. USDA Forest Service General Technical Publication 195.

Minnich, R., A. Sanders, S. Wood, K. Barrows, and J. Lyman 1993 – Natural Resources Management Plan: Marine Corps Air-Ground Combat Center, Twentynine Palms, California. Unpublished report, Dept. of Earth Sciences, University of California, Riverside, California.

Minta, S. C. 1993 – Sexual differences in spatio-temporal interaction among badgers. Oecologia 96:402-409.

Mojave Desert Ecosystem Program. Geospatial Data and Information Portal. [online]: http://www.mojavedata.gov/metadata.php.

Morse, L.E., J.M. Randall, N. Benton, R. Hiebert, and S. Lu. 2004. An Invasive Species Assessment Protocol: Evaluating Non-Native Plants for Their Impact on Biodiversity. Version 1. NatureServe, Arlington, Virginia. http://www.natureserve.org/publications/pubs/invasiveSpecies.pdf.

Mount, Jeffrey F. 1995 – California Rivers and Streams, The Conflict Between Fluvial Process and Land Use. University of California Press, Berkeley and Los Angeles, California.

Munz, P. A. 1974 – Flora of Southern California. University of California Press, Berkeley. 1086 pp.

Murphy, R. W., T. L. Trepanier, and D. J. Morafka 2006 – Conservation genetics, evolution and distinct population segments of the Mojave fringe-toed lizard, *Uma scoparia*. Journal of Arid Environments 67 (Supplement S), pp. 226-247.

Murphy, R. W., K. H. Berry, T. Edwards, A. M. McLuckie 2007 – A Genetic Assessment of the Recovery Units for the Mojave Population of the Desert Tortoise, *Gopherus agassizii* Chelonian Conservation and Biology 6(2):229-251.

Nature Conservancy 2007 – A Conservation Management Strategy for Nine Low Elevation Rare Plants In Clark County, Nevada. TNC Nevada Field Office, Reno.

Newton, G. A. and V. P. Claassen 2003 – Rehabilitation of Disturbed Lands in California: A Manual for Decision-Making. California Department of Conservation, California Geological Survey. 228 p.

Nicholson, L. 1978 – The effects of roads on desert tortoise populations. Proc. Symp., Desert Tort. Council 1978: 127-129.

Norris, K. S. 1958 – The evolution and systematics of the iguanid genus *Uma* and its relation to the evolution of other North American desert reptiles. Bull. Amer. Mus. Nat. Hist. 114, pp. 247-328.

Noss, R. F. 1987 – Corridors in real landscapes: A reply to Simberloff and Cox. Conservation Biology. 1(2): 159-164.

NPS 2002 – National Park Service. Mojave National Preserve General Management Plan. April 2002. [online]: http://www.nps.gov/moja/parkmgmt/gmp.htm

Nussear, K. E., Esque, T. C., Inman, R. D., Gass, Leila, Thomas, K. A., Wallace, C. S. A., Blainey, J. B., Miller, D. M., and Webb, R. H. 2009 – Modeling habitat of the desert tortoise (*Gopherus agassizii*) in the Mojave and parts of the Sonoran Deserts of California, Nevada, Utah, and Arizona: U.S. Geological Survey Open-File Report 2009-1102, 18 p.

Okin, G. S., B. Murray and W. H. Schlesinger 2001 – Degradation of sandy arid shrubland environments: observations, process modeling, and management implications. Journal of Arid Environments Vol. 47, No. 2, pp. 123–144.

Pagel, J.E., D.M. Whittington and G.T. Allen. 2010. Interim Golden Eagle inventory and monitoring protocols; and other recommendations. Division of Migratory Birds, United States Fish and Wildlife Service. February.

Papouchis, C. M., Singer, F. J. & Sloan, W. B. 2001– Responses of desert bighorn sheep to increased human recreation. J. Wildl. Manage., 65: 573-582.

Parendes, L. A. and J. A. Jones 2000 – Role of light availability and dispersal in exotic plant invasion along roads and streams in the H. J. Andrews Experimental Forest, Oregon. Conservation Biology. 14(1): 64-75.

Pavlik, B. M. 1996 – Defining and measuring success. In: D. A. Falk, C. I. Millar, and M. Olwell eds. Restoring Diversity: Strategies for Reintroduction of Endangered Plants. Island Press, Washington, DC.

Polite, C. and J. Pratt 2005 – Prairie Falcon (*Falco mexicanus*). California Wildlife Habitat Relationships System, California Department of Fish and Game, California Inter-agency Wildlife Task Group. [online]: http://www.dfg.ca.gov/whdab/cwhr/A043.html.

Reijnen, R., Foppen, R., Braak, C. T., and J. Thissen 1995 – The effects of car traffic on breeding bird populations in woodland. Journal of Applied Ecology. 32(1): 187-202.

Remsen, J. V., Jr. 1978 – Bird species of special concern in California: An annotated list of declining or vulnerable bird species. Nongame Wild. Invest., Wildl. Mgmt Branch Admin. Rep 78-1, California Dept. Fish & Game, Sacramento.

Rittenhouse, C. D., J. J. Millspaugh, M. W. Hubbard, and S. L. Sheriff 2007 – Movements of translocated and resident three-toed box turtles. Journal of Herpetology 41:115–121.

Rosenblum, E. B.; Hoekstra, H. E.; and M. W. Nachman 2004 – Adaptive reptile color variation and the evolution of the *MC1R* gene. Evolution. 58(8): 1794-1808.

Sanders, A. C. No date. Crucifixion thorn. Unpublished report prepared for the Bureau of Land Management, Riverside, California.

Sawyer, H., R. Neilson, and M. Hicks. 2009 – Distribution and habitat selection patterns of mountain sheep in the Laramie Range. Western Ecosystems Technology, Inc., Cheyanne, Wyoming. 30 pp.

Sawyer, J. O., T. Keeler-Wolf, and J. M. Evans 2009 – Manual of California Vegetation, 2nd ed. California Native Plant Society, Sacramento. 1300 pp.

Schoenherr, A. A. 1992 – A Natural History of California. University of California Press: Berkeley. 772 pp.

Schwartz, O. A., V. C. Bleich, and S. A. Holl 1986 – Genetics and the conservation of mountain sheep *Ovis canadensis nelsoni*. *Biol. Conserv*. 37:179-190.

Scogin, R. 1989 – Studies of *Penstemon albomarginatus* in California. Unpublished report, Rancho Santa Ana Botanic Garden, Claremont, California.

SES 2008. Stirling Energy Systems/R. Liden (tn 49181). Application for Certification, dated December 1, 2008. Submitted to CEC/Docket Unit on December 1, 2008.

SES 2009a – Applicant's Draft Review of Federal and State Surface Waters, March 19, 2009.

SES 2009b – 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 2009c – Applicant's Response to BLM and Energy Commission Data Requests 53-110, March 26, 2009.

SES 2009d – Stirling Energy Systems/C. Champion (tn 50880). Supplement to the Application for Certification, dated April 6, 2009. Submitted to CEC/Docket Unit on April 6, 2009.

SES 2009e – Applicant's Response to California Unions for Reliable Energy Data Requests 1-143, May 6, 2009.

SES 2009f – Applicant's Response to California Unions for Reliable Energy Data Requests 144-178, July 2, 2009.

SES 2009g – Applicant's Response to BLM and Energy Commission Data Requests 31-32 (DESCP/SWPPP, Vol. 1 and 2), July 2, 2009.

SES 2009h – Applicant's Response to BLM and Energy Commission Data Requests 151-155, July 6, 2009.

SES 2009i – Stirling Energy Systems/C. Champion (tn 52457). Applicant's Responses to CURE's Data Requests Set 1, dated July 16, 2009. Submitted to CEC/Docket Unit on July 20, 2009.

SES 2009j – 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.

SES 2009k – Stirling Energy Systems/C. Champion (tn 52467). Applicant's Raven Monitoring and Control Plan, dated July 17, 2009. Submitted to CEC/Docket Unit on July 20, 2009.

SES 2009l – Stirling Energy Systems/C. Champion (tn 52468). Applicant's Report to Map Federal and State Surface Waters, dated July 17, 2009. Submitted to CEC/Docket Unit on July 20, 2009.

SES 2009m – URS/C. Lytle (tn 52599). Applicant's Response to CURE Data Requests, dated July 27, 2009. Submitted to CEC/Docket Unit on July 28, 2009.

SES 2009n – Stirling Energy Systems/F. Bellows (tn 52630). Applicant's Response to Public Comments for June 22 Informational Hearing and Site Visit, dated July 30, 2009. Submitted to CEC/Docket Unit on July 30, 2009.

SES 2009o – Stirling Energy Systems/C. Champion (tn 52877). Applicant's Response to CURE Data Requests Set 2 (Data Requests 229-275), dated August 13, 2009. Submitted to CEC/Docket Unit on August 17, 2009.

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 2009q – 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 2009r – 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 2009s – 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 2009t – Stirling Energy Systems/F. Bellows (tn 53678). Applicant's Response to Energy Commission & Bureau of Land Management's Requests During the September 16th Workshop, dated October 15, 2009. Submitted to CEC/Docket Unit on October 19, 2009.

SES 2009u – 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 2009v – 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 2009w – 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 2009x – Stirling Energy Systems/C. Champion (tn 54385). Applicant's Response to Defenders of Wildlife Set 1 Data Requests 1-11 and Basin and Range Watch Data Requests Set 1 Data Request 1-3, dated December 4, 2009. Submitted to CEC/Docket Unit on December 4, 2009.

SES 2009y – 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 2009z – 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 2009aa – URS/C. Lytle (tn 54619). Biological(Bio) Resources Technical(Tech) Report(Rpt), Noxious Weed Management(Mgmt) Plan, Biological(Bio) Resources Baseline Survey, dated December 23, 2009. Submitted to CEC/Docket Unit on December 23, 2009.

SES 2010 – Stirling Energy Systems/C. Champion (tn 54869). Applicant Submittal of Additional Information Regarding Project Water Supply, dated January 15, 2010. Submitted to CEC/Docket Unit on January 19, 2010.

Sharifi, M. R., A. C. Gibson, and P. W. Rundel 1997 – Surface dust impacts on gas exchange in Mojave Desert shrubs. Journal of Applied Ecology 34:837-846.

Sharifi, M. R., A. C. Gibson, and P. W. Rundel 1999 – Phenological and physiological responses of heavily dusted creosote bush (Larrea tridentata) to summer irrigation in the Mojave Desert. Flora 194:369-378.

Sheppard, J. M. 1996 – Le Conte's Thrasher (Toxostoma lecontei). In A. Poole and F. Gill (eds.), The Birds of North America, No. 230. The Academy of Natural Sciences, Philadelphia, PA, and the American Ornithologists' Union, Washington, D. C. Retrieved from the Birds of North America Online. [online]: http://bna.birds.cornell.edu/bna/species/230doi:10.2173/bna.230

Shreve, F. and I. L. Wiggins 1964 – Vegetation and Flora of the Sonoran Desert. Stanford University Press, Stanford, California.

Simberloff, D., J. A. Farr, J. Cox, and D. W. Mehlman 1992 – Movement corridors: conservation bargains or poor investments? Conservation Biology 6:493-504.

Smith, S. D. 1984 – Environmental effects of solar thermal power systems (STPS): Analysis of plant invasion into the Barstow 10 MWe STPS. U. S. Department of Energy Contract No. DE-AM03-76-SF00012.

Smith, S. D., D. T. Patten and R. K. Monson 1987 – Effects of artificially imposed shade on a Sonoran Desert ecosystem: microclimate and vegetation. *Journal of Arid Environments* Vol. 13, No. 1, pp. 65–82.

SCBS 2009 – Society for the Conservation of Bighorn Sheep/G. Kerr (tn 52127). Society for the Conservation of Bighorn Sheep's Scoping Comments, dated June 22, 2009. Submitted to CEC/Docket Unit on June 23, 2009.

Sorenson, Peter. Wildlife Biologist, US Fish and Wildlife Service. Telephone conversations with Susan Sanders, California Energy Commission, March 10, 2010, regarding impacts to golden eagles, burrowing owls, and other species for the Genesis Power Project Supplemental Staff Assessment July 2010.

Soulé, M. E., D. T. Bolger, A. C. Alberts, J. Wright, M. Sorice, and S. Hill 1988 – Reconstructed dynamics of rapid extinctions of chaparral-requiring birds in urban habitat islands. Conservation Biology 2:75-92.

Spellenberg, R. 2002 – Nyctaginaceae. Pages 376-382 in B. G. Baldwin et al., The Desert Jepson Manual: Vascular Plants of Southeastern California. University of California Press, Berkeley.

Spencer, W.D., P. Beier, K. Penrod, K. Winters, C. Paulman, H. Rustigian-Romsos, J. Strittholt, M. Parisi, and A. Pettler. 2010. California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California. Prepared for California Department of Transportation, California Department of Fish and Game, and Federal Highways Administration.

Stebbins, Robert C. 1944 – Some aspects of the ecology of the iguanid genus, Uma. Ecological Monographs, vol. 14, no 3, pp. 311-332.

Steenhof, K. 1998 – Prairie Falcon (*Falco mexicanus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online. [online]: http://bna.birds.cornell.edu/bna/species/346

Sterling, J. 2008 – Bendire's Thrasher (*Toxostoma bendirei*). In: Shuford, W. D. and T. Gardali (eds). California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Strassburger, Marie. Regional Migratory Bird Chief, US Fish and Wildlife Service. Electronic Communication with Sara Keeler, California Energy Commission, February 2, 2010, regarding the Eagle Act.

Sullivan, J. 1996 – *Taxidea taxus*. *In* Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). [online]: http://www.fs.fed.us/database/feis/wildlife/mammal/tata/all.html.

Sullivan, C. 2008 – Personal communication between Susan Sanders and Charles Sullivan, Bureau of Land Management. Wildlife Biologist, Needles Office. Meeting on November 5, 2008.

TS 2010a – Tessera Solar/F. Bellows (tn 55391). Drainage Layout Figure, dated February 12, 2010. Submitted to CEC/Docket Unit on February 16, 2010.

TS 2010b – Tessera Solar/F. Bellows (tn 55515). Applicant's Submittal of Burrowing Owl Survey Report, dated February 13, 2010. Submitted to CEC/Docket Unit on February 22, 2010.

TS 2010c – 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.

TS 2010d – Tessera Solar/F. Bellows (tn 56536). Applicant's Submittal of Additional Information, date May 4, 2010. Submitted to CEC/Docket Unit on May 5, 2010.

TS 2010e – Tessera Solar/F. Bellows (tn 56789). Applicant's Submittal of Results of 2010 Desert Tortoise Surveys, date May 18, 2010. Submitted to CEC/Docket Unit on May 18, 2010.

TS 2010f – Tessera Solar/F. Bellows (tn 56502). Applicant's Submittal of Results from Helicopter Surveys of Golden Eagle Nests & Bighorn Sheep, date April 30, 2010. Submitted to CEC/Docket Unit on April 30, 2010.

TS 2010g – Tessera Solar/F. Bellows (tn 56100). Applicant's Submittal of Results of the 2010 Burrowing Owl Survey, date March 26, 2010. Submitted to CEC/Docket Unit on March 26, 2010.

TS 2010h – Tessera Solar/F. Bellows (tn 56287). Applicant's Submittal of Comments on the SA/DEIS, date April 14, 2010. Submitted to CEC/Docket Unit on April 15, 2010.

TS 2010i – Tessera Solar/F. Bellows (tn 56786). Applicant's Submittal of Results of First Round of 2010 Spring Botany Surveys, date May 20, 2010. Submitted to CEC/Docket Unit on May 24, 2010.

TS 2010j – Tessera Solar/F. Bellows (tn 57018). Applicant's Submittal of Alternative Site Layout #2, Engineering Figure with SunCatcher Layout, and Revised Project Boundary with 4000' Desert Tortoise Corridor Figure, date June 2, 2010. Submitted to CEC/Docket Unit on June 2, 2010.

Teixeira, C. P., C. S. De Azevedo, M. Mendl, C. F. Cipreste, and R. J. Young 2007 – Revisiting translocation and reintroduction programmes: The importance of considering stress. Animal Behaviour 73:1–13.

Thelander, C. G. 1974 – Nesting territory utilization by Golden Eagles (Aquila chrysaetos) in California during 1974, Spec. Wild. Investigations. California Department of Fish and Game, Sacramento.

Thomas, K., T. Keeler-Wolf, and J. Thorne 2002 – *Central Mojave Field Data. A digital database (Access)*. Flagstaff, AZ: U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Colorado Plateau Field Station.

Thomas, K., T. Keeler-Wolf, J. Franklin, and P. Stine 2004 – Mojave Desert Ecosystem Program: Central Mojave Vegetation Database. Prepared for Mojave Desert Ecosystem Program, U.S. Geological Survey Western Ecological Research Center, Sacramento, California and Southwest Biological Science Center,

Flagstaff, Arizona. [online]: http://www.dfg.ca.gov/biogeodata/vegcamp/pdfs/VegMappingRpt_Central_Mojave_Vegetation_Database.pdf

Thorne, R. F. 1982 – The desert and other transmontane plant communities of southern California. Aliso 10:219-257.

Torres, S. G., V. C. Bleich, and J. D. Wehausen 1994 – Status of bighorn sheep in California, 1993. Desert Bighorn Counc. Trans. 38:17-28.

Torres, S. G., V. C. Bleich, and J. D. Wehausen 1996 – Status of bighorn sheep in California, 1995. Desert Bighorn Counc. Trans. 40:27-34.

Trombulak, S. C. and C. A. Frissell 2000 – Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology. 14(1): 18-30.

Trulio L.A. 1995. Passive Relocation: A Method to Preserve Burrowing Owls on Disturbed Sites. Journal of Field Ornithology 66: 99-106.

Trulio L.A. 1997. Strategies for protecting western burrowing owls (*Speotyto cunicularia hypugaea*) from human activities. Pp 461-465 in Duncan, Johnson and Nicholls (Eds.). Biology and conservation of owls of the northern hemisphere. USDA Forest Service GTR NC 190.

Turner, R. M., J. E. Bowers, and T. L. Burgess 1995 – Sonoran desert plants: an ecological atlas. University of Arizona Press, Tucson, Arizona. 504 pp.

Turner, F. B., Weaver, D. C. and Rorabaugh, J. C. 1984 – Effects of reduction in windblown sand on the abundance of the fringe-toed lizard (Uma inornata) in the Coachella Valley, California. Copeia 1984, pp. 370-378.

URS 2008 – San Joaquin Solar 1 & 2 – Application for Certification Volume 2, Appendix L, "Glint and Glare Study." [online]: http://www.energy.ca.gov/sitingcases/sjsolar/documents/applicant/afc/AFC_volume_02/. Accessed January 2010.

URS 2010 – Microphyllous species: Calico Solar (map). Dated 16 Jun 2010.

USACE and CDFG 2009 – United States Army Corps of Engineers and California Department of Fish and Game. Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan Joint Environmental Impact Statement and Environmental Impact Report. SCH No. 2000011025.

USEPA 2009 – United States Environmental Protection Agency/A. McPherson. (tn 52483). Scoping Comments from the USEPA, dated July 7, 2009. Submitted to CEC/Docket Unit on July 21, 2009.

USFS 2008 – USDA Forest Service. Species Accounts: Animals, Golden Eagle. [online]: http://www.fs.fed.us/r5/scfpr/projects/lmp/read.htm.

USFWS 1994a – United States Fish & Wildlife Service. Endangered and Threatened Wildlife and Plants; Determination of Critical Habitat for the Mojave Population of the Desert Tortoise. Federal Register Vol. 59, No. 26.

USFWS 1994b – United States Fish & Wildlife Service. Desert Tortoise (Mojave Population) Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon.

USFWS 2004 – United States Fish and Wildlife Service. Endangered and threatened wildlife and plants; proposed designation of critical habitat for *Astragalus jaegerianus* (Lane Mountain milk-vetch). Federal Register 69:18018-18035.

USFWS 2005 – United States Fish and Wildlife Service. Endangered and threatened wildlife and plants; designation of critical habitat for *Astragalus jaegerianus* (Lane Mountain milk-vetch); final rule. Federal Register 70:18220-18241.

USFWS 2008a – United States Fish and Wildlife Service. Draft revised recovery plan for the Mojave population of the desert tortoise (*Gopherus agassizii*). U.S. Fish and Wildlife Service, California and Nevada Region, Sacramento, California.

USFWS 2008b – United States Fish and Wildlife Service. Environmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise. Final Report. March 2008. 156 pp.

USFWS 2008c – United States Fish and Wildlife Service. Desert Tortoise Authorized Biologist and Monitor Responsibilities and Qualifications. November 2008. [online]: http://www.fws.gov/ventura/speciesinfo/protocols_guidelines.

USFWS 2009a – United States Fish and Wildlife Service. Final Environmental Assessment – Proposal to Permit Take Provided Under the Bald and Golden Eagle Protection Act. [online]: http://www.fws.gov/migratorybirds/CurrentBirdIssues/BaldEagle/FEA_EagleTakePermit_Final.pdf. Last accessed February 1, 2010.

USFWS 2009b – United States Fish and Wildlife Service. Preparing for Any Action that May Occur Within the Range of the Mojave Desert Tortoise. U.S. Fish and Wildlife Service. April 2009. 16 pp. [online]: http://www.fws.gov/ventura/speciesinfo/protocols_guidelines/. Accessed 7-22-09.

USFWS 2009c – United States Fish and Wildlife Service. *Desert Tortoise Field Manual*. [online]: http://www.fws.gov/Ventura/speciesinfo/protocols_guidelines/

USFWS 2009d – Finding of No Significant Impact. Eagle Permits; Take Necessary to Protect Interest in a Particular Locality. Signed May 19, 2009, Last accessed February 7, 2010. [online]: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BaldEagle/FONSI_EagleRule.09.pdf

USFWS 2009e – United States Fish and Wildlife Service. *Desert TortoiseSpotlight Species 5-year Action Plan*. US Fish and Wildlife Service, Nevada Fish and Wildlife Office, Reno, Nevada.

USFWS 2010 – United States Fish and Wildlife Service. Translocation of Desert Tortoises (Mojave Population) From Project Sites: Plan Development Guidance.

USFWS 2010b. (tn 56936). Renewable Energy Development and Common Raven Predation on the Desert Tortoise -Summary. May 2010.

USGS 2010 – United States Geological Survey. USGS National Hydrographic Dataset. [online]: http://nhd.usgs.gov

Vasek, F. C. 1980 – Creosote bush: long-lived clones in the Mojave Desert. American Journal of Botany 67:246-255.

Vistnes, I. and C. Nellemann 2001 – Avoidance of cabins, roads, and power lines by reindeer during calving. Journal of Wildlife Management. 65(4): 915-925.

von Seckendorff Hoff, K., and R. W. Marlow 1997 – Highways and roads are population sinks for desert tortoises. p. 482 in J. Van Abbema, ed. Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles—An International Conference. New York Turtle and Tortoise Society and WCS Turtle Recovery Program.

von Seckendorff Hoff, K., and R. W. Marlow 2002 – Impacts of vehicle road traffic on desert tortoise populations with consideration of conservation of tortoise habitat in southern Nevada. Chelonian Conservation and Biology 4(2):449–456.

Wall, M. 2009 – Seed Collection Guidelines for California Native Plant Species. Rancho Santa Ana Botanic Garden, Claremont, California. 25 pp. http://rsabg.org/documents/horticulture/Seed%20Collecting%20and%20Storage%20Guidelines.pdf.

Watson, J., S. R. Rae, and R. Stillman 1992 – Nesting density and breeding success of Golden Eagles in relation to food-supply in Scotland. Journal of Animal Ecology 61:543-550.

Weaver, D. C. 1981 – Aeolian sand transport and deposit characteristics at ten sites in Coachella Valley, California. Part II. In: The effect of blowsand reduction on the abundance of the fringe-toed lizard (Uma inornata) in the Coachella Valley, California. A report submitted to U.S. Army Corps of Engineers, Los Angeles District.

Wehausen, J. D. 1980 – Sierra Nevada bighorn sheep: history and population ecology. Ph.D. Diss. Univ. Michigan, Ann Arbor. 240 pp.

Wehausen, J. D., 1992 – Demographic studies of mountain sheep in the Mojave Desert: Report IV. Unpublished report, California Department of Fish and Game, Sacramento. 54 pp.

Wehausen, J. D. 2005 – Nelson Bighorn Sheep *Ovis canadensis nelsoni*. Species Account, West Mojave Plan, Bureau of Land Management. Final environmental impact report and statement for the West Mojave plan: a habitat conservation plan and California desert conservation area plan amendment. Moreno Valley (CA): U.S. Dept. of the Interior, Bureau of Land Management, California Desert District.

Wehausen, J. D., L. L. Hicks, D. P. Garber and J. Elder 1977 – Bighorn sheep management in the Sierra Nevada. Trans. Desert Bighorn Council 21:30-32.

Welles, R. F. and F. B. Welles 1961 – The bighorn of Death Valley. Fauna of the national parks of the United States. USDI, NPS Fauna series No. 6, 242 p.

WWP 2009a – Western Watersheds Project/M. Conor (tn 52476). Western Watersheds' NEPA/CEQA Scoping Comments for Staff Assessment/Environmental Statement and CDCA Plan Amendment, dated July 7, 2009. Submitted to CEC/Docket Unit on Submitted to CEC/Docket Unit on July 20, 2009.

White, S. D., A. C. Sanders and M. Wilcox 1996 – Noteworthy collection: *Androstephium breviflorum*. Madrono 43:334-335.

White, P. J. and R. A. Garrott 1999 – Population dynamics of kit foxes. Canadian Journal of Zoology. 77(3): 486-493.

Whitfield D.P., Fielding, A.H., McLeod, D.R.A. and Haworth, P.F. 2008. A conservation framework for golden eagles: implications for their conservation and management in Scotland. Scottish Natural Heritage Commissioned Report No.193 (ROAME No. F05AC306).

Wijayratne, U. C.; Scoles-Sciulla, S. J.; and L. A. Defalco 2009 – Dust deposition effects on growth and physiology of the endangered *Astragalus jaegerianus* (Fabaceae). Madroño 56:2, 81-88

WC 2009a – Wildlands Conservancy (tn 52471). Scoping Comments from Wildlands Conservancy with Memo on Renewable Siting Criteria for CDCA, dated July 7, 2009. Submitted to CEC/Docket Unit on

WC 2009b – Wildlands Conservancy Mojave Desert Trails National Monument Proposal. [online]: http://www.wildlandsconservancy.org/pdf/MRNM12-16-09.pdf. Accessed January 26, 2010.

Williams, D. F. 1986 – Mammalian Species of Special Concern in California. California Department of Fish and Game, Wildlife Management Division, Administrative Report 86-1:1-112.

Wilson, D. E., and S. Ruff 1999 – The Smithsonian Book of North American Mammals. Smithsonian Institution Press, Washington D.C.

WRCC 2010 – Western Regional Climate Center. "Western U.S. Climate Historical Summaries." Report for Daggett FAA Airport, California (042257). [online]: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca2257. Accessed January 8.

WS 2009 – The Wilderness Society (tn 52470). The Wilderness Society's NEPA/CEQA Scoping Comments for Staff Assessment/Draft Environmental Impact Statement and CDCA Plan Amendment, dated July 7, 2009. Submitted to CEC/Docket Unit on July 20, 2009.

Yosef, R. 1996 – Loggerhead Shrike (*Lanius ludovicianus*). In: The Birds of North America, No. 231 (A. Poole and F. Gill [*eds*.]). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

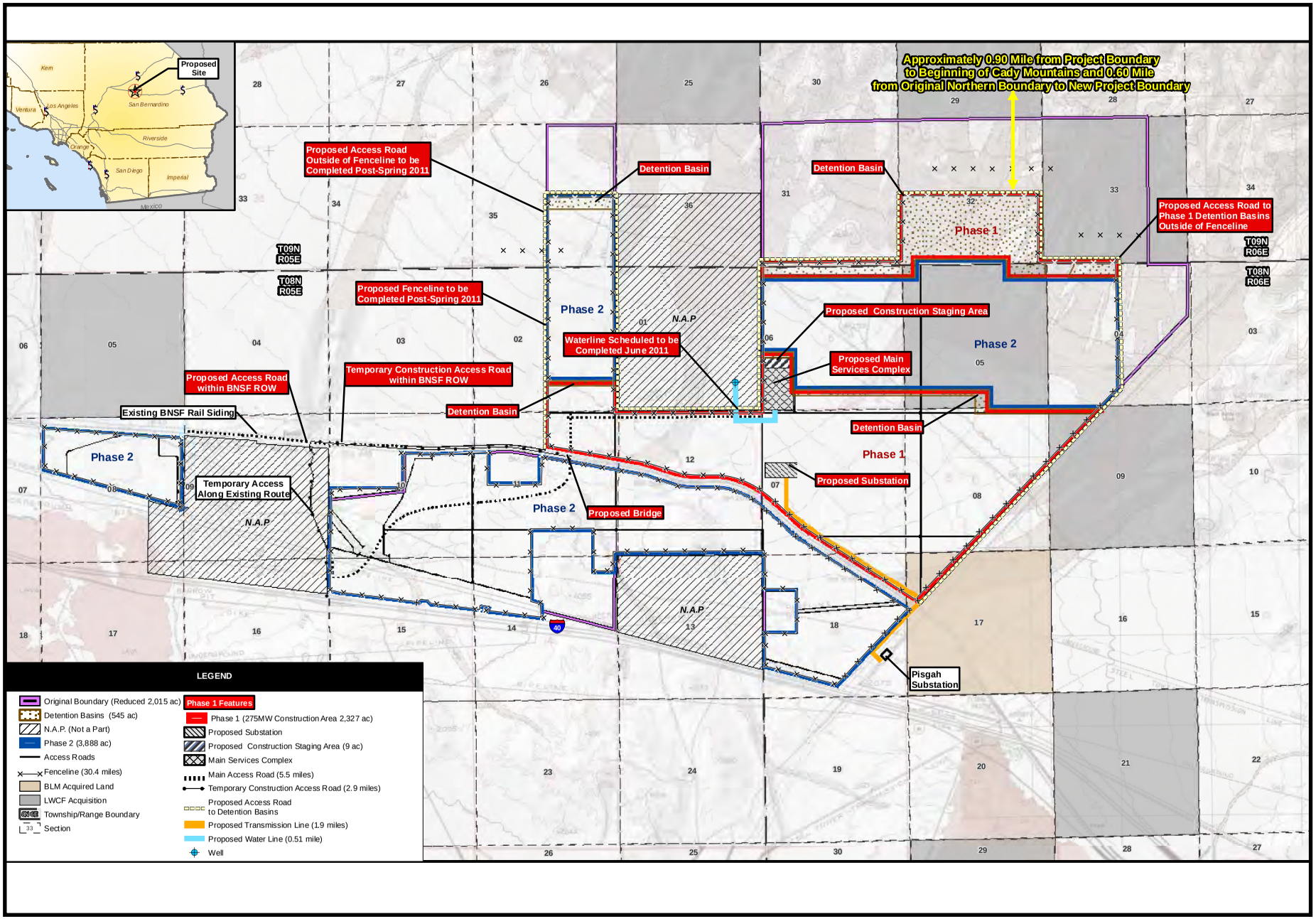
Zeiner, D. C., W. F. Laudenslayer, K. E. Mayer, and M. White 1990 – California's Wildlife: Mammals, Vol. III: Mammals. California Statewide Habitat Relationships System. The State of California, The Resources Agency, Department of Fish and Game. Sacramento, CA.

Zoellick, B. W. and N. S. Smith 1992 – Size and spatial organization of home ranges of kit foxes in Arizona. Journal of Mammalogy. 73(1): 83-88.

Zouhar, Kristin, Jane K. Smith, Steve Sutherland, and Matthew L. Brooks 2008 – Wildland Fire in Ecosystems: Fire and Nonnative Invasive Plants. General Technical Report RMRSGTR-42-Vol. 6, USDA Forest Service Rocky Mountain Research Station, Ogden, Utah: 355 pp.

BIOLOGICAL RESOURCES - FIGURE 1

Calico Solar Project - Proposed Project Footprint



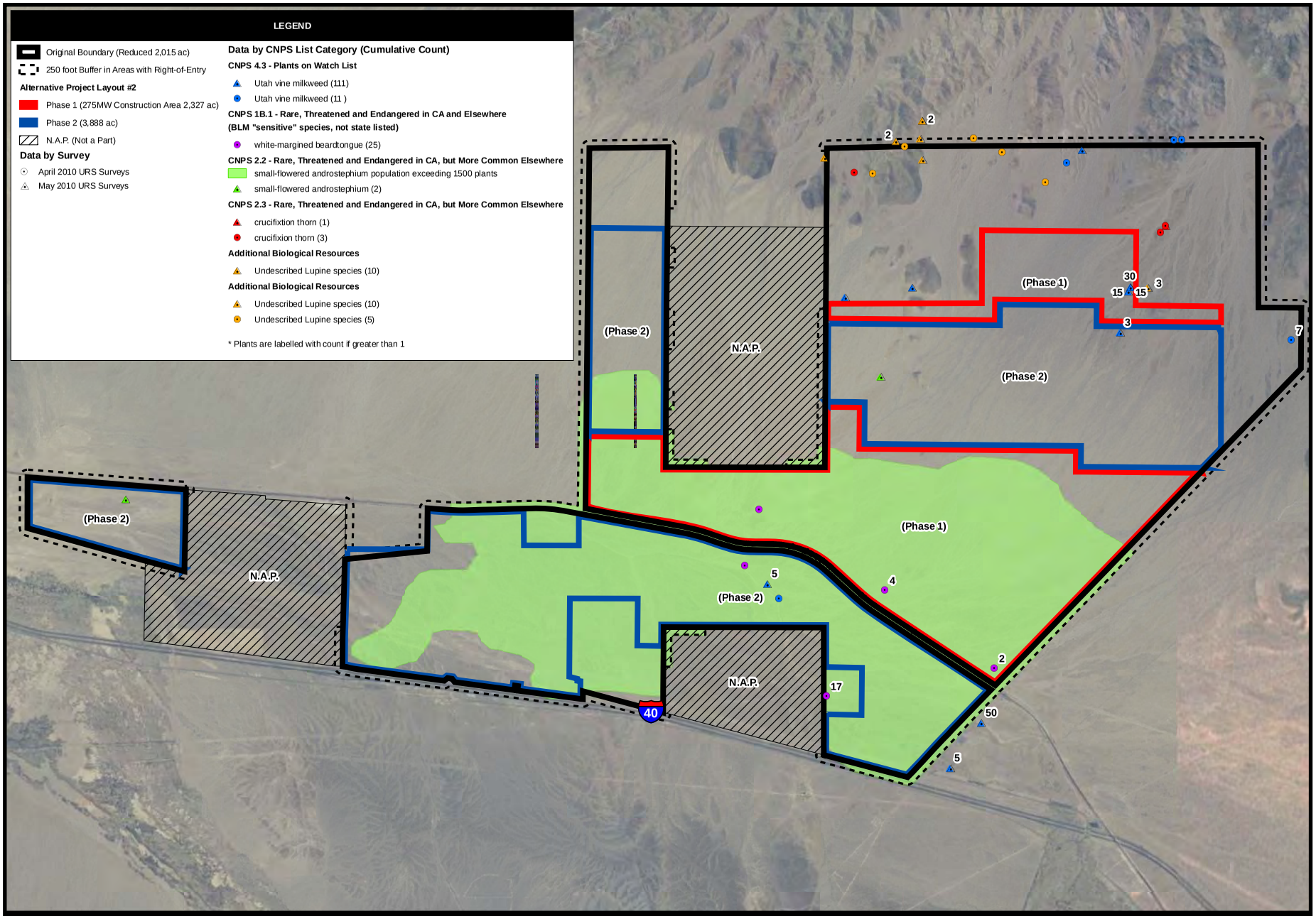
BIOLOGICAL RESOURCES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: URS

BIOLOGICAL RESOURCES - FIGURE 2

Calico Solar Project - Rare Plant Locations



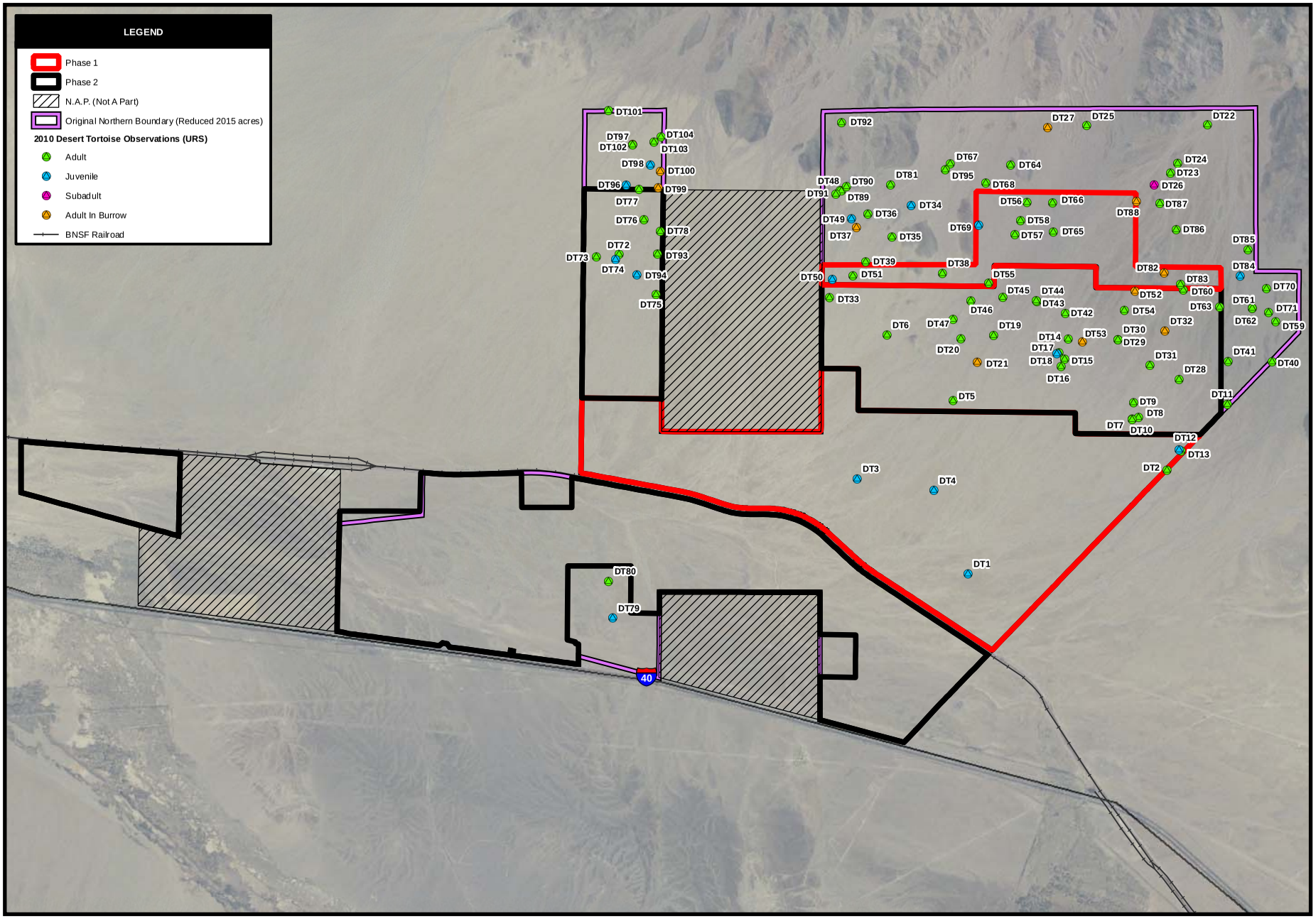
BIOLOGICAL RESOURCES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: URS

BIOLOGICAL RESOURCES - FIGURE 3

Calico Solar Project - Desert Tortoise Sightings



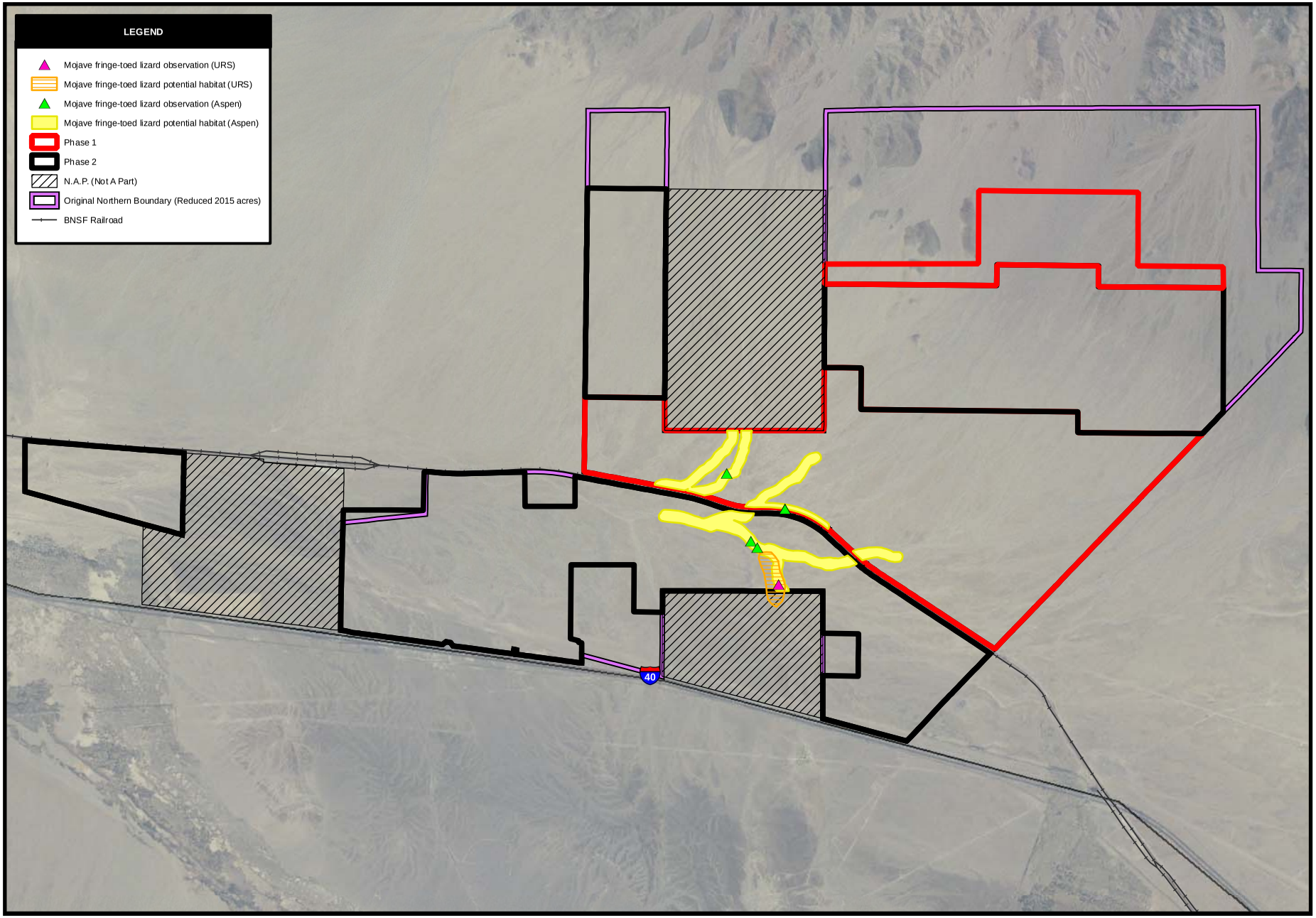
BIOLOGICAL RESOURCES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: URS

BIOLOGICAL RESOURCES - FIGURE 4

Calico Solar Project - Mojave Fringe-Toed Lizard Observations and Habitat



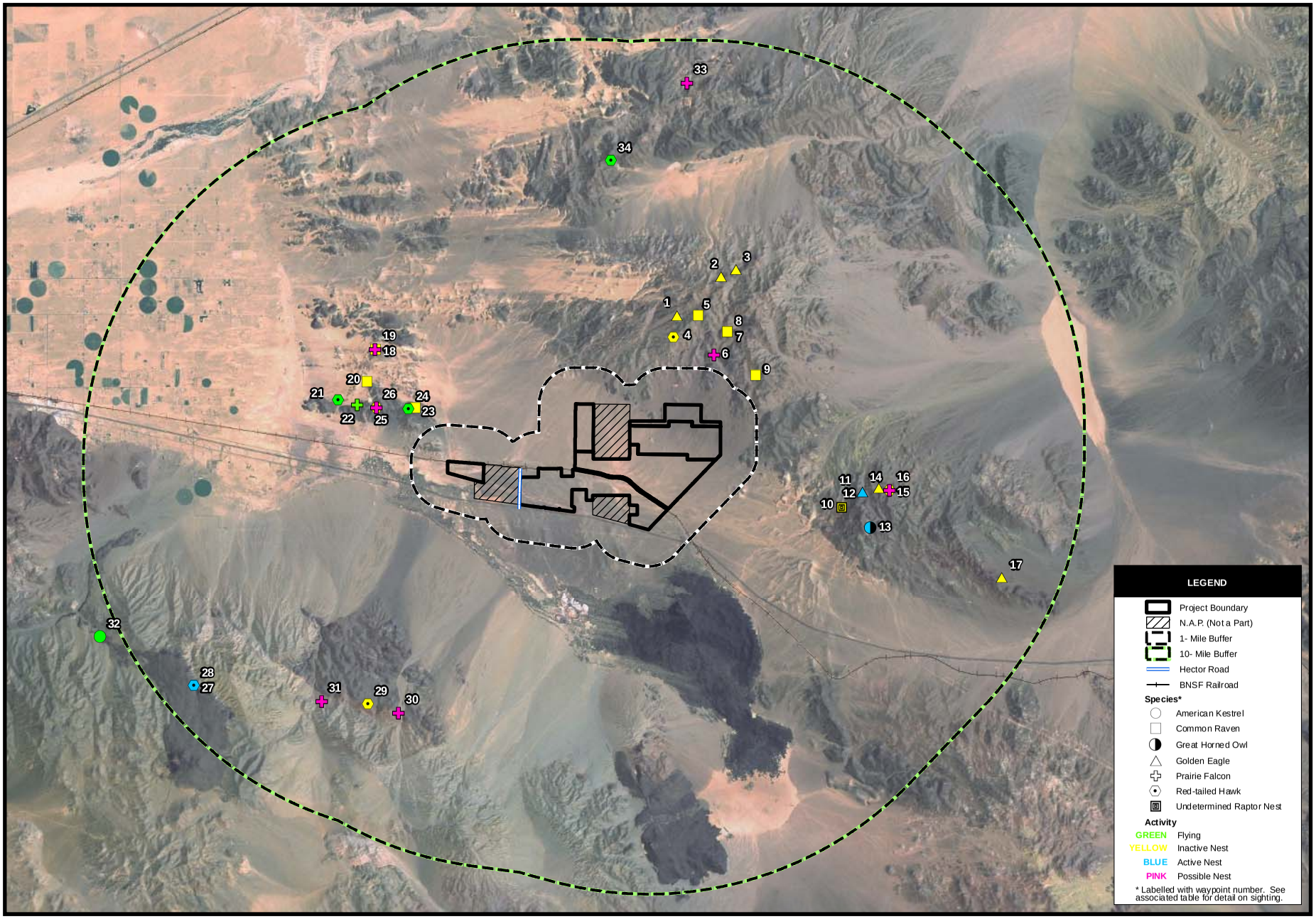
BIOLOGICAL RESOURCES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: URS

BIOLOGICAL RESOURCES - FIGURE 5

Calico Solar Project - Golden Eagle Nest Locations



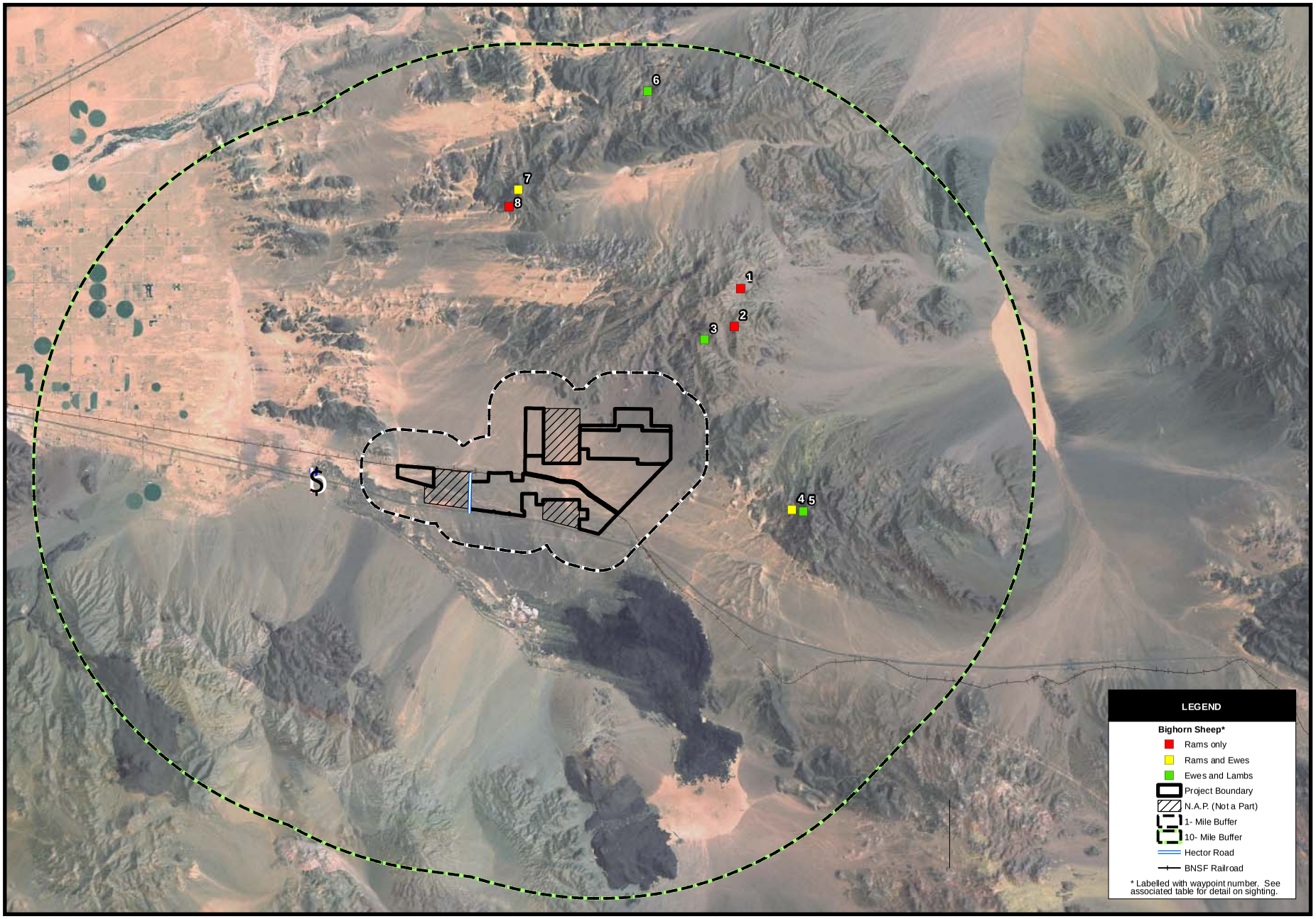
BIOLOGICAL RESOURCES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: URS

BIOLOGICAL RESOURCES - FIGURE 6

Calico Solar Project - Nelson's Bighorn Sheep Locations



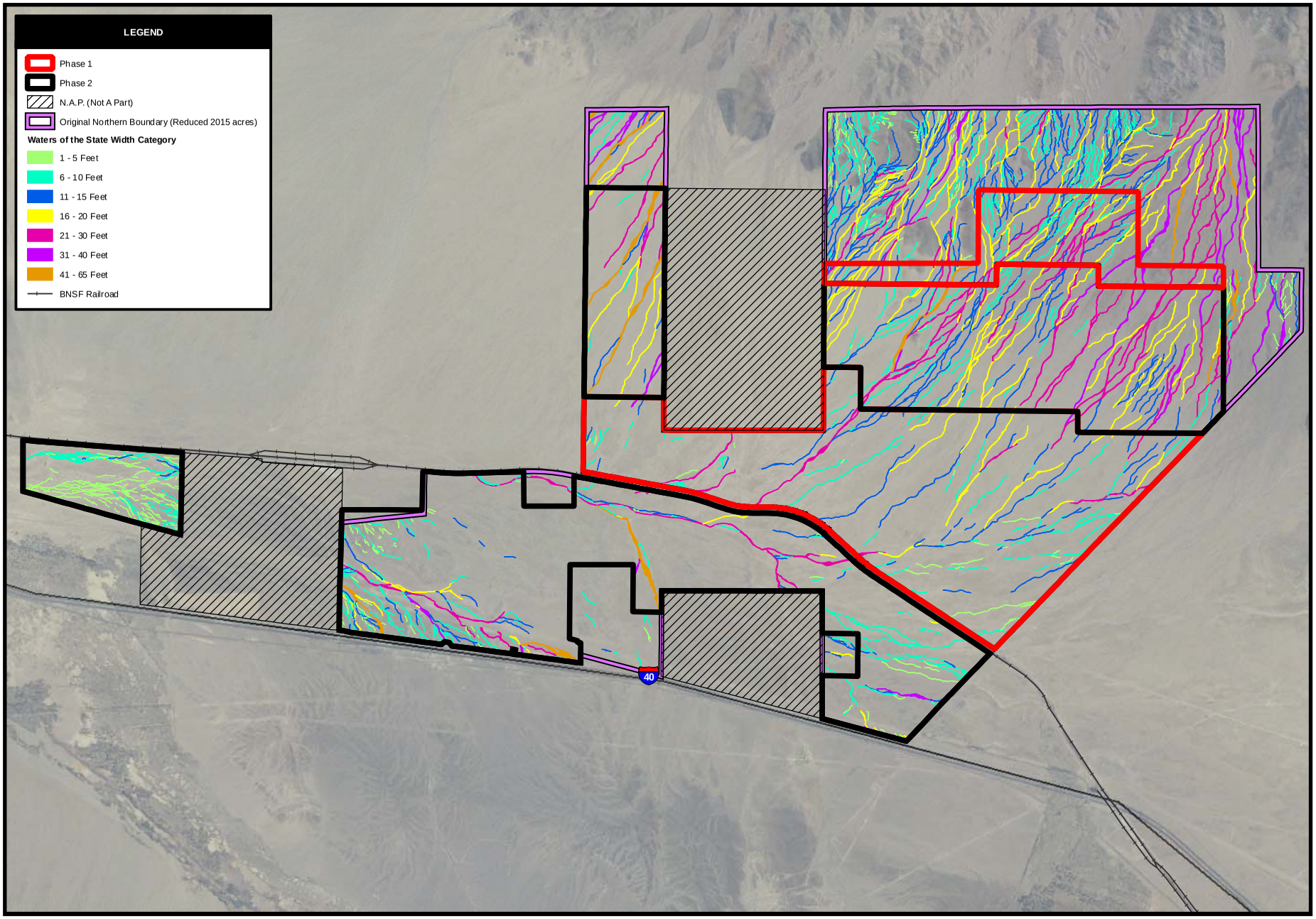
BIOLOGICAL RESOURCES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: URS

BIOLOGICAL RESOURCES - FIGURE 7

Calico Solar Project - State Jurisdictional Waters



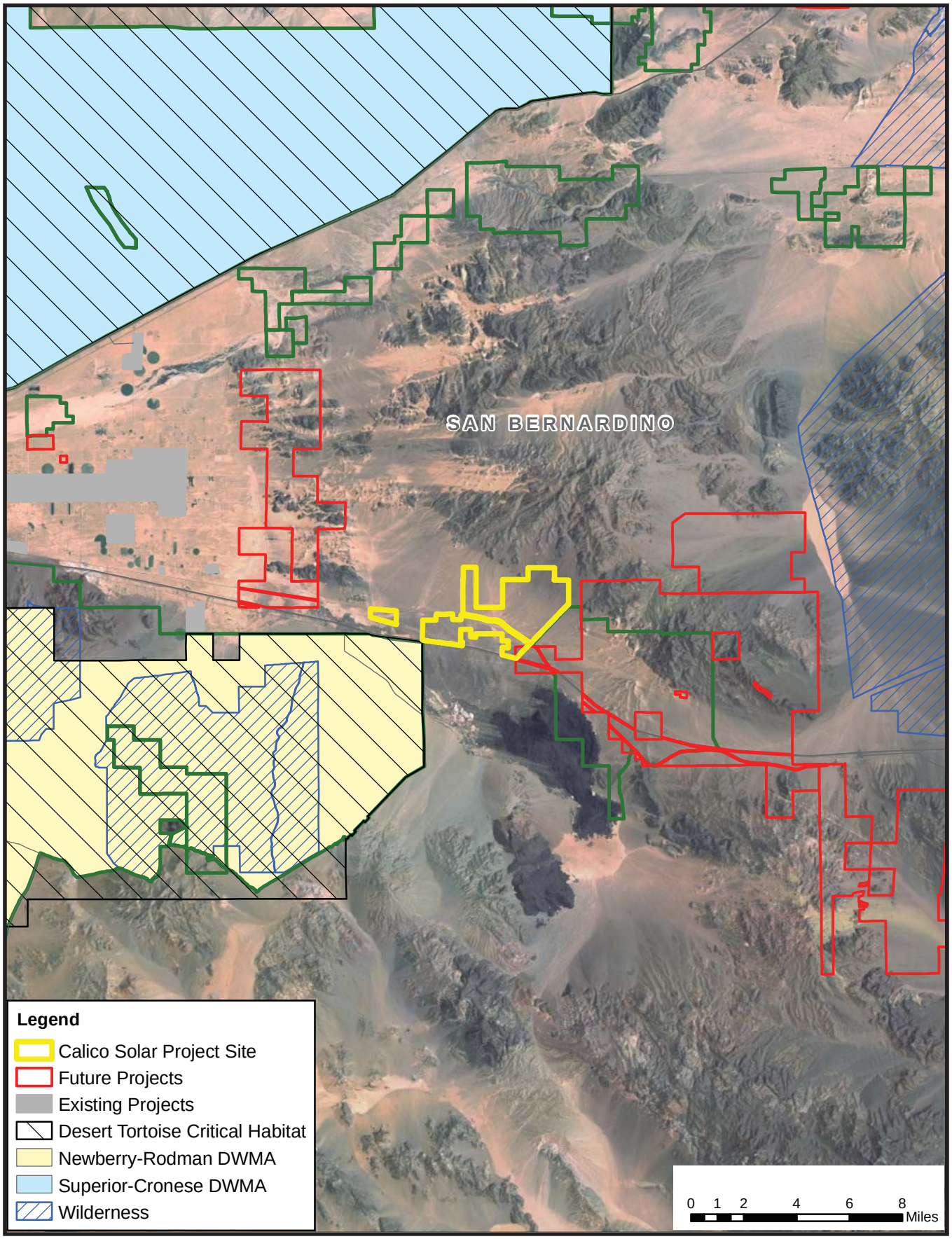
BIOLOGICAL RESOURCES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: URS

BIOLOGICAL RESOURCES - FIGURE 8

Calico Solar Project - Existing Projects/Forseeable Future Projects

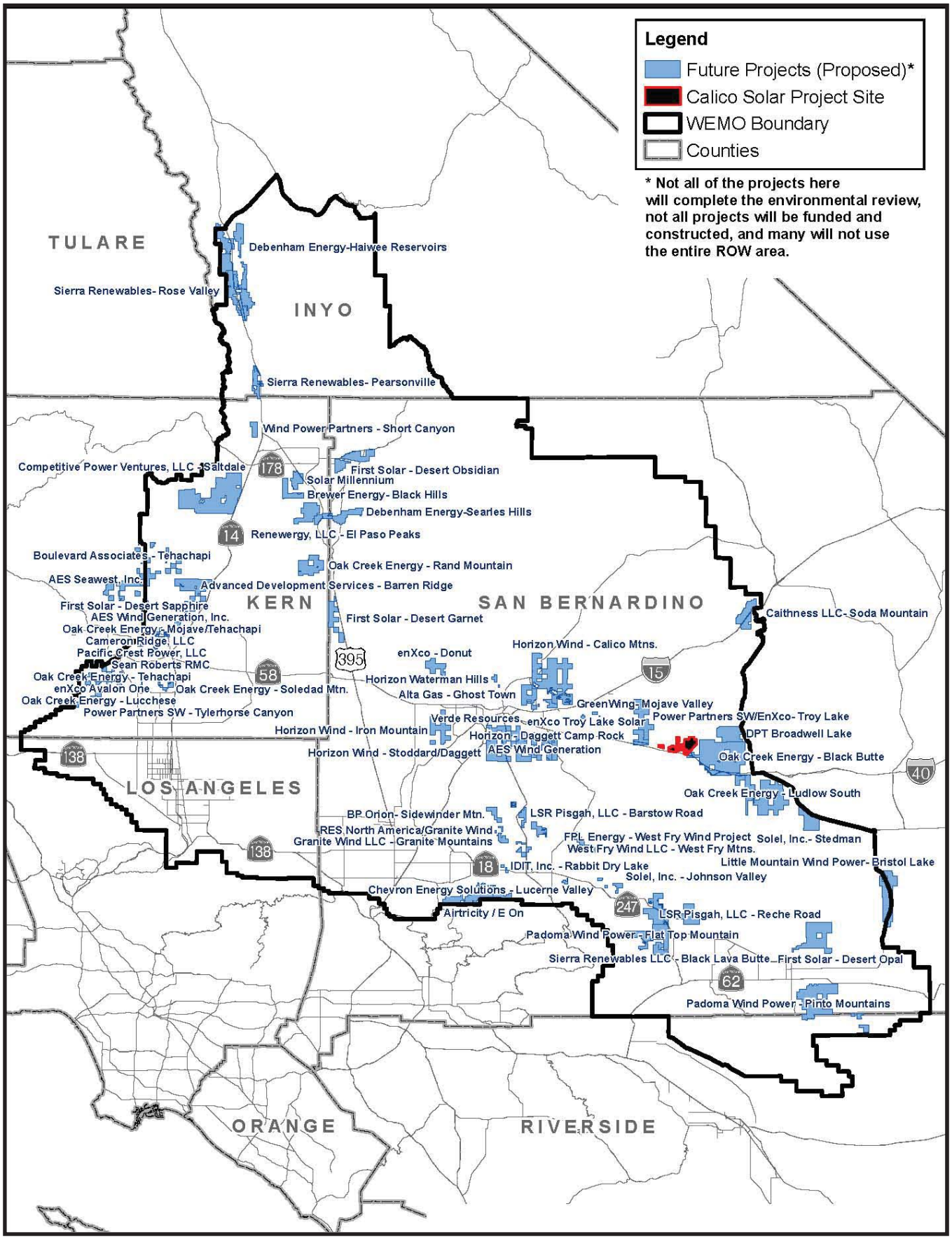


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 9

Calico Solar Project - Forseeable Future Projects (Proposed)

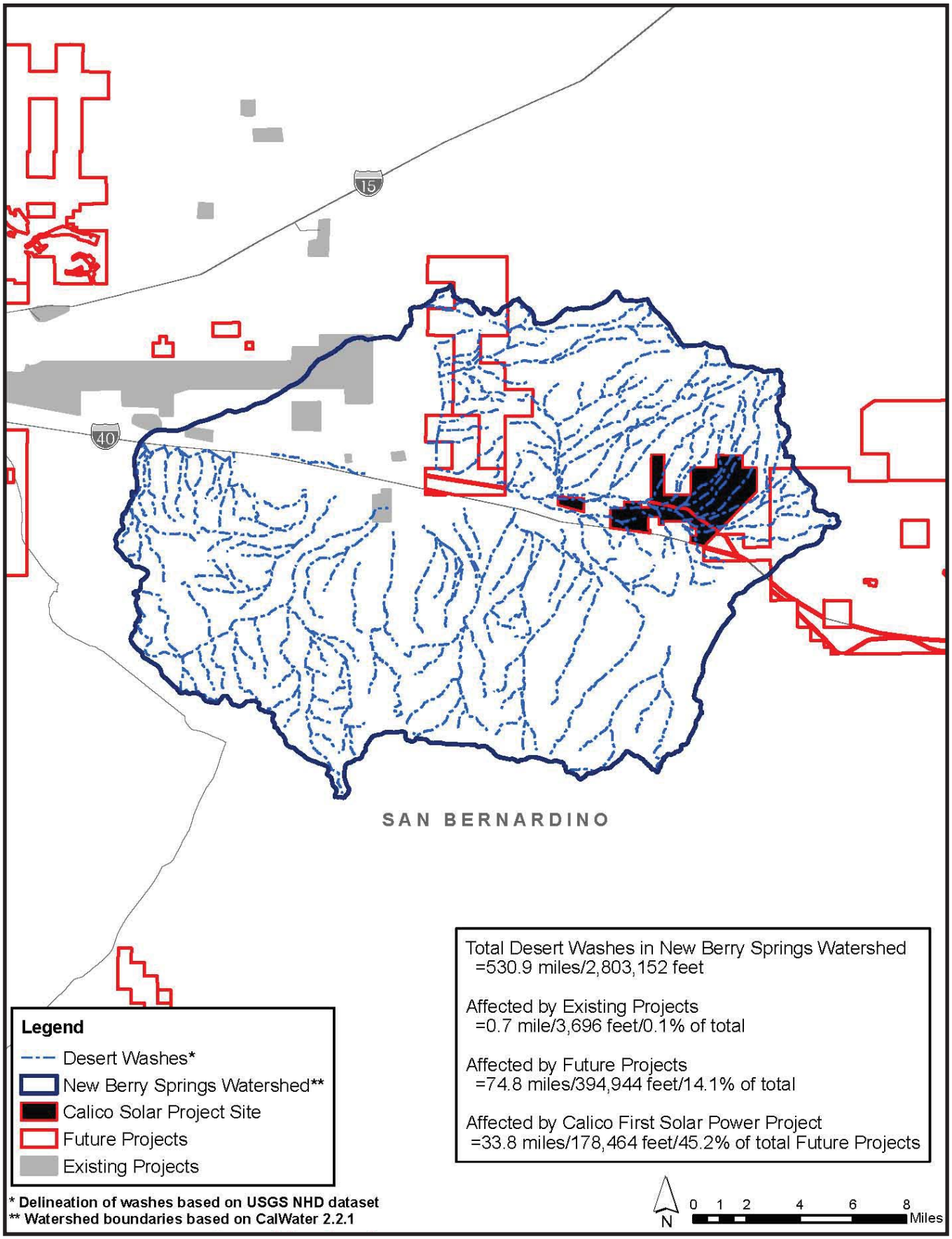


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 10

Calico Solar Project - Desert Washes - New Berry Springs Watershed

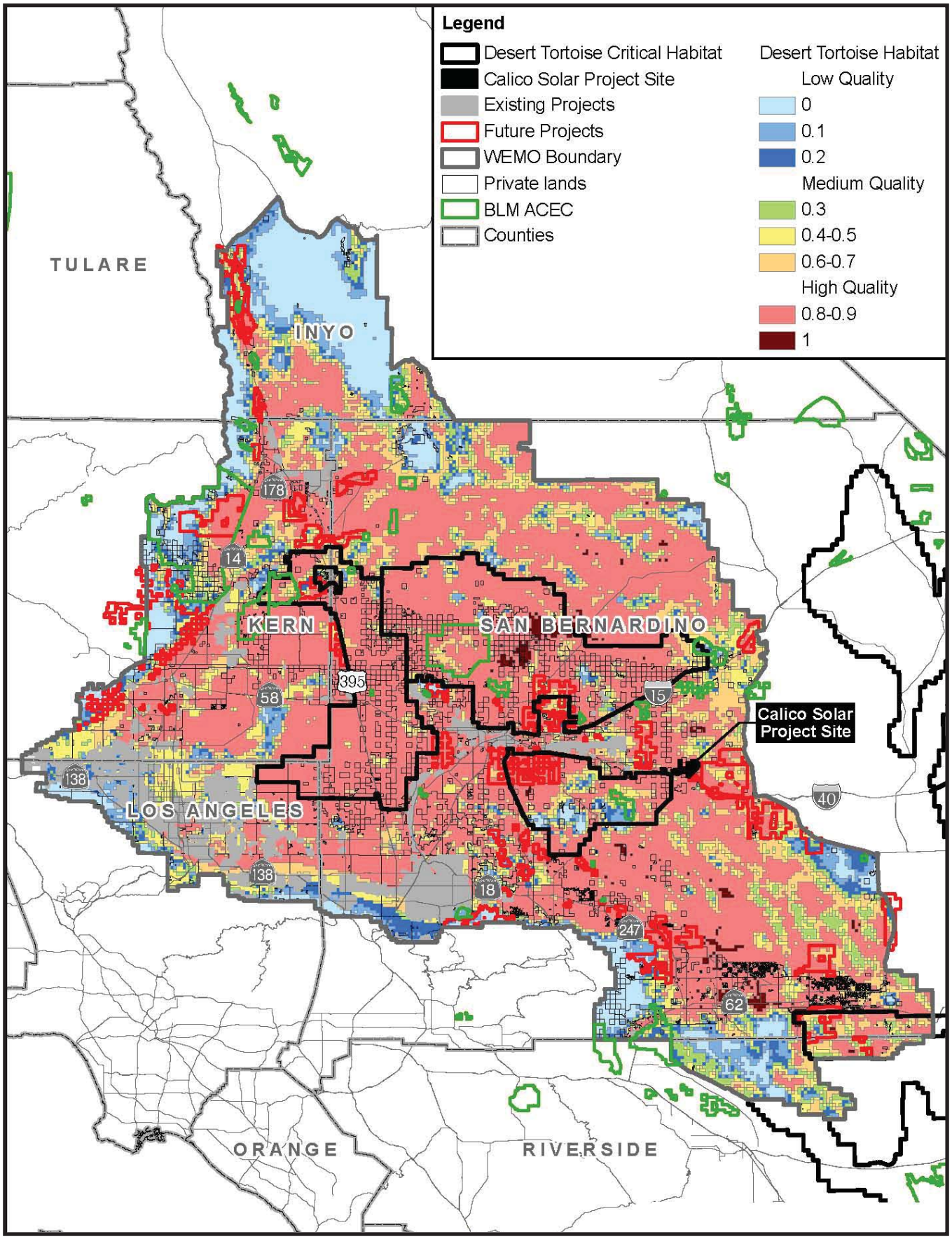


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 11

Calico Solar Project - Desert Tortoise - Habitat Quality and Critical Habitat

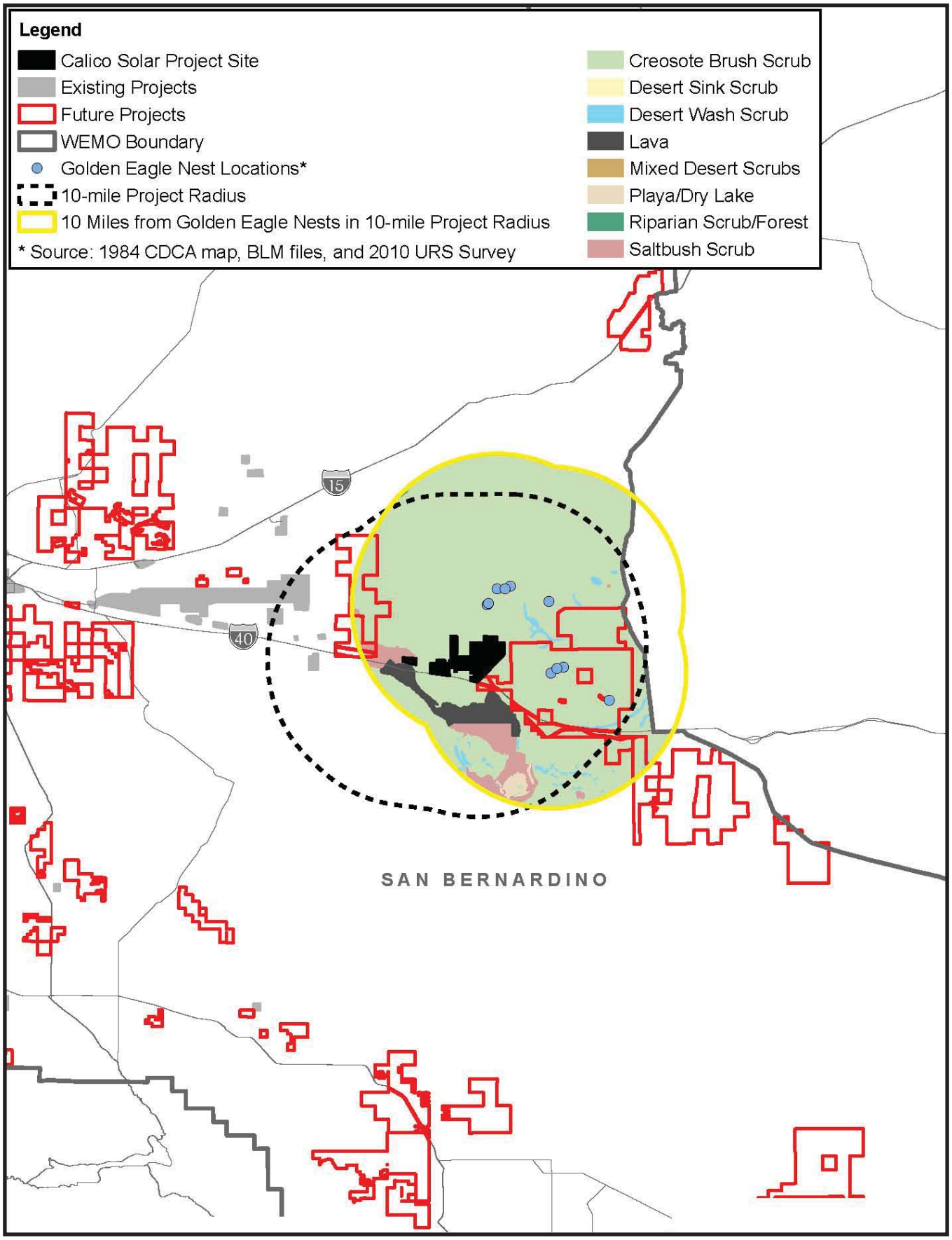


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 12

Calico Solar Project - Golden Eagle Foraging Habitat Within 10 Miles of Nests

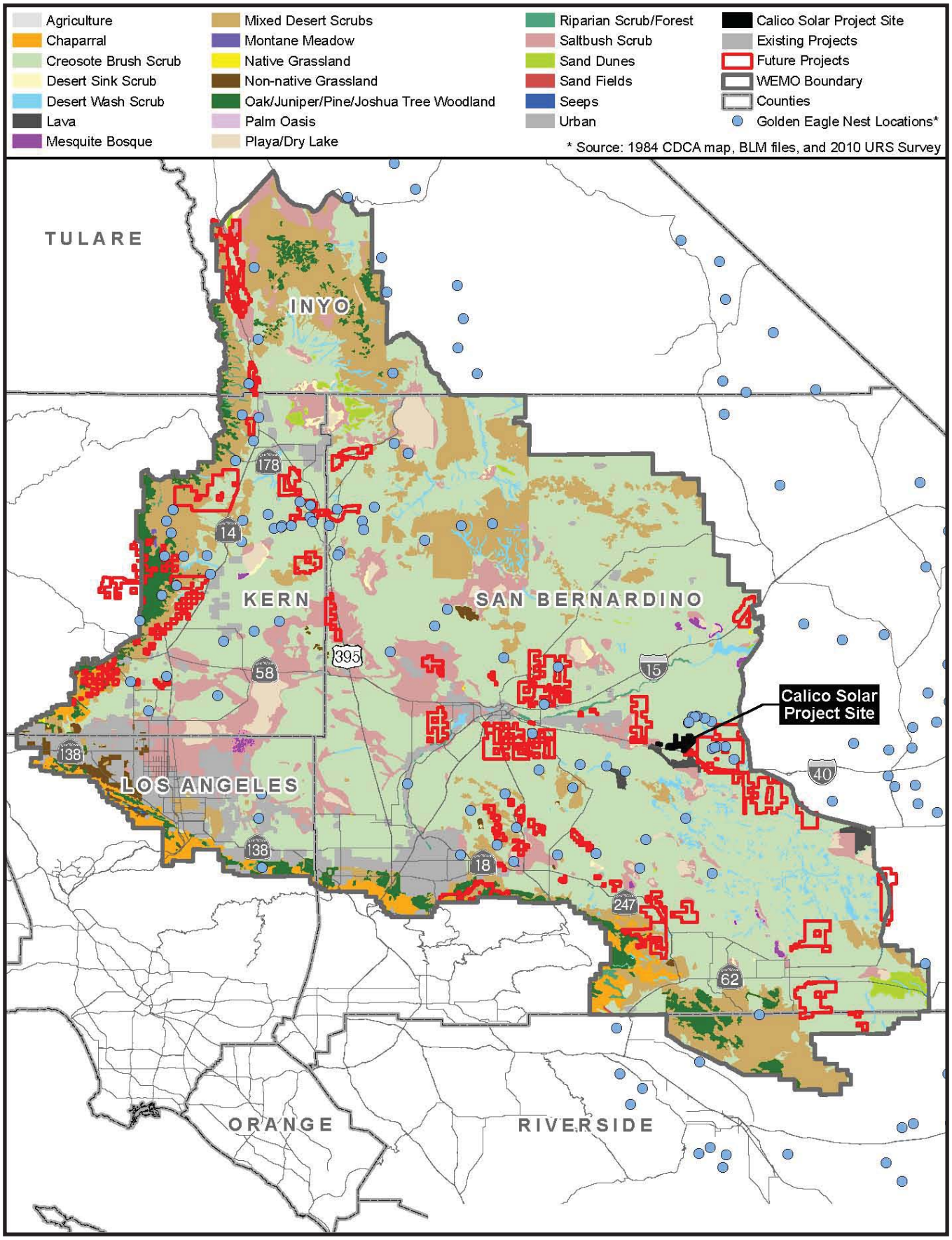


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 13

Calico Solar Project - Golden Eagle Nest Locations

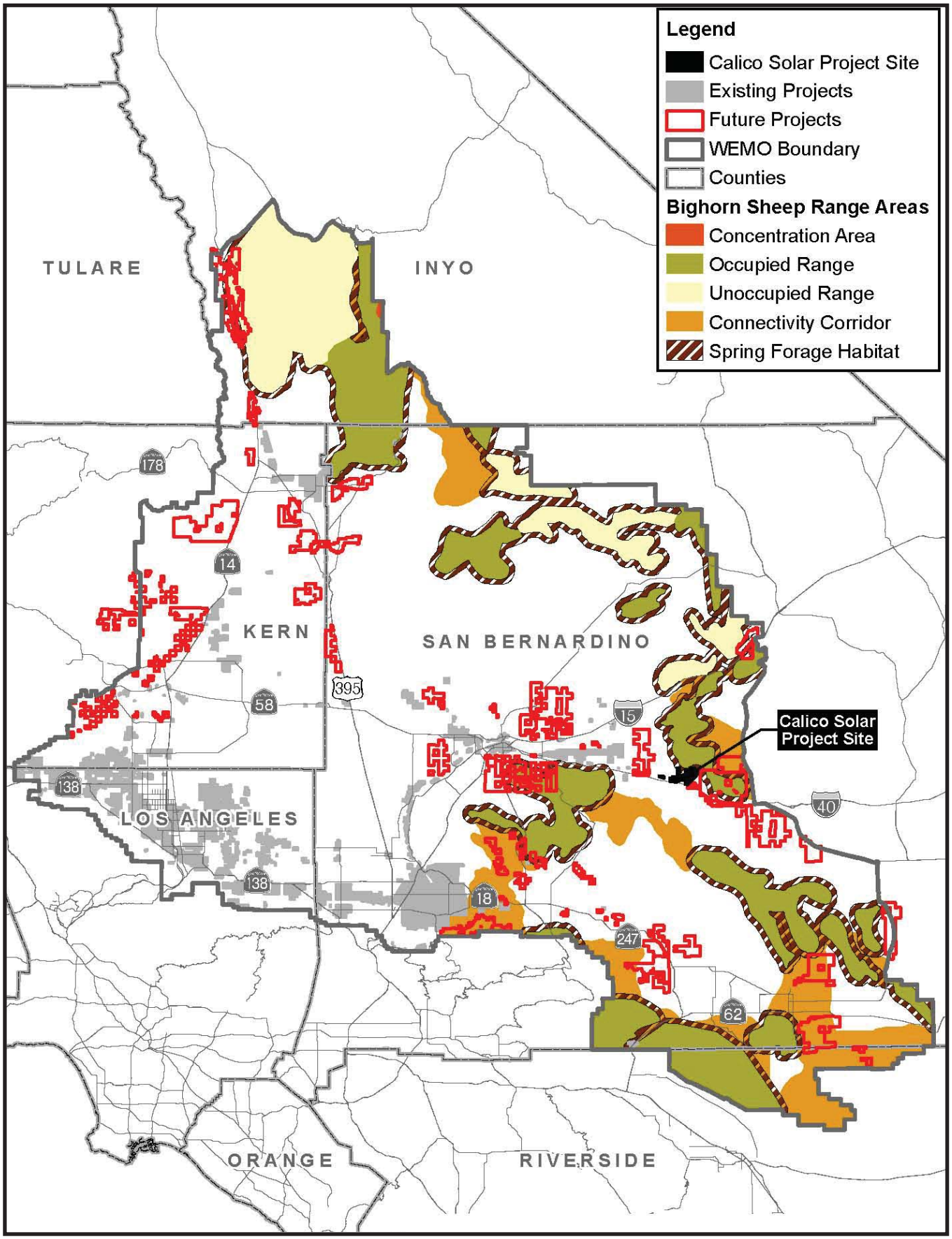


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 14

Calico Solar Project - Bighorn Sheep Habitat

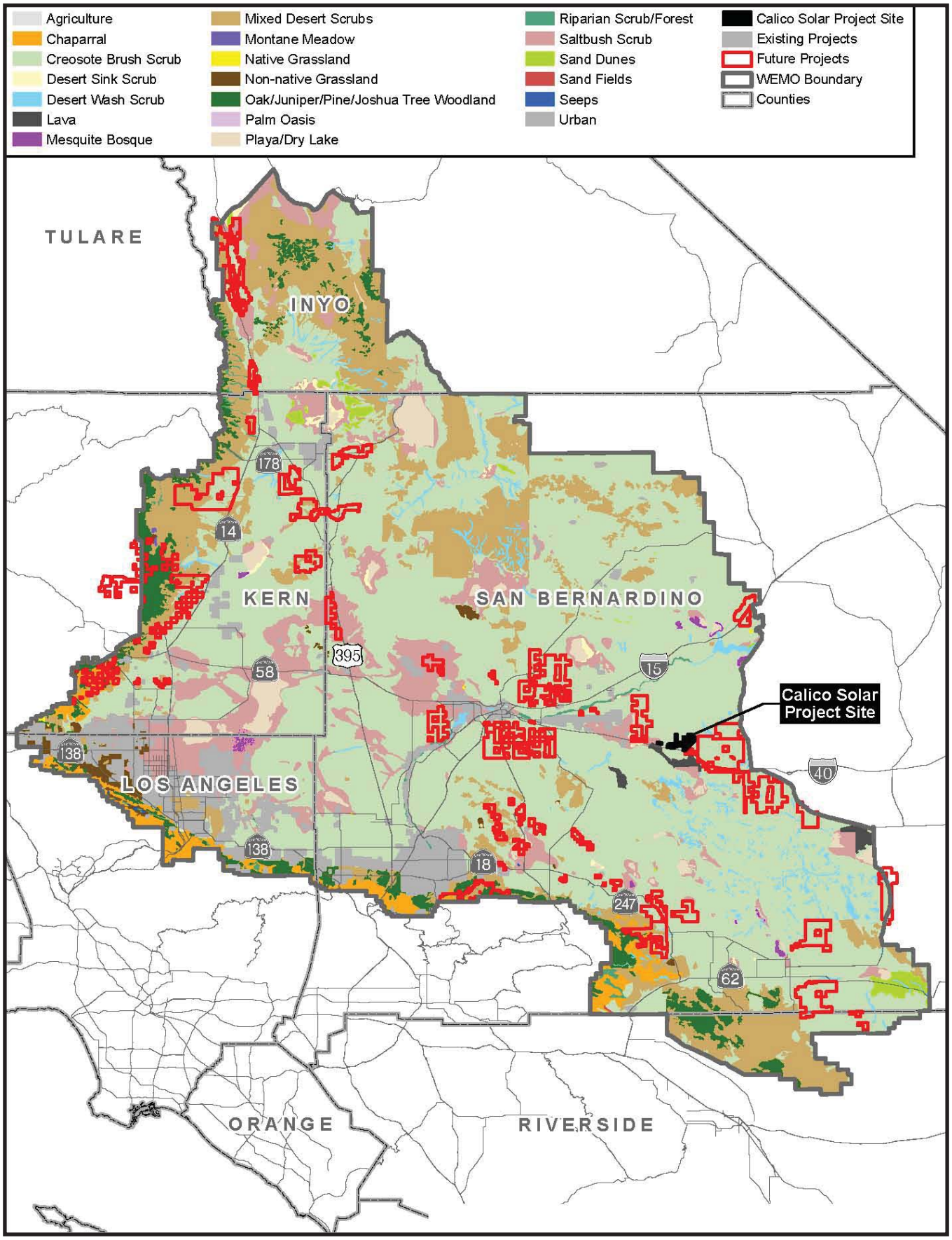


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 15

Calico Solar Project - Plant Communities

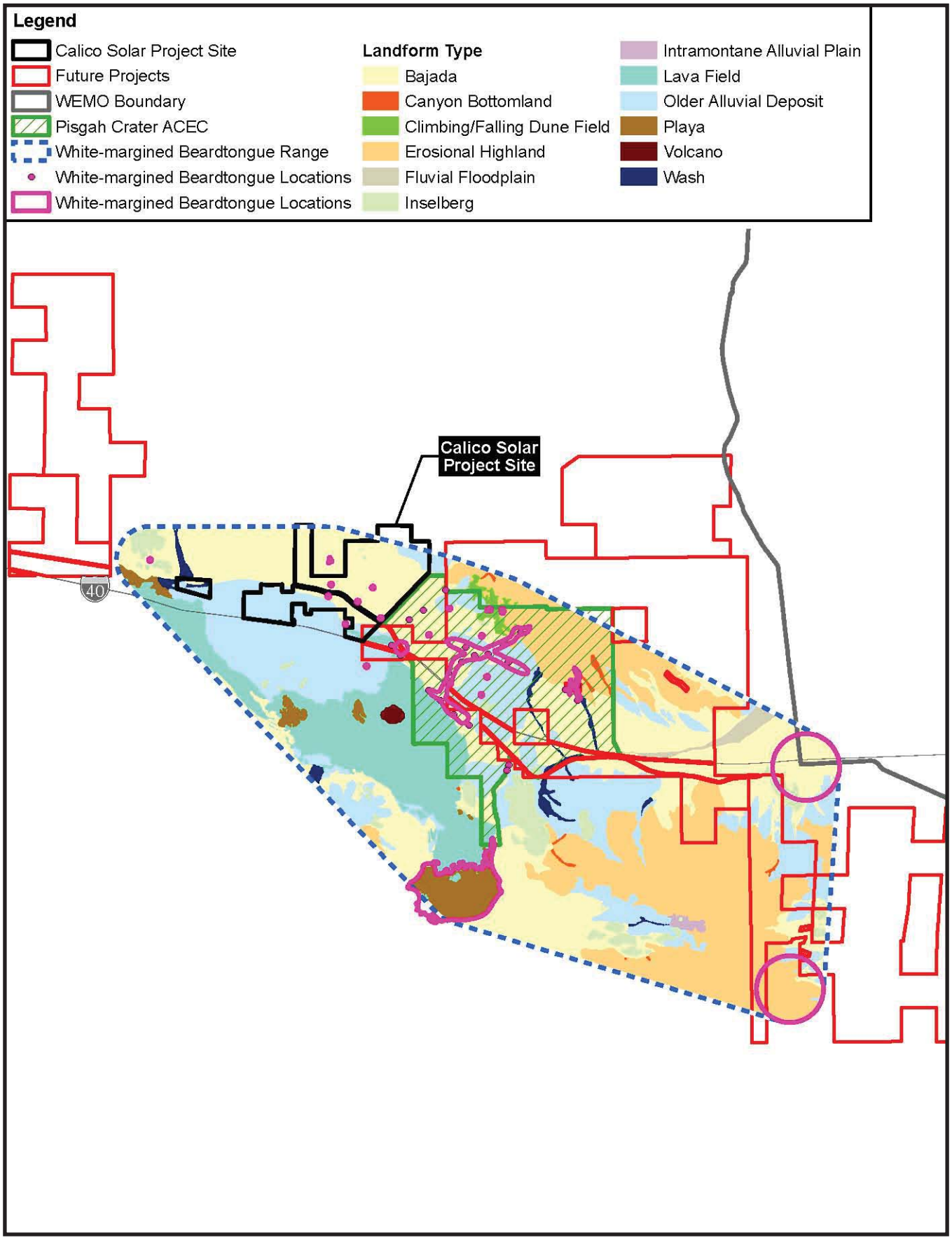


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 16

Calico Solar Project - White-Margined Beardtongue Range in California



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM, CEC