ENVIRONMENTAL ASSESSMENT

C.1 - AIR QUALITY

Testimony of William Walters, P.E.

C.1.1 SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management and California Energy Commission staff (hereinafter jointly referred to as "staff") find that with the adoption of the attached conditions of certification, the proposed Stirling Energy Systems Solar Two Project would comply with all applicable laws, ordinances, regulations, and standards and would not result in any significant California Environmental Quality Act air quality impacts. These Conditions of Certification meet the Energy Commission's responsibility to comply with the California Environmental Quality Act and Bureau of Land Management's responsibility to comply with the National Environmental Policy Act.

Staff have concluded that the proposed project would not have the potential to exceed Prevention of Significant Deterioration 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 Standard during construction and operation. This potential exceedance of federal air quality standards would be considered a direct, adverse impact under National Environmental Policy Act. This impact would be less than adverse with the proposed mitigation measures controlling fugitive dust.

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

C.1.2 INTRODUCTION

Stirling Energy Systems Solar Two, LLC, applicant, submitted an Application for Certification (AFC) to construct and operate a solar power plant in Imperial County, California. The Stirling Energy Systems Solar Two (SES Solar Two) Project would be one of the world's largest solar power projects. The proposed project would have 30,000 solar dish Stirling systems, occupying 6,500 acres. The project site is located in an undeveloped area of Imperial County, approximately 100 miles east of San Diego, California and 14 miles west of El Centro, California. The proposed project would be located just south of Plaster City and adjacent to Interstate 8 at the Dunaway Road exit.

[1] 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.

This analysis evaluates the expected air quality impacts from the emissions of criteria air pollutants from both the construction and operation of the SES Solar Two Project. Criteria air pollutants are defined as air contaminants for which the state and/or federal governments have established ambient air quality standards 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 document. Two subsets of particulate matter are inhalable particulate matter (less than 10 microns in diameter, or PM10) and fine particulate matter (less than 2.5 microns in diameter, or 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 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 SES Solar Two Project is likely to conform with applicable federal, state, and Imperial County Air Pollution Control District (District) air quality laws, ordinances, regulations and standards (Title 20, California Code of Regulations, section 1744 (b));
- whether the SES Solar Two 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 CEQA to a level of insignificance (Title 20, California Code of Regulations, section 1742 (b)).
- whether the SES Solar Two Project would exceed regulatory benchmarks used to analyze National Environmental Policy Act (NEPA) air quality impacts, before or after implementation of recommended mitigation measures.

C.1.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The analysis of proposed project effects must comply with both CEQA and NEPA requirements given the respective power plant licensing and land jurisdictions of the California Energy Commission and U.S. Bureau of Land Management (BLM). Because this document is intended to meet the requirements of both NEPA and CEQA, the method used for determining environmental impacts of the proposed project includes a consideration of guidance provided by both laws. A significant impact is defined under CEQA as “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project” (Cal.Code Regs., tit.14 [hereinafter CEQA Guidelines] Section 15382). Questions used in evaluating significance of air quality impacts are based on Appendix G of the CEQA Guidelines (CCR 2006). The specific approach used by 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 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 SES Solar Two 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 ICAPCD. Prevention of Significant Deterioration (PSD) requires major sources or major modifications to major sources to obtain permits for attainment pollutants. The SES Solar Two 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, SO_2, 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 compression 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, and establishes recordkeeping requirements on stationary compression ignition engines, including emergency fire water pump engines.
Local (Imperial County Air Pollution Control District)	

Applicable LORS	Description
ICAPCD Rule 201 Permits Required	Requires an Authority to Construct before construction of an emission source occurs. Prohibits operation of any equipment that emits or controls air pollutants without first obtaining a permit to operate.
ICAPCD Rule 207 New and Modified Stationary Source Review	Specifies BACT/Offsets technology and requirements for a new emissions unit that has potential to emit any regulated pollutants. Also, specifies District participation requirements for power plant projects under the jurisdiction of the Energy Commission.
ICAPCD Rule 400 Fuel Burning Equipment - Oxides of Nitrogen	Limits the emission levels of oxides of nitrogen from any source to no more than 140 lbs/hr of NOx, calculated as NO_2.
ICAPCD Rule 401 Opacity of Emissions	Limits the opacity of discharges from any single source to less than 20% opacity or No. 1 on the Ringlemann Chart.
ICAPCD Rule 403 General Limitations on the Discharge of Air Contaminants	Limits the concentration of the discharge of air contaminants, combustion contaminants, and particulate matter into the atmosphere.
ICAPCD Rule 405 Sulfur Compounds Emission Standards, Limitations, and Prohibitions	Limits the concentration of the discharge of sulfur compounds and the sulfur content of liquid fuels.
ICAPCD Rule 407 Nuisances	Prohibits the discharge from any source of any air contaminant that may cause injury, detriment, nuisance, or annoyance to any considerable number of persons or the public, or which endangers such persons or public or which may cause injury or damage to business or property.
ICAPCD Rule 415 Transfer and Storage of Gasoline	This rule specifies the vapor recovery requirement for tank filling (Phase I) and vehicle refueling (Phase II) for gasoline storage and refueling facilities.
ICAPCD Rule VIII Fugitive Dust Rules 800 through 806	These rules identify mitigation requirements to reduce fugitive dust emissions.
ICAPCD Rule 1101 New Source Performance Standards	Incorporates the Federal NSPS (40 CFR 60) rules by reference.

C.1.3.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Energy Commission staff assesses four kinds of primary and secondary[2] 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. Operational 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 result from the proposed project's incremental effect, 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, and15355.)

[2] Primary impacts potentially result from facility emissions of NOx, SOx, CO and PM10/2.5. Secondary impacts result from air contaminants that are not directly emitted by the facility but formed through reactions in the atmosphere that result in ozone, and sulfate and nitrate PM10/PM2.5.

C.1.3.3 METHOD AND THRESHOLD FOR DETERMINING CEQA SIGNIFICANCE

CEC staff evaluates potential impacts per Appendix G of the CEQA Guidelines (CCR 2006) as appropriate for the project. A CEQA significant adverse impact is determined if potentially significant CEQA impacts cannot be mitigated appropriately 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 contributes to an existing AAQS exceedance.

Staff evaluates both direct and cumulative impacts. Staff would find that a project or activity would create a direct adverse impact when it causes an exceedance of an AAQS. Staff would find that a project’s effects are cumulatively considerable when the project emissions in conjunction with ambient background, or in conjunction with reasonably foreseeable future projects, substantially contribute to ongoing exceedances of an AAQS. Factors considered in determining whether contributions to ongoing exceedences 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. 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 METHODOLOGY

The National Environmental Policy Act (NEPA) 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 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 project would not result in an adverse impact based on the potential to cause exceedances of the NAAQS. However, regardless of the NEPA requirements for this project, a refined impact and mitigation analysis has been conducted per CEQA requirements, and that analysis and the resulting NEPA findings are described in detail in this document.

C.1.3.5 IMPACTS FROM CLOSURE AND DECOMMISSIONING

Impacts from closure and decommissioning, as a one-time limited duration event, are evaluated with the same methods as construction emissions as discussed above.

C.1.4 PROPOSED PROJECT

C.1.4.1 SETTING AND EXISTING CONDITIONS

Climate and Meteorology

The Imperial Valley portion of Imperial County has a typical desert climate characterized by low precipitation, hot summers, mild winters, low humidity, and strong temperature inversions. Total rainfall in El Centro averages 2.96 inches per year with about 55% of the total rainfall occurring during the winter rainy season and 35% occurring during late summer and early fall thunderstorms (WC 2009). The Imperial Valley is in the rain shadow of the Santa Rosa and San Jacinto mountains, which greatly reduces the winter season rainfall in comparison with coastal and mountain areas located to the west.

The highest monthly average high temperature is 107°F in August and the lowest average monthly low temperature is 41°F in January and December (WC 2009). The applicant provided a wind rose from the Imperial County Airport for the years 1991 to 1995. These wind data indicate the highest wind direction frequencies for the annual, winter, spring, and fall periods are from the west through the southwest. In the summer there is also a high frequency for winds from the east to southeast.

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).

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 $\mu g/m^3$)	0.070 ppm (137 $\mu g/m^3$)
	1 Hour	—	0.09 ppm (180 $\mu g/m^3$)
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 $\mu g/m^3$)	0.03 ppm (57 $\mu g/m^3$)
	1 Hour	0.100 ppm (188 $\mu g/m^3$)[b]	0.18 ppm (339 $\mu g/m^3$)
Sulfur Dioxide (SO_2)	Annual	0.030 ppm (80 $\mu g/m^3$)	—
	24 Hour	0.14 ppm (365 $\mu g/m^3$)	0.04 ppm (105 $\mu g/m^3$)
	3 Hour	0.5 ppm (1300 $\mu g/m^3$)	—
	1 Hour	—	0.25 ppm (655 $\mu g/m^3$)
Particulate Matter (PM10)	Annual	—	20 $\mu g/m^3$
	24 Hour	150 $\mu g/m^3$	50 $\mu g/m^3$
Fine Particulate Matter (PM2.5)	Annual	15 $\mu g/m^3$	12 $\mu g/m^3$
	24 Hour	35 $\mu g/m^3$	—
Sulfates (SO_4)	24 Hour	—	25 $\mu g/m^3$
Lead	30 Day Average	—	1.5 $\mu g/m^3$
	Calendar Quarter	1.5 $\mu g/m^3$	—
Hydrogen Sulfide (H_2S)	1 Hour	—	0.03 ppm (42 $\mu g/m^3$)
Vinyl Chloride (chloroethene)	24 Hour	—	0.01 ppm (26 $\mu g/m^3$)
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.

Note:
[a] – The 2008 standard is shown above, but as of September 16, 2009 this standard is being reconsidered. The 1997 8-hour standard is 0.08 ppm.
[b] – The U.S. EPA is in the process of implementing this new standard, which is expected to become effective in 2010. This standard is based on the 3-year average of the 98th percentile of the yearly distribution of 1-hour daily maximum concentrations. Due to this regulation not yet being effective, with a corresponding lack of guidance on impact analysis and existing background concentrations, staff has not completed an impact assessment for compliance with this standard.

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 is 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.

The project site is located in the Salton Sea Air Basin (SSAB) and is under the jurisdiction of the Imperial County Air Pollution Control District. The Imperial County portion of the SSAB is designated as non-attainment for the federal and state ozone standards, the federal PM10 standard, and the state PM10 standard. This area is designated as attainment or unclassified for the state and federal CO, NOx, SOx, and PM2.5 standards. **Air Quality Table 3** summarizes the project site area's attainment status for various applicable state and federal standards.

Air Quality Table 3
Federal and State Attainment Status
Project Site Area within Imperial County

Pollutant	Attainment Status [a]	
	Federal	State
Ozone	Moderate Nonattainment	Moderate Nonattainment
CO	Attainment	Attainment
NO_2	Attainment[c]	Attainment
SO_2	Attainment	Attainment
PM10	Serious Nonattainment	Nonattainment
PM2.5	Attainment[b]	Attainment[a]

Source: ARB 2009b, U.S.EPA 2009a.

[a] Attainment = Attainment or Unclassified.
[b] Site is adjacent and upwind of the U.S.EPA proposed limited PM2.5 non-attainment area surrounding the developed areas south of the Salton Sea.
[c] 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 2004 through 2008 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 data for the years 1999 through 2008 are shown in **Air Quality Figure 1**. All data are from the El Centro-9th Street monitoring station (where no ozone data is available for 1999 and 2000), with the exception of SOx data from the Calexico-Ethel Street monitoring station. It should be noted that some data collected from the Calexico-Ethel Street monitoring station have abnormally high values. One of the likely reasons for the high values at this location is due to long wait times associated with vehicles crossing the United States (U.S.)/Mexico border. Diesel-fired trucks that do not have to meet the stringent Environmental Protection Agency (EPA) environmental standards and idle for long periods of time near the Calexico monitoring stations could cause high localized criteria pollutant levels. Another likely reason is due to pollutants transported from Mexicali, Mexico.

The El Centro-9th Street monitoring station is located approximately 15 miles east of the project site boundary, 9 miles north of the Mexican border, and 12 miles northwest of the center of Mexicali; the Calexico-Ethel Street monitoring station is located approximately 20.5 miles east southeast from the project site boundary, approximately only 0.7 miles north of the Mexican Border, and approximately only 3 miles northwest of the center of Mexicali. Therefore, the Calexico monitoring station is more strongly influenced by pollution from Mexicali and is less representative of the ambient conditions at the project site than the El Centro monitoring location.

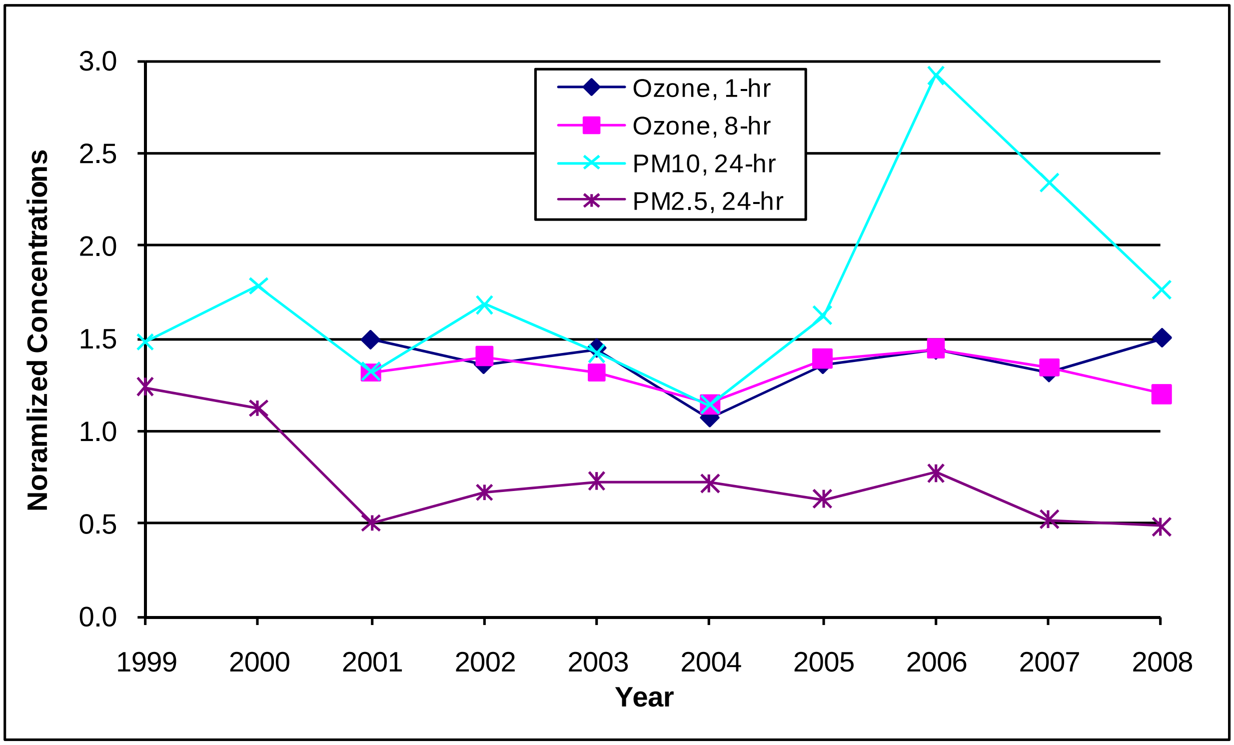
Air Quality Table 4
Criteria Pollutant Summary
Maximum Ambient Concentrations (ppm or μg/m^3)

Pollutant	Averaging Period	Units	2004	2005	2006	2007	2008	Limiting AAQS[c]
Ozone	1 hour	ppm	0.096	0.122	0.129	0.118	0.135	0.09
Ozone	8 hours	ppm	0.08	0.097	0.101	0.094	0.084	0.07
PM10 [a]	24 hours	μg/m^3	57	81	146	117	88.2	50
PM10 [a]	Annual	μg/m^3	35.4	33.9	43.3	47.5	32.7	20
PM2.5 [a]	24 hours	μg/m^3	25.1	22.1	27.1	18.2	17	35
PM2.5 [a, b]	Annual	μg/m^3	9.7	9.4	8.8	8.5	8.1	12
CO	1 hour	ppm	2	4.2	3.1	2.5	3.1	20
CO	8 hours	ppm	1.17	2.23	2.59	1.67	1.71	9.0
NO_2	1 hour	ppm	0.067	0.065	0.066	0.071	0.081	0.18
NO_2	Annual	ppm	0.013	0.011	0.011	0.011	0.009	0.03
SO_2	1 hour	ppm	0.003	0.002	0.192	0.014	0.018	0.25
SO_2	24 hours	ppm	0.003	0.002	0.041	0.004	0.007	0.04
SO_2	Annual	ppm	0.000	0.000	0.001	0.001	0.001	0.03

Source: ARB 2009c, U.S.EPA 2009b

Notes:
[a] Exceptional PM concentration events, such as those caused by wind storms are not shown where excluded by U.S.EPA; however, some exceptions events may still be included in the data presented.
[b] Annual average PM2.5 data shown are National annual average, state annual average data are not available.
[c] The limiting AAQS is the most stringent of the CAAQS or NAAQS for that pollutant and averaging period.

Air Quality Figure 1
1996-2007 Historical Ozone and PM Air Quality Data
El Centro - 9th Street Monitoring Station, Imperial County[a,b]



Source: ARB 2009c, U.S.EPA 2009b

Notes:
[a] 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 2007 is 0.118 ppm/0.09 ppm standard = 1.31.
[b] All data are from El Centro-9th Street monitoring station, except ozone and PM2.5 concentrations data in 2000, which are from Calexico-Ethel monitoring station.

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 in the Imperial County 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 May through September.

Nitrogen Dioxide

The entire air basin is classified as attainment for the state 1-hour and federal annual NO_2 standards. The nitrogen dioxide attainment standard 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 this SSAB.

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 substantial 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 and federal 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. The CO concentrations at El Centro and more specifically Calexico are highly influenced by Mexicali and while CO standards are exceeded periodically in Calexico, due to these exceedances being the result of pollutant transported from Mexico, the whole county is designated as attainment. Additionally, the frequency of these pollutant transport CO standard exceedances has been dropping substantially over time and no monitored exceedances have occurred since 2006. The project area, in comparison with major urban areas, has a lack of substantial mobile source emissions and based on El Centro monitoring, the local CO concentrations are expected to be 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. However, the SSAB is designated as non attainment 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.

The entire SSAB is classified as attainment for the federal standard and unclassified for the state standards. This divergence in 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 vehicle travel on unpaved roads, agricultural operations, or wind-blown dust.

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 SSAB come from a wide variety of fuels: gaseous, liquid and solid; however, the total SO_2 emissions within the SSAB are limited due to the limited number of major stationary sources and California's substantial 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, and the values measured in 2006 that are substantially higher than typical short-term SO_2 concentrations are believed to be primarily due to transport from Mexico, since the SO_2 emission sources in Calexico are minimal in comparison to those in Mexicali.

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 three years of available data collected at the monitoring stations within the Imperial County, excluding known exceptional events, 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	152.6	339	45%
	Annual	20.9	57	37%
CO	1 hour	3,565	23,000	16%
	8 hour	2,878	10,000	29%
PM10	24 hour	146	50	292%
	Annual	47.5	20	238%
PM2.5	24 hour [a]	27.1	35	77%
	Annual	8.8	12	73%
SO_2	1 hour	47.2	655	7%
	3 hour	42.4	1,300	3%
	24 hour	18.4	105	18%
	Annual	2.7	80	3%

Source: ARB 2009c, 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.

Where possible, staff prefers that the recommended background concentration measurements come from nearby monitoring stations with similar characteristics. For this proposed project the El Centro (ozone, PM10, PM2.5, CO, NO_2) and Calexico (SO_2) monitoring stations are the closest monitoring stations to the project site. The Calexico monitoring station is located approximately 20.5 miles east southeast of the project site, right above the U.S-Mexico border. This monitoring station provides more conservative air quality data due to the influence of pollutants from Mexico.

The background concentrations for PM10 are at or above the most restrictive existing ambient air quality standards, while the background concentrations for the other pollutants are all 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.).

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 2008h and CEC 2009x), which the applicant responded to by providing revised emissions estimates with substantially revised mitigation and maintenance equipment use assumptions (SES 2009i and SES 2009n) and substantially revised and more robust dispersion modeling analysis. Staff has reviewed the revised emission estimates and air dispersion modeling analysis[3] and finds them to be reasonable considering the level of emissions mitigation now stipulated by the applicant.

Project Description

The proposed project is located on approximately 6,500 acres, and would include the installation of 30,000 SunCatchers, the Solar Stirling Engine Power Conversion Units (PCUs), the administration building, the maintenance building, and the substation building. The area surrounding the site is primarily open space with recreational use. Plaster City is directly to the north and a few rural residences are located a few miles to the east and west of the site. The closest main access to the site is from Evan Hewes Highway via Dunaway Road and I-8.

The proposed project also includes the construction of a new 230kV substation, main road construction and installation of an 11.8 mile water supply pipeline from the Seeley Waste Water Treatment Plant. New roads constructed for the proposed project would consist of approximately 27 miles of paved arterial roads, approximately 14 miles of unpaved/sealed perimeter roads, and approximately 234 miles of unpaved/sealed SunCatcher field access routes.

The proposed project would be constructed in two sequential phases. Phase I would include the installation of 12,000 SunCatchers and related equipment with a net nominal generating capacity of 300 MW, which would be connected from the onsite substation to the existing SDG&E Imperial Valley Substation via an approximately 10.3-mile double circuit 230kV transmission line. Phase II of the proposed project would include the

[3] This includes a review of the emission source inputs, including the type of source (point, volume, area), the variables used to describe each source (emissions, height, location, temperature, etc. as appropriate), and the appropriateness of the meteorological and topographic data used in the modeling analysis.

installation of an additional 18,000 SunCatchers and related equipment with a net nominal generating capacity of 450 MW, which is proposed to be connected to the SDG&E's 500kV Sunrise Powerlink transmission line that is proposed to be constructed through the project site.

Project Emissions

Project Construction

The total duration of project construction for SES Solar Two is estimated to be approximately 40 months. The actual construction duration would depend in part on the timing of transmission upgrades by San Diego Gas & Electric and the actual rate of SunCatcher installation. Different areas within the project site and the construction laydown areas would be disturbed at different times over the period. Total construction disturbance area would be approximately 3,000 acres, and the permanent disturbance area of project operations would be approximately 2,750 acres. Combustion emissions would result from the offroad construction equipment, including diesel construction equipment used for site grading, excavation, and construction of onsite structures, and water and soil binder spray trucks used to control construction dust emissions. Fuel combustion emissions also would result from onroad construction vehicles, including heavy duty diesel trucks used to deliver materials, other diesel trucks used during construction, and worker personal vehicles and pickup trucks used to transport workers to and from and around the construction site. Fugitive dust would result from site grading/excavation activities; installation of new transmission lines, water and onsite hydrogen gas pipelines; construction of power plant facilities, roads, and substations; and vehicle travel on paved/unpaved roads.

The applicant's mitigated construction emission estimates are provided below in **Air Quality Tables 6** and **7**. Construction during Month 6 is anticipated to have the highest construction emissions and construction during Months 4 through 15 are anticipated to have the highest annual (12-month) construction emissions.

Air Quality Table 6
SES Solar Two Construction - Maximum Daily Emissions (lbs/day)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Construction Emissions						
Onsite Combustion Emissions	312.35	0.31	274.67	56.38	18.95	17.40
Onsite Fugitive Dust Emissions	--	--	--	--	243.63	35.92
Subtotal of Onsite Emissions	**312.35**	**0.31**	**274.67**	**56.38**	**262.58**	**53.31**
Offsite Emissions						
Offsite Combustion Emissions	317.51	0.64	567.20	99.49	19.47	17.04
Offsite Fugitive Dust	--	--	--	--	174.54	19.35
Subtotal of Offsite Emissions	**317.51**	**0.64**	**567.20**	**99.49**	**194.00**	**36.39**
Total Maximum Daily Emissions	**629.86**	**0.95**	**841.87**	**155.87**	**456.58**	**89.70**

Source: SES 2009i, Table 5.2-20 Revised.

Air Quality Table 7
SES Solar Two Construction - Maximum Annual (12-Month) Emissions (tons/yr)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Construction Emissions						
Onsite Combustion Emissions	40.14	0.04	36.91	7.88	2.58	2.37
Onsite Fugitive Dust Emissions	--	--	--	--	36.36	5.31
Subtotal of Onsite Emissions	**40.14**	**0.04**	**36.91**	**7.88**	**38.94**	**7.68**
Offsite Emissions						
Offsite Combustion Emissions	47.42	0.09	75.82	14.17	2.91	2.55
Offsite Fugitive Dust	--	--	--	--	18.93	1.93
Subtotal of Offsite Emissions	**47.42**	**0.09**	**75.82**	**14.17**	**21.84**	**4.49**
Total Maximum Annual Emissions	**87.56**	**0.13**	**112.72**	**22.05**	**60.78**	**12.17**

Source: SES 2009i, Table 5.2-21 Revised.

Air Quality Table 7 shows that the maximum annual (12-month) emissions are below the General Conformity Rule applicability thresholds for PM10 (70 tons) and Ozone Precursors, (NOx [100 tons] and VOC [100 tons]).

Project Operation

The SES Solar Two facility would be a nominal 750 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, seasonal scrubbing is anticipated. Seasonal scrubbing would occur prior to peak electricity demand season, which is June through September. This mechanical scrubbing would require approximately 45 minutes per dish to complete. Maintenance of the power conversion unit (PCU), and associated maintenance vehicle operations primarily due the replacement of the main piston seals (“CGC seals”), would be required every 6,000 hours of running time, which is about 20 months of solar operation.

To minimize operating emissions, the applicant has proposed measures to minimize the operating and maintenance vehicles emissions. The following are the applicant proposed measures.

- Maintenance vehicles measures:
    - o All wash vehicles and other maintenance trucks would be gasoline fueled vehicles that meet California vehicle emissions standards for the model year when obtained.
    - o Propane-fuel fork lift and man lifts would be used for maintenance activities requiring such equipment.
    - o 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 roads 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 El Centro during operations would be provided.
- Stationary and mobile source emissions would be reduced:
    - o An electric fire water pump would be used instead of a diesel-fueled pump.
    - o A 5,000 gallon regular gasoline storage tank would be used and truck refueling would be kept to minimum.
    - o Hydrogen would be produced, stored and distributed onsite to remove the need for hydrogen cylinders and their delivery to the site.

The following are the stationary and mobile emission source operating assumptions that were used to develop the operation emissions estimates for SES Solar Two:

<u>Stationary emission sources:</u>

- The 335 brake-horsepower (bhp) backup diesel generator: testing 15 min/week, 13 hr/yr.
- The 5,000 gallon gasoline storage tank: 85,000 gallons per year tank filling and vehicle refueling throughput, and staff's revised maximum daily throughput basis includes one 4,000 gallon storage tank filling event and maximum daily vehicle refueling of 500 gallons.

<u>Mobile emissions source:</u>

- Mobile emissions sources required for operation and maintenance 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 spreadsheets (SES 2009i).

The SES Solar Two onsite stationary and onsite and offsite mobile source emissions are estimated and summarized in **Air Quality Tables 8** and **9**.

Air Quality Table 8
SES Solar Two Operations - Maximum Daily Emissions (lbs/day)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Operation Emissions						
Onsite Combustion Emissions	15.58	0.07	110.19	14.42	0.29	0.25
Onsite Gasoline Tank Emissions	--	--	--	31.78	--	--
Onsite Fugitive Dust Emissions	--	--	--	--	121.80	17.98
Subtotal of Onsite Emissions	**15.58**	**0.07**	**110.19**	**46.20**	**122.09**	**18.23**
Offsite Emissions						
Offsite Combustion Emissions	11.21	0.04	53.26	2.30	0.47	0.30
Offsite Fugitive Dust	--	--	--	--	22.66	2.04
Subtotal of Offsite Emissions	**11.21**	**0.04**	**53.26**	**2.30**	**23.13**	**2.34**
Total Maximum Daily Emissions	**26.79**	**0.11**	**163.45**	**48.50**	**145.22**	**20.57**

Source: SES 2009i, Table 5.2-25a; SES 2009n, DR 130.

Air Quality Table 9
SES Solar Two Operations - Maximum Annual Emissions (tons/yr)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Operation Emissions						
Onsite Combustion Emissions	2.52	0.01	19.73	2.56	0.04	0.04
Onsite Gasoline Tank Emissions	--	--	--	0.92	--	--
Onsite Fugitive Dust Emissions	--	--	--	--	20.91	3.09
Subtotal of Onsite Emissions	**2.52**	**0.01**	**19.73**	**3.48**	**20.95**	**3.12**
Offsite Emissions						
Offsite Combustion Emissions	1.23	0.01	9.21	0.37	0.06	0.03
Offsite Fugitive Dust	--	--	--	--	2.23	0.10
Subtotal of Offsite Emissions	**1.23**	**0.01**	**9.21**	**0.37**	**2.29**	**0.13**
Total Maximum Annual Emissions	**3.75**	**0.02**	**28.94**	**3.85**	**23.24**	**3.26**

Source: SES 2009i, Table 5.2-25b; SES 2009n, DR 130.

Air Quality Table 9 shows that the maximum annual operation emissions are well below the General Conformity Rule applicability thresholds for PM10 (70 tons) and Ozone Precursors, NOx (100 tons) and VOC (100 tons).

Project Construction and Operation Overlapping

The applicant plans to start operation of SunCatchers as they are ready; therefore it is anticipated that starting at Month 8 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 18, and 27 MW of capacity would be added every month thereafter until the completion by Month 40. Maximum short-term emissions during overlapping periods would occur in the first overlapping Month 8, since construction elements would decline as more SunCatchers are available online. Maximum annual (12-month) overlapping emissions would occur during Months 13-24 for PM10 and PM2.5, and during Months 8-19 for all other criteria pollutants. Maximum overlapping 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 mitigated maximum daily and annual (12-month) emissions during the maximum construction/operation overlapping periods are presented in **Air Quality Tables 10** and **11**.

Air Quality Table 10
Maximum Daily Construction/Operation Overlapping Emissions (lbs/day)

Construction						
	NOx	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Onsite Emissions						
Onsite Combustion Emissions	232.53	0.24	199.21	45.95	15.20	13.95
Onsite Fugitive Dust Emissions	--	--	--	--	194.84	29.09
Subtotal of Onsite Emissions	**232.53**	**0.24**	**199.21**	**45.95**	**210.04**	**43.05**
Offsite Emissions						
Offsite Combustion Emissions	317.51	0.64	567.20	99.49	17.25	16.09
Offsite Fugitive Dust	--	--	--	--	107.00	10.51
Subtotal of Offsite Emissions	**317.51**	**0.64**	**567.20**	**99.49**	**124.25**	**26.60**
Total Maximum Daily Emissions	**550.05**	**0.88**	**766.41**	**145.44**	**333.33**	**69.65**
Operation						
	NOx	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Onsite Emissions						
Onsite Combustion Emissions	1.21	0.02	2.71	0.37	0.02	0.02
Onsite Fugitive Dust Emissions	--	--	--	3.55	2.92	0.43
Subtotal of Onsite Emissions	**1.21**	**0.02**	**2.71**	**3.93**	**2.94**	**0.45**
Offsite Emissions						
Offsite Combustion Emissions	0.27	0.00	1.28	0.06	0.01	0.01
Offsite Fugitive Dust	--	--	--	--	0.54	0.05
Subtotal of Offsite Emissions	**0.27**	**0.00**	**1.28**	**0.06**	**0.56**	**0.06**
Total Maximum Hourly Emissions	**1.47**	**0.02**	**3.99**	**3.98**	**3.50**	**0.50**
Construction/Operation Overlap Totals						
	NOx	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Construction/Operation Overlap Total	**551.52**	**0.90**	**770.40**	**149.42**	**336.83**	**70.15**

Source: SES 2009i, Table 5.2-27b.

Air Quality Table 11 shows that the maximum annual (12-month) overlapping construction/operation emissions are below the General Conformity Rule applicability thresholds for PM10 (70 tons) and Ozone Precursors, (NOx [100 tons] and VOC [100 tons]).

Initial Commissioning

Initial commissioning refers to a period prior to beginning commercial operation when the equipment undergoes initial tests. For this proposed project, initial commission would occur throughout the construction period when each installed Suncatcher becomes operational. Because of this project's use of a non-fuel fired generating technology, staff does not expect major changes in emissions from the facility commissioning activities compared to that of normal operation.

Air Quality Table 11
Maximum Annual Construction/Operation Overlapping Emissions (tons/year)

Construction						
	NOx	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Onsite Emissions						
Onsite Combustion Emissions	30.43	0.03	31.49	6.50	1.45	1.33
Onsite Fugitive Dust Emissions	--	--	--	--	30.09	4.31
Subtotal of Onsite Emissions	**30.43**	**0.03**	**31.49**	**6.50**	**31.54**	**5.64**
Offsite Emissions						
Offsite Combustion Emissions	43.85	0.08	71.26	13.19	2.83	2.50
Offsite Fugitive Dust	--	--	--	--	17.39	1.84
Subtotal of Offsite Emissions	**43.85**	**0.08**	**71.26**	**13.19**	**20.22**	**4.34**
Total Maximum Hourly Emissions	**74.29**	**0.11**	**102.75**	**19.69**	**51.75**	**9.98**
Operation						
	NOx	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Onsite Emissions						
Onsite Combustion Emissions	0.41	0.00	3.10	0.40	0.01	0.01
Onsite Fugitive Dust Emissions	--	--	--	0.65	6.21	0.92
Subtotal of Onsite Emissions	**0.41**	**0.00**	**3.10**	**1.05**	**6.22**	**0.93**
Offsite Emissions						
Offsite Combustion Emissions	0.19	0.00	1.45	0.06	0.02	0.01
Offsite Fugitive Dust	--	--	--	--	0.66	0.03
Subtotal of Offsite Emissions	**0.19**	**0.00**	**1.45**	**0.06**	**0.68**	**0.04**
Total Maximum Hourly Emissions	**0.61**	**0.00**	**4.55**	**1.11**	**6.90**	**0.97**
Construction/Operation Overlap Totals						
	NOx	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Construction/Operation Overlap Total	**74.90**	**0.12**	**107.29**	**20.80**	**58.66**	**10.95**

Source: SES 2009i, Table 5.2-27c.

Dispersion Modeling Assessment

While the emissions are the actual mass of pollutants emitted from the proposed project, the impacts are the concentration of pollutants from the proposed project that reach the ground level. When emissions are expelled at a high temperature and velocity through the relatively tall stack, the pollutants would be greatly 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. The emissions from the proposed project, both stationary source and onsite mobile source emissions, 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 typical 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 this proposed project, the meteorological data used as inputs to the model included hourly wind speeds and directions measured at the Imperial County Airport meteorological station during 1991 through 1995.

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 (1991 to 1995 El Centro 9th Street monitoring station data that corresponds with the meteorological files) were used 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 from the last three years at the most representative monitoring stations as show in **AIR QUALITY Table 5**. Staff added the modeled impacts to these background concentrations, 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 violation of the ambient air quality standards or would contribute to an existing violation.

The following sections discuss the proposed project's short-term direct construction and operation ambient air quality impacts, as estimated by the applicant, and provides a discussion of appropriate mitigation.

Construction Impacts and Mitigation

Using estimated peak hourly, daily and annual construction equipment exhaust emissions, the applicant modeled the proposed project's construction emissions to determine impacts (SES 2009i). To determine the construction impacts on ambient standards (i.e. 1-hour through annual) the on-site off-road construction equipment tailpipe emissions were modeled assuming that the emissions would occur during a daily construction schedule of 6 am to 7 pm, and the onsite facility security, material delivery, and fugitive dust emissions were modeled evenly throughout all hours of the day. The predicted proposed project emission concentration levels were added to a conservatively estimated background of existing emission concentration levels to determine the cumulative impact. The results of the applicant's modeling analysis are presented in **Air Quality Table 12**. The construction modeling analysis includes both the onsite fugitive dust and vehicle tailpipe emission sources estimated by the applicant, which include the applicant's proposed control measures, and that are summarized in **Air Quality Tables 6** and **7**.

Air Quality Table 12
Maximum Proposed Project Construction Impacts

Pollutants	Avg. Period	Project Impact ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hr.	88.94	152.6	241.5	339	71%
	Annual	1.25	20.9	22.2	57	39%
CO	1-hr	78.32	3,565	3,643	23,000	16%
	8-hr	20.60	2,878	2,899	10,000	29%
PM10	24	31.37	146	177.4	50	355%
	Annual	6.11	47.5	53.6	20	268%
PM2.5	24	4.76	27.1	31.9	35	91%
	Annual	0.91	8.8	9.7	12	81%
SO_2	1-hr	0.09	47.2	47.3	665	7%
	3-hr	0.04	42.4	42.4	1,300	3%
	24-hr	0.01	18.4	18.4	105	18%
	Annual	0.001	2.7	2.7	80	3%

Source: SES 2009i, Table 5.2-29 revised.

This modeling analysis indicates, with the exception of 24-hour PM10 impacts, that the proposed project would not create new exceedances; and that with the exception of annual PM10 impacts, that the proposed project would not contribute to existing exceedances for any of the modeled air pollutants. Staff notes that the maximum local background 24-hour measurements of PM10 may be substantially impacted by wind-blown dust. However, in light of the existing PM10 and ozone non-attainment status for the project site area, staff considers the construction emissions of non-attainment pollutants and their precursors (NOx, VOC, and PM emissions) to be potentially CEQA significant and recommends that the off-road equipment and fugitive dust emissions both be mitigated pursuant to CEQA.

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. Additionally, the modeled maximum PM10 concentrations listed in **Air Quality Table 12** would almost certainly occur during days with low average wind speeds and not correspond to the high wind speed days assumed to cause the maximum background concentration. Finally, the proposed project's construction emissions have been determined to be below the General Conformity applicability thresholds for the federal nonattainment pollutants at the project site, PM10 and ozone. Therefore, 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 2009i):

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 shut down when idling for more than 5 minutes, or as required by the ARB.
- Regular preventive maintenance of equipment engines will be performed to minimize emissions.
- Diesel fueled motor vehicles 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[4] Soiltac™ or a product with same or better performance would be applied to all on-site unpaved roads and unpaved parking areas which would also be maintained or resealed as needed to minimize dust emissions.
- Construction grading requirements for the maintenance roads will be limited to surface scraping of topsoil.
- Water application or other suppression techniques would be used to mitigate dust emissions from wind erosion of areas disturbed by construction activities.
- 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 speeds on all unpaved and/or unsealed site areas would be limited to 5 miles per hour.
- 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 that travel off-road would be washed prior to exiting construction site.
- Construction workers would be required to park in sealed laydown areas and would be transported to worksites in buses.

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

- Vehicles, including SunCatcher material delivery trucks, would be required to travel on paved or sealed roads only.
- The SunCatcher vibratory steel fin tube pedestals have been tested for all expected soil conditions on the site and can be utilized on the SunCatcher foundations without the need for a concrete pedestal base[5].

Staff recommends the implementation of mitigation measures contained in Conditions of Certification **AQ-SC1 to AQ-SC5**, which incorporate the applicant's proposed measures with minor revisions and additions recommended by staff to reduce the impacts from the construction of the proposed project. Specific recommendations from staff include requiring the use of Tier 3 offroad equipment where available.

The construction of the proposed project would cause particulate matter emissions that would add to the existing violations of the ambient PM10 air quality standards. Therefore, if unmitigated, the proposed project's construction PM10 emission impacts would be significant under CEQA. Additionally, unmitigated PM10 emissions could exceed General Conformity applicability thresholds, and could potentially cause adverse impacts pursuant to NEPA. However, staff concludes that the implementation of proposed specific mitigation measures during construction of the facility as identified in the conditions of certification would reduce the short-term PM10 impacts to a level that is less than significant pursuant to CEQA, and would mitigate the potential for adverse NEPA impacts.

Operation Impacts and Mitigation

The following section discusses the proposed project's direct operating and overlapping construction/operating 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 U.S.EPA-approved AERMOD model to estimate the impacts of the proposed project's NOx, PM10, CO, and SOx emissions resulting from project operation (SES 2009i). 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 SES Solar Two 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 three years from nearby monitoring stations to assess the proposed project operational impacts. **Air Quality Table 13** presents the results of the applicant's modeling analysis.

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[5] This reduces the need for concrete to be produced at the site or at a nearby concrete batch plant, and reduces truck trip emissions associated with the delivery of finished concrete or the raw materials (water, sand, aggregate, cement) necessary to make concrete.

Air Quality Table 13
Proposed Project Operation Emission Impacts

Pollutants	Avg. Period	Project Impact ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hr.	69.18	152.6	221.8	339	65%
	Annual	0.23	20.9	21.1	57	37%
CO	1-hr	217.77	3,565	3783	23000	16%
	8-hr	64.48	2,878	2942	10000	29%
PM10	24	5.45	146	151.5	50	303%
	Annual	0.96	47.5	48.5	20	242%
PM2.5	24	0.77	27.1	27.9	35	80%
	Annual	0.14	8.8	8.9	12	75%
SO_2	1-hr	1.42	47.2	48.6	665	7%
	3-hr	0.85	42.4	43.3	1300	3%
	24-hr	0.18	18.4	18.6	105	18%
	Annual	0.0004	2.7	2.7	80	3%

Source: SES 2009i, Table 5.2-30a.

This modeling analysis indicates, with the exception of 24-hour PM10 impacts, that the proposed project would not create new exceedances; and that with the exception of annual PM10 impacts, that the proposed project would not contribute to existing exceedances for any of the modeled air pollutants. Staff notes that the maximum local background 24-hour measurements of PM10 may be substantially impacted by wind-blown dust. However, in light of the existing PM10 and ozone non-attainment status for the project site area, staff considers the operating emissions of non-attainment pollutants and their precursors (NOx, VOC, and PM emissions) to be potentially CEQA significant and recommends that the stationary equipment, the off-road maintenance equipment, and fugitive dust emissions all 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 we note that PM10 already exceeds the NAAQS. Additionally, the modeled maximum PM10 concentrations listed in **Air Quality Table 13** would almost certainly occur during days with low average wind speeds and not correspond to the high wind speed days assumed to cause the maximum background concentration. Finally, the proposed project's operating emissions have been determined to be well below the General Conformity applicability thresholds for the federal nonattainment pollutants at the project site, PM10 and ozone. Therefore, no adverse NEPA impacts would occur after implementation of the recommended mitigation measures.

Construction/Operation Overlapping Impacts

The applicant has provided an emission analysis, summarized in **Air Quality Tables 9** and **10**, that indicates that the mitigated construction/operation overlapping 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 2008a, SES 2009i), the applicant has committed to the following emission controls on the stationary equipment associated with the SES Solar Two 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
- CO: 0.39 gram/bhp-hour
- VOC: 0.15 gram/bhp-hour
- PM10/PM2.5: 0.06 gram/bhp-hour
- SO_2: 0.12 gram/bhp-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 85,000 gallons.

Operational and Maintenance Vehicles

- Chemical dust suppressant Soiltac™ or a product with same or better performance would be applied to all unpaved 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 pooling of employees from El Centro will be provided.

- Hydrogen would be produced and stored onsite and distributed to each SunCatcher to eliminate a need for hydrogen cylinder delivery truck trips.
- 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 emissions, propane-fueled fork lift and man lifts would be used for maintenance.

Emission Offsets

The applicant has not proposed any emission offsets, and the stationary source and operating fugitive dust emissions for SES Solar Two 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/emission levels for criteria pollutants currently meet regulatory requirements and that the proposed stationary source emission levels are reduced adequately, but recommends that conditions need to be added to ensure that the emission controls also meet potential future requirements as these stationary sources 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.

Finally staff is recommending condition of certification **AQ-SC9** and **AQ-SC10** to require that the emergency engine meets model year emission standards for the year purchased and that the gasoline tank and appurtenances meet vapor recovery and standing loss requirements that are in effect at the time of construction.

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. The exact nature and location of such reductions is not known and most would occur outside of the SSAB; however, it is reasonable to assume that some of those reductions would occur within the SSAB as the electricity supplied by this proposed project would be partially directed to Imperial Irrigation District transmission lines, or from the neighboring upwind San Diego Air Basin since the electricity supplied by this proposed project would be partially directed to SDG&E transmission lines. However, the overall magnitude of the local emission reductions or the downwind impact of the upwind emission reductions is speculative, so the discussion below focuses solely on the direct emissions from the proposed project within Imperial County.

Ozone

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 SES Solar Two Project do have the potential (if left unmitigated) to contribute to higher ozone levels in the region. These impacts would be cumulatively significant under CEQA because they would contribute to ongoing violations of the state and federal ozone ambient air quality standards.

PM2.5 Impacts

Secondary particulate formation, which staff assumes to be 100% PM2.5, is the process of conversion from gaseous reactants to particulate products. The process of gas-to-particulate conversion, which occurs downwind from the point of emission, is complex and depends on many factors, including local humidity and the presence of specific reactive air pollutants. The basic process assumes that the SOx and NOx emissions are converted into sulfuric acid and nitric acid first, and these 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 Imperial County portion of the Salton Sea Air Basin has extensive agricultural and cattle feedlot activity and is considered ammonia rich. The available chemical characterization data shows that the PM2.5 concentrations in Calexico, which could be severely impacted by pollutant transport from Mexicali, are primarily combustion particulate and fugitive dust. The ammonium nitrate and ammonium sulfate fine particulate concentrations in Calexico in 2002/2003 comprised 23% of the PM2.5 (ARB 2005). Because of the known relationship of NOx and SOx emissions to PM2.5 formation and the known availability of ammonia in this ammonia rich area, it can be said that the emissions of NOx and SOx from the SES Solar Two do have the potential (if left unmitigated) to contribute to higher PM2.5 levels in the region; however, the region is in attainment with PM2.5 standards and the low level of NOx and SOx emissions from this proposed project are not expected to impact that status.

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 Best Available Control Technology (BACT), minimize delivery and employee trips, and reduce the proposed project's mobile source emissions by using lower emitting gasoline and propane fueled new vehicles. With the applicant's stipulated vehicle emission mitigation, which is formalized in Staff Condition of Certification **AQ-SC6,** it is staff's conclusion that the proposed project would not cause CEQA 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 emissions 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 potentially 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 emission 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 potentially 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.1.5 300 MW ALTERNATIVE

The 300 MW alternative would essentially be Phase 1 of the proposed 750 MW project. This alternative is 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 300 MW alternative would consist of 12,000 SunCatchers with a net generating capacity of approximately 300 MW occupying approximately 2,600 acres of land. The 300 MW alternative would transmit power to the grid through the SDG&E's Imperial Valley Substation and would require infrastructure similar to the entire 750 MW project, including a water supply pipeline, transmission line, road access, operations facilities, substation, and hydrogen system (SES 2008a). This infrastructure would require approximately 40 acres.

The 300 MW alternative would use 40% of the SunCatchers, 40% of the power generating potential, and would affect 40% of the land of the proposed 750 MW project. In terms of criteria pollutant emissions, this alternative project would create more than 40% of the proposed project's construction and operation criteria pollutant emissions due to reduced efficiency of scale and staffing, and a requirement for certain facilities and other activities to be built and maintained regardless of project size (SES 2009n).

The maximum short-term and annual construction emissions are not expected to change from that of the proposed project (SES 2009n), but the total duration of construction and total construction period emissions would be reduced as the 300 MW alternative project would not require 40 months to construct. Therefore, the worst-case short-term and annual construction emissions and construction pollutant concentration impacts for this alternative would be identical to that shown in **Air Quality Tables 6**, **7** and **12**.

The maximum short-term and annual operation emissions are expected to decrease from that of the proposed project (SES 2009n) 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**. However, the amount of the emissions and pollutant concentration reduction is not quite proportional to the decrease in project size due a reduction in economy of scale and requirements for certain activities/emission sources that do not scale down or scale down proportionately with project site.

The applicant's estimated 300 MW Alternative onsite stationary and onsite and offsite mobile source emissions, using the same emission control assumptions as those used for the proposed project, are estimated and summarized in **Air Quality Tables 14** and **15**.

Air Quality Table 14
SES Solar Two Operations - 300 MW Alternative
Maximum Daily Emissions (lbs/day)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Operation Emissions						
Onsite Combustion Emissions	8.10	0.047	48.89	6.02	0.17	0.15
Onsite Gasoline Tank Emissions	--	--	--	31.78[a]	--	--
Onsite Fugitive Dust Emissions	--	--	--	--	53.72	7.92
Subtotal of Onsite Emissions	**8.10**	**0.04**	**46.89**	**37.80**	**53.89**	**8.07**
Offsite Emissions						
Offsite Combustion Emissions	8.42	0.02	29.48	1.35	0.34	0.23
Offsite Fugitive Dust	--	--	--	--	17.79	1.90
Subtotal of Offsite Emissions	**8.42**	**0.02**	**29.48**	**1.35**	**18.13**	**2.14**
Total Maximum Daily Emissions	**16.52**	**0.07**	**76.37**	**39.15**	**72.01**	**10.21**

Source: SES 2009n, DR 133, Table DR 133a.

Note:
[a] Includes staff's correction that assumes one 4,000 gallon gasoline delivery and 500 gallons of vehicle refueling during a worst-case day.

Air Quality Table 15
SES Solar Two Operations - 300 MW Alternative
Maximum Annual Emissions (tons/yr)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Operation Emissions						
Onsite Combustion Emissions	1.17	0.00	8.34	1.05	0.02	0.02
Onsite Gasoline Tank Emissions	--	--	--	0.71	--	--
Onsite Fugitive Dust Emissions	--	--	--	--	8.66	1.27
Subtotal of Onsite Emissions	**1.17**	**0.00**	**8.34**	**1.76**	**8.68**	**1.29**
Offsite Emissions						
Offsite Combustion Emissions	0.73	0.00	4.93	0.20	0.03	0.02
Offsite Fugitive Dust	--	--	--	--	1.35	0.08
Subtotal of Offsite Emissions	**0.73**	**0.01**	**4.93**	**0.20**	**1.39**	**0.10**
Total Maximum Annual Emissions	**1.90**	**0.01**	**13.27**	**1.96**	**10.06**	**1.39**

Source: SES 2009n, DR 133, Table DR 133b.

Air Quality Table 14 and **15**, as compared to the proposed project emissions shown in **Air Quality Table 8** and **9**, indicates that the operation emissions from the 300 MW Alternative would vary from approximately 45 to 80% of the proposed project's maximum daily emissions, and approximately 43 to 51% of the proposed project's annual emissions.

Air Quality Table 15 also shows that the maximum annual operation emissions from the 300 MW Alternative would remain well below the General Conformity Rule applicability thresholds for PM10 (70 tons) and Ozone Precursors, (NOx [100 tons] and VOC [100 tons]).

The results of the 300 MW Alternative would be the following:

- The worst-case short-term construction emissions and ground level pollutant concentration impacts would be the same as the proposed project and would require the same level of mitigation. The total construction period and total construction emissions and long-term ground level pollutant concentration impacts would be reduced from those required to construct the proposed project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated, but mainly out of air basin, criteria pollutant emissions would be slightly reduced.
- The impacts of the proposed project would not occur on the 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 300 MW Alternative were approved, other renewable projects would likely be developed on other sites in the in Imperial County, the Mojave Desert, or in adjacent states to fill the 450 MW gap not supplied by the proposed project as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

C.1.5.3 CEQA LEVEL OF SIGNIFICANCE

The CEQA level of significance for the 300 MW 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 300 MW Alternative would be the same as that proposed for the proposed project (staff recommended conditions **AQ-SC1** to **AQ-SC10**).

C.1.6 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives developed to reduce impacts to the waters of the U.S. would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative is illustrated in **Alternatives Figure 1B**. This alternative would have the same outer project boundaries as the proposed project, but it would include prohibition of permanent drainage effects, thereby reducing the available acreage for development to 4,690 acres, and reducing the number of SunCatchers from 30,000 under the proposed project to 25,290.

C.1.6.1 SETTING AND EXISTING CONDITIONS

The setting and existing conditions for this alternative are the same as the proposed project. The existing ambient air quality does not change and the facility would still be within the same air basin and subject to the same air quality LORS.

C.1.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Drainage Avoidance #1 alternative would consist of 25,290 SunCatchers with a net generating capacity of approximately 632 MW occupying the entire proposed project footprint but avoiding primary drainages. Like the proposed project, this alternative would transmit power to the grid through the SDG&E's Imperial Valley Substation and would require infrastructure similar to the entire 750 MW project, including a water supply pipeline, transmission line, road access, operations facilities, substation, and hydrogen system (SES 2008a). This infrastructure would require approximately 40 acres.

The Drainage Avoidance #1 alternative would use 84% of the SunCatchers, and have 84% of the power generating potential, but would affect nearly the same land as the proposed 750 MW project (though using this land less densely). In terms of criteria pollutant emissions, the alternative would create more than 84% of the proposed project's construction and operation criteria pollutant emissions due to reduced efficiency of scale and staffing, and a requirement for certain facilities and other activities to be built and maintained regardless of project size (SES 2009n).

The maximum short-term and annual construction emissions are not expected to change from that of the proposed project (SES 2009n), but the total duration of construction and total construction period emissions would be reduced as the Drainage Avoidance #1 alternative project would not require 40 months to construct. Therefore, the worst-case short-term and annual construction emissions and construction pollutant concentration impacts for this alternative would be identical to that shown in **Air Quality Tables 6**, **7** and **12**.

The maximum short-term and annual operation emissions are expected to decrease from that of the proposed project (SES 2009n) due to its smaller number of operational components. 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**. However, the amount of the emissions and pollutant concentration reduction is not quite proportional to the decrease in project size due a reduction in economy of scale and requirements for certain activities/emission sources that do not scale down or scale down proportionately with project site.

Staff estimated the operational emissions for the Drainage Avoidance #1 alternative by interpolating between the applicant-provided values for the proposed project (see **Air Quality Tables 8** and **9**) and for the 300 MW alternative (see **Air Quality Tables 14** and **15**), which by association incorporates the same emission control assumptions as those used for the proposed project. Staff's operating emissions estimate for the Drainage Avoidance #1 alternative are summarized in **Air Quality Tables 16** and **17**.

Air Quality Table 16
SES Solar Two Operations – Drainage Avoidance #1 Alternative
Maximum Daily Emissions (lbs/day)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Operation Emissions						
Onsite Combustion Emissions	13.62	0.06	94.12	12.22	0.26	0.22
Onsite Gasoline Tank Emissions	--	--	--	31.78[a]	--	--
Onsite Fugitive Dust Emissions	--	--	--	--	103.95	15.34
Subtotal of Onsite Emissions	**13.62**	**0.06**	**94.12**	**44.00**	**104.21**	**15.57**
Offsite Emissions						
Offsite Combustion Emissions	10.48	0.03	47.02	2.05	0.44	0.28
Offsite Fugitive Dust	--	--	--	--	21.38	2.00
Subtotal of Offsite Emissions	**10.48**	**0.03**	**47.02**	**2.05**	**21.82**	**2.28**
Total Maximum Daily Emissions	**24.10**	**0.10**	**141.14**	**46.05**	**126.03**	**17.85**

Source: Staff's linear interpolation of the applicant's emission data supplied for the proposed project (SES 2009i) and 300 MW Alternative (SES 2009n, DR 133, Table DR 133a).

Note:
[a] Includes staff's correction that assumes one 4,000 gallon gasoline delivery and 500 gallons of vehicle refueling during a worst-case day.

Air Quality Table 17
SES Solar Two Operations - Drainage Avoidance #1 Alternative
Maximum Annual Emissions (tons/yr)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Operation Emissions						
Onsite Combustion Emissions	2.17	0.01	16.74	2.16	0.03	0.03
Onsite Gasoline Tank Emissions	--	--	--	0.86	--	--
Onsite Fugitive Dust Emissions	--	--	--	--	17.70	2.61
Subtotal of Onsite Emissions	**2.17**	**0.01**	**16.74**	**3.03**	**17.73**	**2.65**
Offsite Emissions						
Offsite Combustion Emissions	1.10	0.01	8.09	0.33	0.05	0.03
Offsite Fugitive Dust	--	--	--	--	2.00	0.09
Subtotal of Offsite Emissions	**1.10**	**0.01**	**8.09**	**0.33**	**2.05**	**0.12**
Total Maximum Annual Emissions	**3.26**	**0.01**	**24.83**	**3.35**	**19.78**	**2.77**

Source: Staff's linear interpolation of the applicant's emission data supplied for the proposed project (SES 2009i) and 300 MW Alternative (SES 2009n, DR 133, Table DR 133a).

Air Quality Table 16 and **17**, as compared to the proposed project emissions shown in **Air Quality Table 8** and **9**, indicates that the operation emissions from the Drainage Avoidance #1 alternative would vary from approximately 86 to 95% of the proposed projects maximum daily emissions, and approximately 85 to 87% of the proposed project's annual emissions.

Air Quality Table 17 also shows that the maximum annual operation emissions from the Drainage Avoidance #1 alternative would remain well below the General Conformity Rule applicability thresholds for PM10 (70 tons) and Ozone Precursors, (NOx [100 tons] and VOC [100 tons]).

The results of the Drainage Avoidance #1 Alternative would be the following:

- The worst-case short-term construction emissions and ground level pollutant concentration impacts would be the same as the proposed project and would require the same level of mitigation. The total construction period and total construction emissions and long-term ground level pollutant concentration impacts would be reduced from those required to construct the proposed project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated, but mainly out of air basin, criteria pollutant emissions would be slightly reduced.
- The impacts of the proposed project would still occur across the entire proposed project site, but in a less dense configuration due to avoidance of primary drainages.

If the Drainage Avoidance #1 Alternative were approved, other renewable projects may be developed on other sites in the in Imperial County, the Mojave Desert, or in adjacent states to fill the 118 MW gap not supplied by the proposed project as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

C.1.6.3 CEQA LEVEL OF SIGNIFICANCE

The level of significance under CEQA for the Drainage Avoidance #1 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 Drainage Avoidance #1 Alternative would be the same as that proposed for the proposed project (staff recommended conditions **AQ-SC1** to **AQ-SC10**).

C.1.7 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative would eliminate both the eastern and westernmost portions of the proposed project, where the largest drainage complexes are located. This alternative is shown in **Alternatives Figure 1C**. It would reduce the overall size of the project site by 3,347 acres (from 6,500 acres to 3,153 acres) It would also reduce the number of SunCatchers from 30,000 under the proposed project to 16,915. In this alternative, permanent structures would be allowed within all drainages inside the revised, smaller project boundaries.

C.1.7.1 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.1.7.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Drainage Avoidance #2 alternative would consist of 16,915 SunCatchers with a net generating capacity of approximately 423 MW occupying only the central portion of the proposed project area, and avoiding the major drainages east and west of the central portion. Like the proposed project, this alternative would transmit power to the grid through the SDG&E's Imperial Valley Substation and would require infrastructure similar to the entire 750 MW project, including a water supply pipeline, transmission line, road access, operations facilities, substation, and hydrogen system (SES 2008a). This infrastructure would require approximately 40 acres.

The Drainage Avoidance #2 alternative would use 56% of the SunCatchers, have 56% of the power-generating potential, and would affect a smaller land area. In terms of criteria pollutant emissions, the alternative would create more than 56% of the proposed project's construction and operation criteria pollutant emissions due to reduced efficiency of scale and staffing, and a requirement for certain facilities and other activities to be built and maintained regardless of project size (SES 2009n).

The maximum short-term and annual construction emissions are not expected to change from that of the proposed project (SES 2009n), but the total duration of construction and total construction period emissions would be reduced as this alternative would not require 40 months to construct. Therefore, the worst-case short-term and annual construction emissions and construction pollutant concentration impacts for this alternative would be identical to that shown in **Air Quality Tables 6**, **7** and **12**.

The maximum short-term and annual operation emissions are expected to decrease from that of the proposed project (SES 2009n) due to its smaller number of operational components. 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**. However, the amount of the emissions and pollutant concentration reduction is not quite proportional to the decrease in project size due a reduction in economy of scale and requirements for certain activities/emission sources that do not scale down or scale down proportionately with project site.

Staff estimated the operational emissions for the Drainage Avoidance #2 alternative by interpolating between the applicant provided values for the proposed project (see **Air Quality Tables 8** and **9**) and for the 300 MW alternative (see **Air Quality Tables 14** and **15**), which by association incorporates the same emission control assumptions as those used for the proposed project. Staff's operating emissions estimate for the Drainage Avoidance #2 alternative are summarized in **Air Quality Tables 18** and **19**.

Air Quality Table 18
SES Solar Two Operations – Drainage Avoidance #2 Alternative
Maximum Daily Emissions (lbs/day)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Operation Emissions						
Onsite Combustion Emissions	10.14	0.05	65.65	8.32	0.20	0.18
Onsite Gasoline Tank Emissions	--	--	--	31.78[a]	--	--
Onsite Fugitive Dust Emissions	--	--	--	--	72.33	10.67
Subtotal of Onsite Emissions	**10.14**	**0.05**	**65.65**	**40.10**	**72.53**	**10.85**
Offsite Emissions						
Offsite Combustion Emissions	8.42	0.02	29.48	1.35	0.34	0.23
Offsite Fugitive Dust	--	--	--	--	17.79	1.9
Subtotal of Offsite Emissions	**8.42**	**0.02**	**29.48**	**1.35**	**18.13**	**2.13**
Total Maximum Daily Emissions	**18.56**	**0.07**	**95.13**	**41.45**	**90.66**	**12.98**

Source: Staff's linear interpolation of the applicant's emission data supplied for the proposed project (SES 2009i) and 300 MW Alternative (SES 2009n, DR 133, Table DR 133a).

Note:
[a] Includes staff's correction that assumes one 4,000 gallon gasoline delivery and 500 gallons of vehicle refueling during a worst-case day.

Air Quality Table 19
SES Solar Two Operations - Drainage Avoidance #2 Alternative
Maximum Annual Emissions (tons/yr)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Operation Emissions						
Onsite Combustion Emissions	1.54	0.00	11.45	1.46	0.03	0.03
Onsite Gasoline Tank Emissions	--	--	--	0.77	--	--
Onsite Fugitive Dust Emissions	--	--	--	--	12.01	1.77
Subtotal of Onsite Emissions	**1.54**	**0.00**	**11.45**	**2.23**	**12.03**	**1.79**
Offsite Emissions						
Offsite Combustion Emissions	0.87	0.00	6.10	0.25	0.04	0.02
Offsite Fugitive Dust	--	--	--	--	1.59	0.09
Subtotal of Offsite Emissions	**0.87**	**0.00**	**6.10**	**0.25**	**1.63**	**0.11**
Total Maximum Annual Emissions	**2.41**	**0.01**	**17.55**	**2.48**	**13.66**	**1.90**

Source: Staff's linear interpolation of the applicant's emission data supplied for the proposed project (SES 2009i) and 300 MW Alternative (SES 2009n, DR 133, Table DR 133a).

Air Quality Table 18 and **19**, as compared to the proposed project emissions shown in **Air Quality Table 8** and **9**, indicates that the operation emissions from the Drainage Avoidance #2 alternative would vary from approximately 58 to 85% of the proposed projects maximum daily emissions, and approximately 58 to 64% of the proposed project's annual emissions.

Air Quality Table 19 also shows that the maximum annual operation emissions from the Drainage Avoidance #2 alternative would remain well below the General Conformity Rule applicability thresholds for PM10 (70 tons) and Ozone Precursors, (NOx [100 tons] and VOC [100 tons]).

The results of the Drainage Avoidance #2 Alternative would be the following:

- The worst-case short-term construction emissions and ground level pollutant concentration impacts would be the same as the proposed project and would require the same level of mitigation. The total construction period and total construction emissions and long-term ground level pollutant concentration impacts would be 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, unless the land use plan were modified.

If the Drainage Avoidance #2 Alternative were approved, other renewable projects may be developed on other sites in the in Imperial County, the Mojave Desert, or in adjacent states to fill the 327 MW gap not supplied by the proposed project as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

C.1.7.3 CEQA LEVEL OF SIGNIFICANCE

The CEQA level of significance for the Drainage Avoidance #2 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 Drainage Avoidance #2 Alternative would be the same as that proposed for the proposed project (staff recommended conditions **AQ-SC1** to **AQ-SC10**).

C.1.8 NO PROJECT / NO ACTION ALTERNATIVE

There are three No Project/No Action Alternatives evaluated in this section, as follows:

NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on SES Solar Two project application and on CDCA land use plan amendment

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

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

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another renewable energy project.

- The benefits of the proposed project in reducing fossil fuel use and greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation (see **Appendix Air-1 - Greenhouse Gas Emissions** for details).

If the proposed project is not approved, renewable projects would likely be developed on other sites in Imperial 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 two large wind projects proposed on BLM land within a few miles of the SES Solar 2 site in addition to large wind projects proposed in Mexico, south of the proposed site. In addition, there are seven large solar projects proposed on BLM land within the area served by the BLM El Centro Field Office. There are currently 70 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District.

NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on SES Solar Two project and amend the CDCA land use plan to make the area available for future solar development

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

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. As a result, air pollutant emissions and impacts would result from the construction and operation of the solar technology and would likely be similar to the air quality impacts from the proposed project. Different solar technologies require different amounts of construction and operations maintenance; however, the benefits of the proposed project in displacing fossil fuel fired generation and reducing associated pollutant emissions could occur with a different solar technology at this site and therefore with this alternative. As such, this No Project/No Action Alternative could result in air quality impacts and benefits similar to the impacts under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on SES Solar Two project application and amend the CDCA land use plan to make the area unavailable for future solar development

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

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the air quality of the site is not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in air quality impacts under the proposed project nor would it result in the air quality 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.1.9 CUMULATIVE IMPACTS ANALYSIS

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 Imperial County portion of the Salton Sea Air Basin, including a discussion of historical ambient levels for each of the assessed 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

Imperial County is designated as non-attainment for both federal and State ozone and PM10 standards. All other criteria pollutants (NO_2, and SO_2, and PM2.5) are considered to be in attainment of state standards, and in attainment and/or unclassified for federal standards.

Ozone

The current federally approved ozone plan for Imperial County is the *1991 Air Quality Attainment Plan*. This plan includes recommendations for measures to control stationary source and mobile source Reactive Organic Gases (ROG) and NOx emissions. Measures applicable to the proposed project include additional NOx control for internal combustion engines (ICEs). The proposed project's equipment would comply with the measures listed in the 1991 plan.

Imperial County failed to meet federal attainment for the 8-hour ozone NAAQS, and was formally reclassified as moderate nonattainment of the Federal 8-hour ozone standard in 2008[6]. Imperial County is currently required to develop an 8-hour Attainment Plan and is in the process of completing this plan. The most recent interim draft ozone plan contains control measures or strategies for the reduction of NOx and ROG emissions from stationary and mobile sources. The only measures potentially applicable to the proposed project would include transportation control measures to reduce trips to and from the site; including carpool/vanpool measures and facility design measures to enable the use of public transportation and reduce trips to and from the site during shift changes and lunch. The applicant has proposed several transportation control measures including vanpools and the use of low emission electric-hybrid vehicles, as appropriate. Since the measures in this interim draft ozone plan are not currently approved or directly applicable, the applicant may be required to enact additional emission control measures during the project's life in order to comply with new District rules enacted as part of the revised 8-hour ozone State Implementation Plan (SIP).

Particulate Matter

The current federally approved PM10 plan for Imperial County is the *1993 State Implementation Plan for PM10 in the Imperial Valley*. This plan focuses on the reduction of fugitive dust emissions from wind erosion, agricultural operations including open burning, unpaved roads, and construction activities. The recommended mitigation measures for project construction and operation would comply with the recommended PM10 mitigation measures in this plan.

U.S.EPA reclassified Imperial County from "moderate" to "serious" non-attainment of the 24-hour PM10 NAAQS on August 11, 2004. As part of this re-classification, Imperial County is required to develop a new PM10 Attainment Plan that provides attainment and at least 5% annual reduction in PM10 or PM10 precursor emissions until the area reaches attainment status. Imperial County completed a new PM10 Attainment Plan on August 11, 2009 that addresses impacts of PM10 transport from Mexicali, Mexico, impacts of PM10 generated by natural events such as wind and wildfire, and impacts from local sources. This plan states that the PM10 NAAQS has been attained but for international emissions. The plan relies on control measures already adopted as District rules. The core of the PM10 control program is based on the Imperial County Regulation VIII fugitive dust rules, most provisions of which were effective January

[6] U.S.EPA proposed on 9/23/09 that Imperial County be approved as attainment of the 1997 federal 8-hour ozone standard. The state has proposed that Imperial County be designated non-attainment for the revised 2008 federal 8-hour ozone standard, but that standard is now being reconsidered by U.S.EPA. So, at this time it is unclear if completion of the 8-hour ozone attainment planning efforts by Imperial County are required, or if an ozone attainment maintenance plan will be required instead.

2006. Regulation VIII includes Rule 801 Construction and Earthmoving Activities, Rule 802 Bulk Materials, Rule 803 Carry-Out and Track-out, Rule 804 Open Areas, Rule 805 Paved and Unpaved Roads, and Rule 806 Conservation Management Practices. U.S. EPA approval of this plan is pending.

The SES Solar Two Project would comply with these control measures by complying with the existing District rules and the proposed conditions of certification.

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 SES Solar Two Project air quality impacts can be reasonably estimated through air dispersion modeling (see the "Operational Modeling Analysis" subsection), the proposed project's 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 "Environmental Setting" 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 considerable concentration overlap for non-reactive pollutant concentrations between two 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 SES Solar Two Project if the high impact area is the result of high fence line concentrations from another stationary source and SES Solar Two 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 considerable expertise, the applicant has already performed a modeling analysis of the project alone (see the "Operational 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 project emissions can be evaluated, and the mitigation itself can be proposed by staff and/or the applicant (see the "Mitigation" subsection).

The applicant, in consultation with the District, has conducted a survey of new development projects and stationary sources that have potential for emissions of criteria air contaminants within 6 miles of the project site that are either under construction, or have received permits to be built or operate in the foreseeable future. The applicant reviewed a total of 31 projects, and 24 of them are located outside of a 6-mile radius of the proposed project site and were eliminated from the list of cumulative emission sources. Six projects were eliminated due to their annual permitted emission increases being negative, negligible, or less than 5 tons per year. The last project was eliminated because it is indefinitely on hold. 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 a number of other large development projects proposed in the region. For example, there are two large wind projects proposed on BLM land within a few miles of the SES Solar 2 site in addition to large wind projects proposed in Mexico, south of the proposed site. In addition, there are seven large solar projects proposed on BLM land within the area served by the BLM El Centro Field Office. This potential for substantial 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.

C.1.10 COMPLIANCE WITH LORS

The Imperial County Air Pollution Control District issued a Preliminary Determination of Compliance (PDOC) for the SES Solar Two on August 20, 2009 (ICAPCD 2009b) and after a 30 day comment period that ended on September 24, 2009, issued a Final Determination of Compliance on October 14, 2009 (ICAPCD 2009c). 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-31**).

Energy Commission staff provided comments on the PDOC to the District on September 21, 2009 (CEC 2009xx). Staff has found that the revisions made to the FDOC adequately address staff's comments.

C.1.10.1 FEDERAL

The District is responsible for issuing federal New Source Review (NSR) permits 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 serious nonattainment of the federal PM10 ambient air quality standards and moderate nonattainment of the federal ozone 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), 70 tons/year of direct and indirect PM10 emissions, and 70 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 and focuses on fugitive dust emissions from agricultural activities, unpaved roads, and other sources.

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 70 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, and establishes recordkeeping requirements. The proposed Tier 3 engine meets the emission limit requirements of this rule. This measure would also limit the engine's testing and maintenance operation to 13 hours per year.

C.1.8.3 LOCAL

The District rules and regulations specify the emissions control and offset requirements for new sources such as the SES Solar Two. Best Available Control Technology would be implemented, and District rules and regulations do not require emission reduction credits (ERCs) to offset the proposed project's emissions. 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 ICAPCD; and the District issued the PDOC on September 20, 2009 (ICAPCD 2009b), and after a 30 day comment period issued the FDOC on October 14, 2009 (ICAPCD 2009c). The FDOC states that the proposed project is expected to comply with all applicable District rules and regulations. The FDOC 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 – Permits Required

This rule requires an Authority to Construct and Permit to Operate before the construction or operation, respectively, of non-exempt emission sources. The FDOC completes the permit application review and the Authority of Construct and Permit to Operate would be provided per rule requirements after the CEC licensing process and after construction of the permitted emission sources, respectively. Compliance with this rule is expected.

Rule 207 – New and Modified Stationary Source Review

This rule establishes the stationary source[7] requirements that must be met to obtain a Permit to Operate, including the requirement to comply with best available control technology (BACT), provide emission offsets for emission increases above specified thresholds; and provide a dispersion modeling analysis, an alternatives analysis, and a compliance certification (if applicable). In the FDOC, the District has determined that the proposed emission controls meet BACT requirements. Therefore, compliance with this rule has been demonstrated.

The SES Solar Two, as a minor stationary source, does not require offsets, require a dispersion modeling, analysis, or require a compliance certification per District Rule 207.

Regulation IV – Prohibitions

Rule 400 – Fuel Burning Equipment

This rule limits discharge into the atmosphere from fuel burning equipment combustion contaminants exceeding in concentration at the point of discharge 140 lbs/hr of nitrogen oxides, calculated as nitrogen dioxide (NO_2). The emergency engine's maximum hourly NOx emission potential at full load operation is 3.41 lbs/hr; therefore, compliance with this rule is expected.

Rule 401 – Opacity of Emissions

Rule 401 limits visible emissions from emissions sources. This rule prohibits discharge of any emissions, other than uncombined water vapor, for more than three minutes in any hour. Compliance with this rule is expected with the implementation of the recommended staff and District conditions of certification.

Rule 403 – General Limitation on the Discharge of Air Contaminants

This rule limits discharge into the atmosphere from any single emission unit, combustion contaminants exceeding in concentration at the point of discharge 0.2 grains per dry cubic foot of gas, calculated to 12% of carbon dioxide (CO_2) at standard conditions averaged over 25 consecutive minutes. The only item subject to this rule is the emergency generator engine which would have negligible combustion contaminant emissions. Compliance with this rule is expected.

Rule 405 – Sulfur Compounds Emission Standards, Limitations, and Prohibitions

This rule limits the concentration of the discharge of sulfur compounds and the sulfur content of liquid fuels. The use of California diesel fuel would ensure compliance with this rule.

Rule 407 – Nuisance

This rule restricts emissions that would cause nuisance or injury to people or property (identical to California Health and Safety Code 41700). Compliance with this rule is

[7] The maintenance vehicles are not stationary sources and are not subject to District rules.

expected with the implementation of the recommended staff and District conditions of certification.

Rule 415 – Transfer and Storage of Gasoline

This rule specifies the vapor recovery requirement for tank filling (Phase I) and vehicle refueling (Phase II) for gasoline storage and refueling facilities. The proposed gasoline tank would have both Phase I and Phase II vapor controls and would need to comply with the District's conditions (**AQ-19** through **AQ-31**). Compliance with this rule is expected.

Regulation VIII – Fugitive Dust Rules

Rule 800 – General Requirements for Control of Fine Particulate Matter

Specifies the types of chemical stabilizing agents and dust suppressant materials that can (and cannot) be used to minimize fugitive dust from anthropogenic (man-made) sources. The rule also specifies test methods for determining compliance with visible dust emission (VDE) standards, stabilized surface conditions, soil moisture content, silt content for bulk materials, silt content for unpaved roads and unpaved vehicle/ equipment traffic areas, and threshold friction velocity. Records shall be maintained only for those days that a control measure was implemented, and kept for two years after the date of each entry. A fugitive dust management plan for unpaved roads is discussed in Rule 805. Compliance is expected with the implementation of staff recommended mitigation measures **AQ-SC3** and **AQ-SC7**.

Rule 801 – Construction and Earthmoving Activities

Requires fugitive dust emissions throughout construction activities (from pre-activity to active operations and during periods of inactivity) to comply with the conditions of a stabilized surface area and to not exceed an opacity limit of 20%, by means of water application, chemical dust suppressants, or constructing and maintaining wind barriers. A Dust Control Plan is also required and shall be submitted to the APCO at least 30 days prior to the start of any construction activities on any site that will include 10 acres or more of disturbed surface area for residential developments, 5 acres or more of disturbed surface area for non-residential development. Compliance is expected with the implementation of staff recommended mitigation measures **AQ-SC3** and **AQ-SC7**.

Rule 802 – Bulk Materials

Limits the fugitive dust emissions from the outdoor handling, storage and transport of bulk materials. Requires fugitive dust emissions to comply with the conditions of a stabilized unpaved road surface and to not exceed an opacity limit of 20%. It specifies that bulk materials be transported using wetting agents, allow appropriate freeboard space in the vehicles, or be covered. It also requires that stored materials be covered or stabilized. Compliance is expected with the implementation of staff recommended mitigation measures **AQ-SC3** and **AQ-SC7**.

Rule 803 – Carry-out and Track-out

Limits carry-out and track-out during construction, demolition, excavation, extraction, and other earthmoving activities (Rule 801), from bulk materials handling (Rule 802), and from paved and unpaved roads (Rule 805) where carry-out has occurred or may occur. Specifies acceptable (and unacceptable) methods for cleanup of carry-out and track-out. Compliance is expected with the implementation of staff recommended mitigation measures **AQ-SC3** and **AQ-SC7**.

Rule 804 – Open Areas

Requires any open area of 0.5 acres or more within urban areas (3 acres or more within rural areas), that contains at least 1,000 square feet of disturbed surface area to comply with the conditions of a stabilized unpaved road surface and to not exceed an opacity limit of 20%, by means of water application, chemical dust suppressants, paving, applying and maintaining gravel, or planting vegetation. Compliance is expected with the implementation of staff recommended mitigation measures **AQ-SC3** and **AQ-SC7**.

Rule 805 – Paved and Unpaved Roads

Specifies the width of paved shoulders on paved roads and guidelines for medians. Requires gravel, roadmix, paving, landscaping, watering, and/or the use of chemical dust suppressants on unpaved roadways to prevent exceeding an opacity limit of 20%. Compliance is expected with the implementation of staff recommended mitigation measures **AQ-SC3** and **AQ-SC7**.

Rule 806 – Conservation Management Practices

This rule limits fugitive emissions from Agricultural Operation Sites. The SES Solar Two facility is not subject to this rule.

Regulation XI – New Source Performance Standards

Rule 1101 – New Source Performance Standards (NSPS)

This rule incorporates the Federal NSPS (40 CFR 60) rules by reference. The proposed Tier 3 emergency generator engine meets the emission limit requirements of the only NSPS ((Subpart IIII) that applies to the proposed SES Solar Two equipment.

C.1.11 NOTEWORTHY PUBLIC BENEFITS

Renewable energy facilities, such as the SES Solar Two, are needed to meet California's mandated renewable energy goals. While there are no local area air quality public benefits[8] resulting from the proposed project, it would indirectly reduce criteria pollutant emissions within the Southwestern U.S. by reducing fossil fuel fired generation.

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

C.1.12 CONDITIONS OF CERTIFICATION/ MITIGATION MEASURES

C.1.12.1 STAFF CONDITIONS OF CERTIFICATION

Staff conditions **AQ-SC1** through **AQ-SC4** and **AQ-SC7** are both CEQA and NEPA mitigation conditions. Staff conditions **AQ-SC5**, **AQ-SC6**, and **AQ-SC8** to **AQ-SC10** 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 60 days prior to the start of ground disturbance, the project owner shall submit to the BLM's Authorized Officer and CPM for approval, the name, resume, qualifications, and contact information for the on-site AQCMM and all AQCMM Delegates.

AQ-SC2 Air Quality Construction Mitigation Plan (AQCMP): The project owner shall provide an AQCMP, for approval, which details the steps that will be taken and the reporting requirements necessary to ensure compliance with Conditions of Certification **AQ-SC3**, **AQ-SC4,** and **AQ-SC5**.

Verification: At least 60 days prior to the start of any ground disturbance, the project owner shall submit the AQCMP to the BLM's Authorized Officer and CPM for approval. The AQCMP shall include effectiveness and environmental data for the proposed soil stabilizer. The BLM's Authorized Officer or CPM will notify the project owner of any necessary modifications to the plan within 30 days from the date of receipt.

AQ-SC3 Construction Fugitive Dust Control: The AQCMM shall submit documentation to the BLM's Authorized Officer and CPM in each Monthly Compliance Report that demonstrates compliance with the Air Quality Construction Mitigation Plan (AQCMP) mitigation measures for the purposes of preventing all fugitive dust plumes from leaving the project. Any deviation from the AQCMP mitigation measures shall require prior BLM Authorized Officer and CPM notification and approval.

Verification: The AQCMM shall provide the BLM's Authorized Officer and the CPM a Monthly Compliance Report (**COMPLIANCE-6**) to include the following to demonstrate control of fugitive dust emissions:

A. a summary of all actions taken to maintain compliance with this condition;

B. copies of any complaints filed with the District in relation to project construction; and

C. any other documentation deemed necessary by the BLM Authorized Officer, CPM, and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

The following fugitive dust mitigation measures shall be included in the Air Quality Construction Mitigation Plan (AQCMP) required by **AQ-SC2**.

A. The main access roads through the facility to the power block areas will be either paved or stabilized using soil binders, or equivalent methods, to provide a stabilized surface that is similar for the purposes of dust control to paving, that may or may not include a crushed rock (gravel or similar material with fines removed) top layer, prior to initiating construction in the main power block area, and delivery areas for operations materials (chemicals, replacement parts, etc.) will be paved prior to taking initial deliveries.

B. All unpaved construction roads and unpaved operational site roads, as they are being constructed, shall be stabilized with a non-toxic soil stabilizer or soil weighting agent that can be determined to be both as efficient or more efficient for fugitive dust control as ARB approved soil stabilizers, and shall not increase any other environmental impacts including loss of vegetation. All other disturbed areas in the project and linear construction sites shall be watered as frequently as necessary during grading; and after active construction activities shall be stabilized with a non-toxic soil stabilizer or soil weighting agent, or alternative approved soil stabilizing methods, in order to comply with the dust mitigation objectives of Condition of Certification **AQ-SC4**. The frequency of watering can be reduced or eliminated during periods of precipitation.

C. No vehicle shall exceed 10 miles per hour on unpaved areas within the construction site, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions.

D. Visible speed limit signs shall be posted at the construction site entrances.

E. All construction equipment vehicle tires shall be inspected and washed as necessary to be cleaned free of dirt prior to entering paved roadways.

F. Gravel ramps of at least 20 feet in length must be provided at the tire washing/cleaning station.

G. All unpaved exits from the construction site shall be graveled or treated to prevent track-out to public roadways.

H. All construction vehicles shall enter the construction site through the treated entrance roadways, unless an alternative route has been submitted to and approved by the CPM and BLM Authorized Officer.

I. Construction areas adjacent to any paved roadway below the grade of the surrounding construction area or otherwise directly impacted by sediment from site drainage shall be provided with sandbags or other equivalently effective measures to prevent run-off to roadways, or other similar run-off control measures as specified in the Storm Water Pollution Prevention Plan (SWPPP), only when such SWPPP measures are necessary so that this condition does not conflict with the requirements of the SWPPP.

J. All paved roads within the construction site shall be swept daily or as needed (less during periods of precipitation) on days when construction activity occurs to prevent the accumulation of dirt and debris.

K. At least the first 500 feet of any paved public roadway exiting the construction site or exiting other unpaved roads en route from the construction site or construction staging areas shall be swept as needed (less during periods of precipitation) on days when construction activity occurs or on any other day when dirt or runoff resulting from the construction site activities is visible on the public paved roadways.

L. All soil storage piles and disturbed areas that remain inactive for longer than 10 days shall be covered, or shall be treated with appropriate dust suppressant compounds.

M. All vehicles that are used to transport solid bulk material on public roadways and that have potential to cause visible emissions shall be provided with a cover, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to provide at least 2 feet of freeboard.

N. Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) shall be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition shall remain in place until the soil is stabilized or permanently covered with vegetation.

AQ-SC4 Dust Plume Response Requirement: The AQCMM or an AQCMM Delegate shall monitor all construction activities for visible dust plumes. Observations of visible dust plumes that have the potential to be transported (A) off the project site and within 400 feet upwind of any regularly occupied structures not owned by the project owner or (B) 200 feet beyond the centerline of the construction of linear facilities indicate that existing mitigation measures are not resulting in effective mitigation. The AQCMP shall include a section detailing how the additional mitigation measures will be accomplished within the time limits specified. The AQCMM or Delegate shall implement the following procedures for additional mitigation measures in the event that such visible dust plumes are observed:

Step 1: The AQCMM or Delegate shall direct more intensive application of the existing mitigation methods within 15 minutes of making such a determination.

Step 2: The AQCMM or Delegate shall direct implementation of additional methods of dust suppression if Step 1, specified above, fails to result in adequate mitigation within 30 minutes of the original determination.

Step 3: The AQCMM or Delegate shall direct a temporary shutdown of the activity causing the emissions if Step 2, specified above, fails to result in effective mitigation within one hour of the original determination. The activity shall not restart until the AQCMM or Delegate is satisfied that appropriate additional mitigation or other site conditions have changed so that visual dust plumes will not result upon restarting the shutdown source. The owner/operator may appeal to the CPM or BLM Authorized Officer any directive from the AQCMM or Delegate to shut down an activity, if the shutdown shall go into effect within one hour of the original determination, unless overruled by the CPM or BLM Authorized Officer before that time.

Verification: The AQCMM shall provide the BLM's Authorized Officer and the CPM a Monthly Compliance Report (**COMPLIANCE-6**) to include:

A. a summary of all actions taken to maintain compliance with this condition;

B. copies of any complaints filed with the District in relation to project construction; and

C. any other documentation deemed necessary by the CPM and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC5 Diesel-Fueled Engine Control: The AQCMM shall submit to the CPM, in the Monthly Compliance Report, a construction mitigation report that demonstrates compliance with the AQCMP mitigation measures for purposes of controlling diesel construction-related emissions. Any deviation from the AQCMP mitigation measures shall require prior and CPM notification and approval.

Verification: The AQCMM shall include in the Monthly Compliance Report (**COMPLIANCE-6**) the following to demonstrate control of diesel construction-related emissions:

A. A summary of all actions taken to maintain compliance with this condition;

B. A list of all heavy equipment used on site during that month, including the owner of that equipment and a letter from each owner indicating that equipment has been properly maintained; and

C. Any other documentation deemed necessary by the CPM, and the AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

The following off-road diesel construction equipment mitigation measures shall be included in the Air Quality Construction Mitigation Plan (AQCMP) required by **AQ-SC2**.

a. All diesel-fueled engines used in the construction of the facility shall have clearly visible tags issued by the on-site AQCMM showing that the engine meets the conditions set forth herein.

b. All construction diesel engines with a rating of 50 hp or higher shall meet, at a minimum, the Tier 3 California Emission Standards for Off-Road

Compression-Ignition Engines, as specified in California Code of Regulations, Title 13, section 2423(b)(1), unless a good faith effort to the satisfaction of the CPM that is certified by the on-site AQCMM demonstrates that such engine is not available for a particular item of equipment. In the event that a Tier 3 engine is not available for any off-road equipment larger than 100 hp, that equipment shall be equipped with a Tier 2 engine, or an engine that is equipped with retrofit controls to reduce exhaust emissions of nitrogen oxides (NOx) and diesel particulate matter (DPM) to no more than Tier 2 levels unless certified by engine manufacturers or the on-site AQCMM that the use of such devices is not practical for specific engine types. For purposes of this condition, the use of such devices is "not practical" for the following, as well as other, reasons.

1. There is no available retrofit control device that has been verified by either the California Air Resources Board or U.S. Environmental Protection Agency to control the engine in question to Tier 2 equivalent emission levels and the highest level of available control using retrofit or Tier 1 engines is being used for the engine in question; or

2. The construction equipment is intended to be on site for 5 days or less.

3. The CPM may grant relief from this requirement if the AQCMM can demonstrate a good faith effort to comply with this requirement and that compliance is not practical.

c. The use of a retrofit control device may be terminated immediately, provided that the CPM is informed within 10 working days of the termination and that a replacement for the equipment item in question meeting the controls required in item "b" occurs within 10 days of termination of the use, if the equipment would be needed to continue working at this site for more than 15 days after the use of the retrofit control device is terminated, if one of the following conditions exists :

   1. The use of the retrofit control device is excessively reducing the normal availability of the construction equipment due to increased down time for maintenance, and/or reduced power output due to an excessive increase in back pressure.

   2. The retrofit control device is causing or is reasonably expected to cause engine damage.

   3. The retrofit control device is causing or is reasonably expected to cause a substantial risk to workers or the public.

   4. Any other seriously detrimental cause which has the approval of the CPM prior to implementation of the termination.

d. All heavy earth-moving equipment and heavy duty construction-related trucks with engines meeting the requirements of (b) above shall be properly maintained and the engines tuned to the engine manufacturer's specifications.

e. All diesel heavy construction equipment shall not idle for more than five minutes. Vehicles that need to idle as part of their normal operation (such as concrete trucks) are exempted from this requirement.

f. Construction equipment will employ electric motors when feasible.

AQ-SC6 The project owner, when obtaining dedicated on-road or off-road vehicles for mirror washing activities and other facility maintenance activities, shall only obtain new model year vehicles that meet California on-road vehicle emission standards or appropriate U.S.EPA/California off-road engine emission standards for the model year when obtained.

Verification: At least 60 days prior to the start of commercial operation, the project owner shall submit to the CPM a copy of the plan that identifies the size and type of the on-site vehicle and equipment fleet and the vehicle and equipment purchase orders and contracts and/or purchase schedule. The plan shall be updated every other year and submitted in the Annual Compliance Report (**COMPLIANCE-7**).

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 reducing fugitive dust from ongoing operations; that:

A. describes the active operations and wind erosion control techniques such as windbreaks and chemical dust suppressants, including their ongoing maintenance procedures, that shall be used on areas that could be disturbed by vehicles or wind anywhere within the project boundaries; and

B. identifies the location of signs throughout the facility that will limit traveling on unpaved portion of roadways to solar equipment maintenance vehicles only. In addition, vehicle speed shall be limited to no more than 10 miles per hour on these unpaved roadways, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions.

The site operations fugitive dust control plan shall include the use of durable non-toxic soil stabilizers on all regularly used unpaved roads and disturbed off-road areas, or alternative methods for stabilizing disturbed off-road areas, within the project boundaries, and shall include the inspection and maintenance procedures that will be undertaken to ensure that the unpaved roads remain stabilized. The soil stabilizer used shall be a non-toxic soil stabilizer or soil weighting agent that can be determined to be both as efficient or more efficient for fugitive dust control as ARB approved soil stabilizers, and shall not increase any other environmental impacts including loss of vegetation.

The performance and application of the fugitive dust controls shall also be measured against and meet the performance requirements of condition **AQ-SC4**. The performance requirements of **AQ-SC4** shall also be included in the operations dust control plan.

<u>Verification:</u> At least 60 days prior to the start of commercial operation, the project owner shall submit to the BLM's Authorized Officer and the CPM for review and approval a copy of the site Operations Dust Control Plan that identifies the dust and erosion control procedures, including effectiveness and environmental data for the proposed soil stabilizer, that will be used during operation of the project and that identifies all locations of the speed limit signs. At least 60 days after the start of commercial operation, the project owner shall provide to the BLM's Authorized Officer and the CPM a report identifying the locations of all speed limit signs, and a copy of the project employee and contractor training manual that clearly identifies that project employees and contractors are required to comply with the dust and erosion control procedures and on-site speed limits.

AQ-SC8 The project owner shall provide the CPM copies of all District issued Authority-to-Construct (ATC) and Permit-to-Operate (PTO) document for the facility.

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

<u>Verification:</u> The project owner shall submit any ATC, PTO, and proposed air permit modifications to the CPM within 5 working days of its submittal either by 1) the project owner to an agency, or 2) receipt of proposed modifications from an agency. The project owner shall submit all modified air permits to the CPM within 15 days of receipt.

AQ-SC9 The emergency generator engine procured for this project will meet or exceed the NSPS Subpart IIII emission standards for the model year that corresponds to the date of purchase.

<u>Verification:</u> The project owner shall submit the emergency engine specifications to the CPM at least 30 days prior to purchasing the engines for review and approval.

AQ-SC10 The gasoline tank and appurtenances procured for this project will meet or exceed all vapor recovery and standing loss requirements in affect at the time of construction.

<u>Verification:</u> The project owner shall submit the gasoline tank and refueling equipment specifications and documentation of compliance with effective vapor recovery and standing loss requirements to the CPM at least 30 prior to purchasing the equipment for review and approval.

C.1.12.2 DISTRICT CONDITIONS

DISTRICT FINAL DETERMINATION OF COMPLIANCE CONDITIONS (ICAPCD 2009c)

District conditions **AQ-1** through **AQ-31** are CEQA-only required conditions.

General Conditions

EQUIPMENT DESCRIPTION:

A. Emergency Generator Engine, driven by a Cummins, QSL9_GNR3, 335 hp, T2 diesel engine.

B. 5,000 gallon above ground fuel storage tank.

AQ-1 Operation of this equipment shall be in compliance with all data and specifications submitted with the application on August 11th, 2008 (FR#574708) under which this permit is issued unless otherwise noted.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

AQ-2 Operation of the described equipment shall be in compliance with all applicable Imperial County Air Pollution Control District Rules and Regulations.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

AQ-3 This Permit does not authorize the emissions of air contaminants in excess of those allowed by U.S.EPA (Title 40 of the Code of Federal Regulations), the State of California Division 26, Part 24, Chapter 3 of the Health and Safety Code, or the APCD (Rules and Regulations).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

AQ-4 This permit cannot be considered permission to violate applicable existing laws, regulations, rules, or statutes of other governmental agencies.

Verification: Not necessary.

AQ-5 No air contaminant shall be released into the atmosphere which causes a public nuisance, caused by permitted operation.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

Facility Roads

AQ-6 Materials used for Chemical Stabilization of soils, including petroleum resins, asphaltic emulsions, acrylics, and adhesives shall not violate State Water Quality Control Board standards for use as a soil stabilizer. Materials accepted by the California Air Resources Board (ARB) and the United States Environmental Protection Agency (EPA), and which meet State water quality standards, shall be considered acceptable to the ICAPCD.

<u>Verification:</u> Compliance with Conditions **AQ-SC3** and **AQ-SC4** during construction, and Condition **AQ-SC7** during operation will demonstrate compliance with this condition.

AQ-7 Any use of dust suppressants or gravel pads, and paving materials such as asphalt or concrete for paving, shall comply with other applicable District rules.

<u>Verification:</u> Compliance with Conditions **AQ-SC3** and **AQ-SC4** during construction, and Condition **AQ-SC7** during operation will demonstrate compliance with this condition.

AQ-8 The project owner shall apply Soiltac soil conditioner or a similar product on all unpaved roads once per year or as necessary to comply with application information.

<u>Verification:</u> Compliance with Conditions **AQ-SC3** and **AQ-SC4** during construction, and Condition **AQ-SC7** during operation will demonstrate compliance with this condition.

AQ-9 The project owner must clean up any bulk material tracked out or carried out onto a paved road at the end of the work day.

<u>Verification:</u> Compliance with Conditions **AQ-SC3** and **AQ-SC4** during construction, and Condition **AQ-SC7** during operation will demonstrate compliance with this condition.

AQ-10 All paved and unpaved roads shall limit Visible Dust Emissions (VDE) to 20% opacity, as determined by the test methods for “Visual Determination of Opacity” in Rule 800 Appendix A.

<u>Verification:</u> Compliance with Conditions **AQ-SC3** and **AQ-SC4** during construction, and Condition **AQ-SC7** during operation will demonstrate compliance with this condition.

AQ-11 The project owner shall compile and retain records that provide evidence of control measure application. The project owner shall describe, in the records, the type of treatment or control measure, extent of coverage, and date applied. For control measures which require multiple daily applications, recordings the frequency of application will fulfill the recordkeeping requirements of this rule (i.e., water being applied three times a day and the date). Records shall be provided to the ICAPCD upon request.

<u>Verification:</u> Compliance with Conditions **AQ-SC3** and **AQ-SC4** during construction, and Condition **AQ-SC7** during operation will demonstrate compliance with this condition.

Emergency Generator Engine

EQUIPMENT DESCRIPTION:

Emergency Generator Engine, driven by a Cummins, QSL9_GNR3, 335 hp, T2 diesel engine.

AQ-12 A log shall be maintained on the premises showing hours of operation and routine repairs of emergency generator engine. This log shall be made available for inspection by the ICAPCD.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

AQ-13 The emergency generator engine shall be restricted to operate a total of 50 hours per year for non-emergency testing and maintenance purposes.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

AQ-14 The project owner shall submit to the ICAPCD an annual report by the end of February of each operating year containing the monthly fuel consumption and hours operated per month for the unit.

Verification: As part of the Annual Compliance Report (**COMPLIANCE-7**), the project owner shall include the monthly fuel consumption and hour operated records required by this condition, including a photograph showing the annual reading of engine hours.

AQ-15 The emergency generator shall not be used to provide power to sources other than the SES Solar Two Power Plant.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

AQ-16 The diesel engine shall not discharge into the atmosphere any visible air contaminant other than uncombined water vapor, for a period or periods aggregating more than three minutes in any one hour, which is 20% opacity or greater.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

AQ-17 Hour Meter, with a minimum display capability of 9,999 hours, shall be installed and maintained to proper working condition for the unit.

Verification: At least thirty (30) days prior to the installation of the engine, the project owner shall provide the District and the CPM the specification of the hour timer.

AQ-18 Emergency generator set's diesel is subject to New Source Performance Standards (NSPS) Subpart IIII and shall meet Tier 3 emissions standards (40 CFR 60.4205 (b)).

Verification: The project owner shall submit the emergency engine specifications to the District and the CPM for review and approval at least 30 days prior to purchasing the engine.

Above Ground Storage Tank

EQUIPMENT DESCRIPTION:

A. 5,000 gallon above ground fuel storage tank.

AQ-19 The Phase I Vapor Recovery System shall be installed and operated in accordance with the requirements of the California Air Resources Board (ARB) Executive Order G-70-102-A – Certification of a Phase I Vapor Recovery System for Aboveground Storage Tanks with less than 40,000 Gallons Capacity for Gasoline or Gasoline/Methanol Blended Fuels (ARB E.O. G-70-102-A).

Verification: The project owner shall submit the ARB Phase I Vapor Recovery System specifications to the District for approval, if required by District rules, and to the CPM for review at least 30 days prior to installing the system.

AQ-20 The Phase II Vapor Recovery System, including all associated underground and aboveground plumbing, shall be installed, operated, and maintained in accordance with ARB's Executive Order G-70-52-AM – Certification of Components for Red Jacket, Hirt, and Balance Phase II Vapor Recovery System and Executive Order G-70-162-A – Steel Tank Institute Fireguard Aboveground Tank Vapor Recovery System. Section 41954(f) of the California Health and Safety Code prohibits the sale, offering for sale, or installation of any vapor control system unless the system has been certified by ARB (ARB E.O. G-70-52-AM; ARB E.O. G-70-162-A).

Verification: The project owner shall submit the ARB Phase II Vapor Recovery System specifications to the District for approval, if required by District rules, and to the CPM for review at least 30 days prior to installing the system.

AQ-21 All applicable components shall be maintained to a state that is leak free and vapor tight (ICAPCD Rule 415).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

AQ-22 The District shall be notified when installation of all piping and control fittings required by aforementioned Rules has been completed. Vapor control piping and fittings shall remain exposed until the District has inspected the installation or given approval to complete back fill (ICAPCD Rule 415 & 108).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

AQ-23 Each vent pipe shall be equipped with an ARB certified pressure/vacuum relief valve. Plumbing may be manifolded to reduce the number of relief valves needed. The settings of the pressure/vacuum relief valve(s) shall be as follows:

a) Positive Pressure Setting: 2.5 to 6.0 inches H_2O

b) Negative Pressure Setting: 6.0 to 10.0 inches H_2O (ARB E.O. G-70-102-A).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

AQ-24 The project owner shall successfully conduct the following performance tests of the Phase I Vapor Recovery System within thirty (30) days of start-up:

a) ARB TP-201.3B – Determination of Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities with Aboveground Storage Tanks (ARB E.O. G-70-102-A; ICAPCD Rule 415)

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

AQ-25 For the purpose of compliance determination, all tests shall be conducted after all back-filling, paving, and installation of all Phase I and Phase II components, including P/V valves, have been completed (ICAPCD Rule 415).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

AQ-26 The project owner shall submit all test results for the initial performance tests required pursuant to condition **AQ-24** within twenty (20) days of start-up (ICAPCD Rule 415).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

AQ-27 The performance tests required pursuant to condition **AQ-24** shall be successfully conducted at least once in each twelve (12) month period after the date of successful completion of the startup performance testing. Test results shall be submitted to the Air District within twenty (20) days of conducting these annual tests (ICAPCD Rule 415).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

AQ-28 The project owner shall annually submit to the Air District a report containing the gasoline throughput from the preceding calendar year. This annual report shall be submitted to this office no later than February 28th.

Verification: As part of the Annual Compliance Report (**COMPLIANCE-7**), the project owner shall include gasoline throughput and annual VOC emission estimates.

AQ-29 The project owner shall maintain an operational and maintenance manual for the Phase I and Phase II vapor recovery system of the facility. The manual must be kept at the facility and made available to the APCD upon request (ICAPCD Rule 415).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

AQ-30 The project owner shall perform monthly liquid and vapor leak inspections during product transfer operations. Information record shall include date of inspection, findings, leak determination method, corrective action, and name and signature of person performing the inspection (ICAPCD Rule 415).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

AQ-31 Uncertified, missing, or improperly installed equipment and emission related defects shall be tagged out of service immediately. Such defects include, but are not limited to, suffered damage or wear which prevents proper operation of equipment (ICAPCD Rule 415).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S.EPA or CEC staff.

C.1.13 CONCLUSIONS

Staff has made the following conclusions about the SES Solar Two 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-31.**
- The proposed project's construction activities, if left unmitigated, 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 operational NOx, SOx, PM2.5 and CO emission impacts are not CEQA significant.
- 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.

- To ensure compliance with emergency engine emission and gasoline tank vapor recovery regulations at the time of their purchase, staff recommends **AQ-SC9** and **AQ-SC10**, respectively.
- The proposed project would be consistent with the requirements of SB 1368 and the Emission Performance Standard for greenhouse gases (see **Appendix Air-1**).

C.1.14 REFERENCES

ARB 2005 (California Air Resources Board) – Characterization of Ambient PM10 and PM2.5 in California, Technical Report. June 2005.

ARB 2009a (California Air Resources Board) – California Ambient Air Quality Standards available on ARB Website. http://www.arb.ca.gov/aqs/aqs.htm. Accessed 2009.

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

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

CEC 2008h – BLM and Energy Commission staff's Data Requests Set 1 Part 2 (53-127). December 2, 2008.

CEC 2009x – BLM and Energy Commission staff's Data Requests Set 2 Part 1 (128-141). May 6, 2009.

CEC 2009xx – CEC Staff PDOC comment letter. September 21, 2007.

ICAPCD 2008b – Notice of Preliminary Determination of Compliance (PDOC). Permit Number 3838 – SES Solar Two Project (08-AFC-5), Dated August 12, 2009, received August 18, 2009.

ICAPCD 2008c – Notice of Final Determination of Compliance (FDOC) Permit Number 3838 – SES Solar Two Project (08-AFC-5), dated and received October 14, 2009.

SES (Stirling Energy Systems Solar Two, LLC) 2008a – Application for Certification for the Stirling Energy Systems (SES) Solar Two Project, Volumes 1 and 2. Submitted to the California Energy Commission, June 30, 2008.

SES 2009i – Applicant's Response to BLM and Energy Commission Data Requests 53-110, March 26, 2009.

SES 2009n – Applicant's Response to BLM and Energy Commission Data Requests 128-141, June 5, 2009.

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 October 2009.

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

WC (Weather Channel) 2009 – Averages and records for El Centro, California. Website: http://www.weather.com. Accessed October 2009.

APPENDIX AIR-1 - GREENHOUSE GAS EMISSIONS

Testimony of William Walters, P.E.

SUMMARY OF CONCLUSIONS

The SES Solar Two Project is a proposed addition to the state's electricity system. SES Solar Two is a solar concentrating thermal power plant, which is comprised of 30,000 solar dish Stirling systems (referred to as SunCatchers). Each SunCatcher focuses solar energy to power a 25-kilowatt Stirling engine. As a solar project, SES Solar Two would emit considerably less greenhouse gas (GHG) than the existing statewide average GHG emissions per unit of generation and would emit considerably less GHG emissions per unit of generation than 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 SES Solar Two 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 cumulatieve 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 SES Solar Two, affects all other power plants in the interconnected system. The operation of the SES Solar Two would affect the overall electricity system operation and GHG emissions in several ways:

- SES Solar Two would provide low-GHG, renewable generation.
- SES Solar Two 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.
- SES Solar Two could facilitate to some extent the replacement of generation provided by aging fossil-fired power plants that use once-through cooling.

These system impacts would result in a net reduction in GHG emissions across the electricity system providing energy and capacity to California. Thus, staff concludes that the proposed project would result in a cumulative overall reduction in GHG emissions from power plants, does not worsen current conditions, and would not result in impacts that are cumulatively CEQA significant.

Staff concludes that the short-term minor emission of greenhouse gases during construction that are necessary to create this new low GHG-emitting power generating facility would be sufficiently reduced by "best practices" and would be more than offset by GHG emission reductions during operation. Thus, construction GHG emissions would not be CEQA significant.

The SES Solar Two 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 SES Solar Two Project, which solely generates electricity from solar power, is exempt from the mandatory GHG emission reporting requirements for electricity generating facilities [CCR Title 17 §95101(c)(1)]. However, the proposed project may be subject to future reporting requirements and GHG reductions or trading requirements as additional state or federal GHG regulations are developed and implemented.

INTRODUCTION

Greenhouse gas (GHG) emissions are not criteria pollutants, but they are discussed in the context of cumulative impacts. However, on April 2, 2007, the U.S. Supreme Court found that GHGs are pollutants that must be covered by the federal Clean Air Act. In response, on September 30, 2009, the U.S. Environmental Protection Agency proposed to apply Prevention of Significant Deterioration (PSD) requirements to facilities whose carbon dioxide-equivalent emissions exceed 25,000 tons per year (U.S.EPA 2009c). The rule making is not finalized, but the GHG emissions for SES Solar Two are not expected to exceed this amount.

The state has demonstrated a clear willingness to address global climate change through research, adaptation and inventory reductions. In that context, staff evaluates the GHG emissions from the proposed project, presents information on GHG emissions related to electricity generation, and describes the applicable GHG standards and requirements.

Generation of electricity can produce greenhouse gases with the criteria air pollutants that have been traditionally regulated under the federal and state Clean Air Acts. For fossil fuel-fired power plants, the GHG emissions include primarily carbon dioxide, with much smaller amounts of nitrous oxide (N_2O, not NO or NO_2, which are commonly known as NOx or oxides of nitrogen), and methane (CH_4 – often from unburned natural gas). For solar energy generation projects the stationary source GHG emissions are much smaller than fossil fuel-fired power plants, but the associated maintenance vehicle emissions are higher. Other sources of GHG emissions include sulfur hexafluoride (SF_6) from high voltage equipment and hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) from refrigeration/chiller equipment. GHG emissions from the electricity sector are dominated by CO_2 emissions from carbon-based fuels; other sources of GHG emissions are small and also are more likely to be easily controlled or reused or recycled, but are nevertheless documented here as some of the compounds have very high global warming potentials.

Global warming potential is a relative measure, compared to carbon dioxide, of a compound's residence time in the atmosphere and ability to warm the planet. Mass emissions of GHGs are converted into carbon dioxide equivalent (CO2E) metric tonnes (MT) for ease of comparison.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local laws and policies in **Greenhouse Gas Table** 1 pertain to the control and mitigation of greenhouse gas emissions. Staff's analysis examines the proposed project's compliance with these requirements.

GLOBAL CLIMATE CHANGE AND ELECTRICITY PRODUCTION

There is general scientific consensus that climate change is occurring and that human activity contributes in some measure (perhaps substantially) to that change. Man-made emissions of greenhouse gases, if not sufficiently curtailed, are likely to contribute further to continued increases in global temperatures. Indeed, the California Legislature finds that "[g]lobal warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California" (Cal. Health & Safety Code, sec. 38500, division 25.5, part 1).

Greenhouse Gas Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Mandatory Reporting of Greenhouse Gases	This rule requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 metric tons of CO_2 equivalent emissions per year.
State	
California Global Warming Solutions Act of 2006, AB 32 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)	This act requires the California Air Resources Board (ARB) to enact standards that will reduce GHG emission to 1990 levels by 2020. Electricity production facilities will be regulated by the ARB.
California Code of Regulations, tit. 17, Subchapter 10, Article 2, sections 95100 et. seq.	These ARB regulations implement mandatory GHG emissions reporting as part of the California Global Warming Solutions Act of 2006 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)
Title 20, California Code of Regulations, section 2900 et seq.; CPUC Decision D0701039 in proceeding R0604009	The regulations prohibit utilities from entering into long-term contracts with any base load facility that does not meet a greenhouse gas emission standard of 0.5 metric tonnes carbon dioxide per megawatt-hour (0.5 $MTCO_2$/MWh) or 1,100 pounds carbon dioxide per megawatt-hour (1,100 lbs CO_2/MWh).

In 1998, the Energy Commission identified a range of strategies to prepare for an uncertain climate future, including a need to account for the environmental impacts associated with energy production, planning, and procurement (CEC 1998, p.5). In 2003, the Energy Commission recommended that the state require reporting of greenhouse gases (GHG) or global climate change[9] 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

[9] Global climate change is the result of greenhouse gases, or air emissions with global warming potentials, affecting the global energy balance, and thereby, climate of the planet. The term greenhouse gases (GHG) and global climate change (GCC) gases are used interchangeably.

reductions to be achieved by 2020.[10] To achieve this, ARB has a mandate to define the 1990 emissions level and achieve the maximum technologically feasible and cost-effective GHG emission reductions.

The ARB adopted early action GHG reduction measures in October 2007, adopted mandatory reporting requirements and the 2020 statewide target in December 2007, and adopted a statewide scoping plan in December 2008 to identify how emission reductions will be achieved from major sources of GHG via regulations, market mechanisms, and other actions. ARB staff is developing regulatory language to implement its plan and holds ongoing public workshops on key elements of the recommended GHG reduction measures, including market mechanisms (ARB 2006). The regulations must be effective by January 1, 2011 and mandatory compliance commences on January 1, 2012. The mandatory reporting requirements are effective for electric generating facilities with a nameplate capacity equal or greater than 1 megawatt (MW) capacity if their emissions exceed 2,500 metric tonnes per year. The due date for initial reports by existing facilities was June 1, 2009.

Examples of strategies that the state might pursue for managing GHG emissions in California, in addition to those recommended by the Energy Commission and the Public Utilities Commission, were identified in the California Climate Action Team's Report to the Governor (CalEPA 2006). The scoping plan approved by ARB in December 2008 builds upon the overall climate policies of the Climate Action Team report and shows the recommended strategies to achieve the goals for 2020 and beyond. Some strategies focus on reducing consumption of petroleum across all areas of the California economy. Improvements in transportation energy efficiency (fuel economy), land use planning, and alternatives to petroleum-based fuels are slated to provide substantial reductions by 2020 (CalEPA 2006). The scoping plan includes a requirement for 33% of California's electrical energy to be provided from renewable sources by 2020 (implementing California's 33% RPS goal), aggressive energy efficiency targets, and a cap-and-trade system that includes the electricity sector (ARB 2008b).

It is likely that GHG reductions mandated by ARB will not be uniform across emitting sectors, in that reductions will be based on cost-effectiveness (i.e., the greatest effect for the least cost). For example, the ARB proposes a 40% reduction in GHG from the electricity sector, even though that sector currently only produces about 25% of the state's GHG emissions. In response, in September 2008 the Energy Commission and the Public Utilities Commission provided recommendations (CPUC 2008) to ARB on how to achieve such reductions through both programmatic and regulatory approaches, and identified regulation points should ARB decide that a multi-sector cap and trade system is warranted.

The Energy Commission's *2007 Integrated Energy Policy Report* (IEPR) also addressed climate change within the electricity, natural gas, and transportation sectors (CEC 2007). For the electricity sector, it recommended such approaches as pursuing all cost-effective energy efficiency measures and meeting the Governor's stated goal of a 33% renewable portfolio standard. The Energy Commission's *2009 Integrated Energy Policy*

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

Report continues to emphasize the important of meeting greenhouse gas emissions reduction goals along with other important statewide issues such as backing out use of once-through cooling in coastal California power plants (CEC 2009d).

SB 1368[11], 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[12] (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 five years or more, including contracts with power plants located outside of California.[13] 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, SES Solar Two 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[14] include regulation, spinning reserve, non-spinning reserve, voltage support, and black start capability. Individual generation resources can be built and operated to provide only one specific service. Alternatively, a resource may be able to provide one or all of these services, depending on its design and constantly changing system needs and operations.

California is actively pursuing policies to reduce GHG emissions that include adding non-GHG emitting renewable generation resources to the system mix. The generation

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[11] Public Utilities Code § 8340 et seq.

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

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

[14] See page CEC 2009b, page 95.

of electricity using fossil fuels, even in a back-up generator at a thermal solar plant, produces air emissions known as greenhouse gases in addition to the criteria air pollutants that have been traditionally regulated under the federal and state Clean Air Acts. Greenhouse gas emissions contribute to the warming of the earth's atmosphere, leading to climate change.

PROJECT CONSTRUCTION

Construction of industrial facilities such as power plants requires coordination of numerous equipment and personnel. The concentrated on-site activities result in short-term, unavoidable increases in vehicle and equipment emissions that include greenhouse gases. The greenhouse gas emissions estimate, determined for the entire 40 month construction period, is presented below in **Greenhouse Gas Table 2,** where the GHG emissions were converted by staff into MTCO2E and totaled.

Greenhouse Gas Table 2
SES Solar Two Estimated Potential Construction Greenhouse Gas Emissions

Construction Element	CO_2-Equivalent (MTCO2E) [a,b]
On-Site Construction Equipment	4,983.73
On-Site Construction/Delivery Trucks	1,738.14
On-Site Worker/Security Vehicles	144.20
Off-Site Construction Trucks	123.35
Off-Site Worker/Security Vehicles	10,101.93
Off-Site SunCatcher Delivery Trucks	14,240.30
Construction Total	31,331.65

Source: SES 2009n, Table DR-131a
[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%, is CO_2 from these combustion sources.

PROJECT OPERATIONS

Operations GHG emissions are shown in **Greenhouse Gas Table 3**. Operation of the proposed SES Solar Two Project would cause GHG emissions from the facility maintenance fleet and employee trips, emergency fire pump engine, and sulfur hexafluoride emissions from new electrical component equipment.

Greenhouse Gas Table 3
Estimated SES Solar Two Potential Operating Greenhouse Gas Emissions

	Annual CO_2-Equivalent (MTCO2E)[a]
Onsite Combustion [b]	1,042.67
Offsite Total [b]	673.18
Equipment Leakage (SF_6)	271.83
Total Project GHG Emissions – MTCO2E [b]	**1,987.68**
Facility MWh per year [c]	1,620,000
Facility GHG Performance (MTCO2E/MWh)	0.00123

Sources: SES 2009i, Table 5.2-26a, p. AQ-20

[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%, is CO_2 from these two emission sources.
[c] Approximately a 25% capacity factor.

Greenhouse Gas Table 3 shows what the proposed project, as permitted, could potentially emit in greenhouse gases on an annual basis. All emissions are converted to CO_2-equivalent and totaled. Electricity generation GHG emissions are generally dominated by CO_2 emissions from the carbon-based fuels; other sources of GHG are typically small and also are more likely to be easily controlled or reused/recycled. For this solar project the primary fuel, solar energy, is greenhouse gas free, but there is direct and indirect gasoline and diesel fuel use in the maintenance vehicles, offsite delivery vehicles, staff and employee vehicles, and the two diesel-fueled emergency engines. Another GHG emission source for this proposed project is SF_6 from electrical equipment leakage.

The proposed project is estimated to emit, directly from primary and secondary emission sources on an annual basis, nearly 2,000 metric tonnes of CO_2-equivalent GHG emissions per year. The SES Solar Two 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, SES Solar Two has an estimated GHG emission rate of 0.00123 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*[15]. **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, the 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 SES One, to be on the order of 5 months (Greenpeace 2005, Page 9); and the project life for SES One is estimated to be 40 years (SES 2008a, p. 3-74). Therefore, the proposed project's GHG emissions reduction potential from energy displacement would be substantial[16].

Natural Carbon Uptake Reduction

The 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

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[15] 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.

[16] 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.

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 6,500 acre project, which does not require the complete removal of vegetation over most of the project site, the maximum equivalent loss in carbon uptake would be 9,645 MT of CO_2 per year, which would correspond to 0.006 MT of CO_2 per MW 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 MW depending on the fuel and technology, that is enabled by this proposed project.

CLOSURE AND DECOMMISSIONING

Closure and decommissioning, as a one-time limited duration event, would have emissions that are similar in type and magnitude, but likely lower than, the construction emissions as discussed above.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff assesses four kinds of impacts: construction, operation, closure and decommissioning, and cumulative effects. As the name implies, construction impacts result from the emissions occurring during the construction of the proposed project. The operation impacts result from the emissions of the proposed project during operation. Cumulative impacts analysis assesses the impacts that result from the proposed project's incremental effect viewed over time. The impact of GHG emissions caused by this solar facility is characterized by considering how the power plant would affect the overall electricity system. The integrated electricity system depends on non-fossil and fossil-fueled generation resources to provide energy and satisfy local capacity needs. As directed by the Energy Commission's adopted order initiating an informational (OII) proceeding (08-GHG OII-1) (CEC 2009a), staff is refining and implementing the concept of a "blueprint" that describes the long-term roles (i.e., retirements and displacement) of fossil-fueled power plants in California's electricity system as we move to a high-renewable, low-GHG electricity system, which will include projects like SES Solar Two.

PROPOSED PROJECT

<u>Construction Impacts</u>

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 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. 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 0.00048 MT CO2E per MW.

Direct/Indirect Operation Impacts and Mitigation

The proposed SES Solar Two 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 SES Solar Two in Renewables Goals/Load Growth

As California moves towards an increased reliance on renewable energy by implementing the Renewables Portfolio Standard, non-renewable energy resources may be curtailed or displaced. These potential reductions in non-renewable energy, shown in **Greenhouse Gas Table 4**, could be as much as 36,000 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[17]. If, for example, forecasted retail sales in 2020 were lowered by 10,000 GWh due to the success of increased energy efficiency expenditures, non-renewable energy needs fall by an additional 8,000 to 6,700 GWh/year, depending on the RPS level, totaling as much as 45,000 GWh per year of reduced non-renewable energy, depending on the RPS assumed as shown in **Greenhouse Gas Table 4**.

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

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]	265,185	
Statewide Retail Sales, 2020, forecast [a]	308,070	
Growth in Retail Sales, 2008-20	42,885	
Growth in Net Energy for Load [b]	46,316	
California Renewable Electricity	**GWh @ 20% RPS**	**GWh @ 33% RPS**
Renewable Energy Requirements, 2020 [c]	61,614	101,663
Current Renewable Energy, 2008	29,174	
Change in Renewable Energy-2008 to 2020 [c]	32,440	72,489
Resulting Change in Non-Renewable Energy [d]	13,876	(-36,173)

Source: Energy Commission staff 2009.

Notes:
a. Not including 8% transmission and distribution losses.
b. Based on 8% transmission and distribution losses, or 42,885 GWh x 1.08 = 46,316 GWh.
c. Renewable standards are calculated on retail sales and not on total generation, which accounts for 8% transmission and distribution losses.
d. Based on net energy (including 8% transmission and distribution losses), not on retail sales

The Role of SES Solar Two in Retirements/Replacements

SES Solar Two would be capable of annually providing 1,620 GWh of renewable generation energy to replace resources that are or will likely be precluded from serving California loads. State policies, including GHG goals, are discouraging or prohibiting new contracts and new investments in high GHG-emitting facilities such as coal-fired, generation, generation that relies on water for once-through cooling, and aging power plants (CEC 2007). Some of the existing plants that are likely to require substantial capital investments to continue operation in light of these policies may be unlikely to undertake the investments and will retire or be replaced.

Replacement of High GHG-Emitting Generation

High GHG-emitting resources, such as coal, are effectively prohibited from entering into new long-term contracts for California electricity deliveries as a result of the Emissions Performance Standard adopted in 2007 pursuant to SB 1368. Between now and 2020, more than 18,000 GWh of energy procured by California utilities under these contracts will have to reduce GHG emissions or be replaced; these contracts are presented in **Greenhouse Gas Table 5**.

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[18], 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 this proposed project; some will come from new and existing natural gas fired generation. All of these new facilities will have substantially lower GHG emissions rates than coal and petroleum coke-fired facilities, which typically averages about 1.0 $MTCO_2$/MWh without carbon capture and sequestration. Thus, new renewable facilities will result in a net reduction in GHG emissions from the California electricity sector.

Retirement of Generation Using Once-Through Cooling

The State Water Resource Control Board (SWRCB) has proposed major changes to once-through cooling (OTC) units, shown in **Greenhouse Gas Table 6**, which would likely require extensive capital to retrofit, or retirement, or substantial curtailment of dozens of generating units. In 2008, these units collectively produced almost 58,000 GWh. While the more recently built OTC facilities may well install dry or wet cooling towers and continue to operate, the aging OTC plants are not likely to be retrofit to use

[18] 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.

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 SES Solar Two. A project like SES Solar Two, located far from the coastal load pockets like the San Diego and Los Angeles Local Reliability Areas (LRAs), 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, SES One 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.

300 MW ALTERNATIVE

The 300 MW alternative would essentially be Phase 1 of the proposed 750 MW project. This alternative is shown in Alternatives Figure 1A. The 300 MW alternative would consist of 12,000 SunCatchers with a net generating capacity of approximately 300 MW occupying approximately 2,600 acres of land. The 300 MW alternative would transmit power to the grid through the SDG&E Imperial Valley Substation and would require infrastructure similar to the 750 MW project, including a water supply pipeline, transmission line, road access, operations facilities, substation, and hydrogen system (SES 2008a). This infrastructure would require approximately 40 acres.

The 300 MW alternative would retain 40% of the SunCatchers, 40% of the power generating potential, and would affect 40% of the land of the proposed 750 MW project. In terms of GHG emissions, the 300 MW alternative is estimated to create approximately 54.7% of the construction and operational GHG emissions[19] due to reduced efficiency of scale and staffing, and a requirement for certain facilities and other activities regardless of project size (SES 2009n).

The results of the 300 MW 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 slightly reduced. The overall efficiency would decrease slightly, or the GHG emission rate per unit of generation would increase slightly, due to reduction in efficiencies of scale. Both State and Federal law support the increased use of renewable power generation.

If the 300 MW 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 Imperial County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

DRAINAGE AVOIDANCE #1 ALTERNATIVE

The Drainage Avoidance #1 alternative would consist of 25,290 SunCatchers with a net generating capacity of approximately 632 MW occupying the entire proposed project footprint but avoiding primary drainages, which reduces the total project development to 4,690 acres. This alternative is shown in **Alternatives Figure 1B**. The Drainage Avoidance #1 alternative would transmit power to the grid through the SDG&E Imperial

[19] The applicant estimated that the annual operating emissions for the 300 MW size would be approximately 54.7% of the proposed project, 1,086.95 MTCO2E per year versus 1,987.68 MTCO2E per year (SES 2009i, SES 2009n). The applicant did not provide a similar construction emission estimate for the 300 MW Alternative, but staff assumes that a similar reduction in efficiency and increase in GHG emission per MW built would also occur during construction.

Valley Substation and would require infrastructure similar to the 750 MW project, including a water supply pipeline, transmission line, road access, operations facilities, substation, and hydrogen system (SES 2008a). This infrastructure would require approximately 40 acres.

The Drainage Avoidance #1 alternative would retain 84.3% of the SunCatchers, 84.3% of the power generating potential, and would affect 72.2% of the land of the proposed 750 MW project. In terms of GHG emissions, the Drainage Avoidance #1 alternative is estimated by staff to create slightly more than 88.2% of the construction GHG emissions and slightly more than 88.2% of the operational GHG emissions[20] due to reduced efficiency of scale and staffing, and a requirement for certain facilities and other activities regardless of project size (SES 2009n).

The results of the Drainage Avoidance #1 alternative would be the following:

- The impacts of the proposed project would not occur on the lands not used due to the smaller project size, and these lands are assumed not to be available for other uses as they would be within the proposed project's controlled fence line.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would be slightly reduced. The overall efficiency, would decrease slightly, or the GHG emission rate per unit of generation would increase slightly, due to reduction in efficiencies of scale. Both State and Federal law support the increased use of renewable power generation.

If the Drainage Avoidance #1 alternative were approved, other renewable projects may be developed that would compensate for the loss of generation compared to the proposed project on other sites in the Imperial County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative would consist of 16,915 SunCatchers with a net generating capacity of approximately 423 MW occupying only the central portion of the proposed project area, and avoiding the major drainages east and west of the central portion, which reduces the total project development to 3,153 acres. This alternative is shown in **Alternatives Figure 1C**. The Drainage Avoidance #2 alternative would transmit power to the grid through the SDG&E Imperial Valley Substation and would require infrastructure similar to the 750 MW project, including a water supply pipeline, transmission line, road access, operations facilities, substation, and hydrogen system (SES 2008a). This infrastructure would require approximately 40 acres.

The Drainage Avoidance #2 alternative would retain 56.4% of the SunCatchers, 56.4% of the power generating potential, and would affect 48.5% of the land of the proposed 750 MW project. In terms of GHG emissions, it is estimated that this alternative would

[20] This estimate is based on a linear MW capacity approach using the applicants provided project and 300 MW alternative estimates for operating emissions (SES 2009i, SES 2009n), which are assumed to be similar to the construction emission efficiency per MW of capacity.

create more than 67.3% of the construction GHG emissions and more than 67.3% of the operational GHG emissions[21] due to reduced efficiency of scale and staffing, and a requirement for certain facilities and other activities regardless of project size (SES 2009n).

The results of the Drainage Avoidance #2 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 slightly reduced. The overall efficiency, would decrease slightly, or the GHG emission rate per unit of generation would increase slightly, due to reduction in efficiencies of scale. Both State and Federal law support the increased use of renewable power generation.

If the Drainage Avoidance #2 alternative were approved, other renewable projects may be developed that would compensate for the loss of generation compared to the proposed project on other sites in the Imperial County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

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 SES Solar Two project application and on CDCA land use plan amendment

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

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

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another renewable energy project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

[21] This estimate is based on a linear MW capacity approach using the applicants provided project and 300 MW alternative estimates for operating emissions (SES 2009i, SES 2009n), which are assumed to be similar to the construction emission efficiency per MW of capacity.

If the proposed project is not approved, renewable projects would likely be developed on other sites in Imperial 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 two large wind projects proposed on BLM land within a few miles of the SES Solar 2 site in addition to large wind projects proposed in Mexico, south of the proposed site. In addition, there are seven large solar projects proposed on BLM land within the area served by the BLM El Centro Field Office. There are currently 70 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District.

No Project / No Action Alternative #2: No Action on SES Solar Two project and amend the CDCA land use plan to make the area available for future solar development

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

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. As a result, GHG emissions would result from the construction and operation of the solar technology and would likely be similar to the GHG emissions from the proposed project. Different solar technologies require different amounts of construction and operations maintenance; however, it is expected that all the technologies would provide the more significant benefit, like the proposed project, of displacing fossil fuel fired generation and reducing associated GHG emissions. As such, this No Project/No Action Alternative could result in GHG benefits similar to those of the proposed project.

No Project / No Action Alternative #3: No Action on SES Solar Two project application and amend the CDCA land use plan to make the area unavailable for future solar development

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

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

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.

Cumulative effects are defined by 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 entire 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

SES Solar Two, 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 SES Solar Two 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, the proposed project would not be subject to federal mandatory reporting of greenhouse gases. It would also be exempt from the state’s greenhouse gas reporting requirements.

NOTEWORTHY PUBLIC BENEFITS

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

CONCLUSIONS

The SES Solar Two 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 CEQA and NEPA impact, would not worsen current conditions, and would thus not result in CEQA impacts that are cumulatively significant or result in 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 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 project operations and would, therefore, not be CEQA significant.

The SES Solar Two 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 this 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, Volume 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

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 (Stirling Energy Systems Solar Two, LLC) 2008a (tn: 46819) – Application for Certification for the Stirling Energy Systems (SES) Solar Two Project, Volumes 1 and 2. Submitted to the California Energy Commission, June 30, 2008.

SES 2009i – Applicant's Response to BLM and Energy Commission Data Requests 53-110 (tn: 50750), March 26, 2009.

SES 2009n – Applicant's Response to BLM and Energy Commission Data Requests 128-141 (tn: 51828), June 5, 2009.

U.S.EPA 2009c. - United States Environmental Protection Agency. Fact Sheet -- Proposed Rule: Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule. September 30, 2009.

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).

ACRONYMS

AAQS	Ambient Air Quality Standard
AERMOD	ARMS/EPA Regulatory Model
AFC	Application for Certification
APCO	Air Pollution Control Officer
AQCMM	Air Quality Construction Mitigation Manager
AQCMP	Air Quality Construction Mitigation Plan
AQMD	Air Quality Management District
AQMP	Air Quality Management Plan
ARB	California Air Resources Board
ATC	Authority to Construct
ATCM	Airborne Toxic Control Measure
BACM	Best Available Control Measures
BACT	Best Available Control Technology
bhp	brake horsepower
BLM	Bureau of Land Management
CalEPA	California Environmental Protection Agency
CCR	California Code of Regulations
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
CTG	Combustion Turbine Generator
DPM	Diesel Particulate Matter
EIR	Environmental Impact Report
EPS	Emission Performance Standard
ERC	Emission Reduction Credit
FDOC	Final Determination Of Compliance
GCC	Global Climate Change
GHG	Greenhouse Gas
GSU	Generator Set-up Unit

GWh	Gigawatt-hour
H_2S	Hydrogen Sulfide
HFCs	Hydrofluorocarbons
hp	horsepower
HSC	Health and Safety Code
ICAPCD	Imperial County Air Pollution Control District
IEPR	Integrated Energy Policy Report
IID	Imperial Irrigation District
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
μg/m3	microgram per cubic meter
mg/m3	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 Protection Act
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NOx	Oxides of Nitrogen or Nitrogen Oxides
NSPS	New Source Performance Standard
NSR	New Source Review
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
PM2.5	Particulate Matter less than 2.5 microns in diameter
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
RACM	Reasonably Available Control Measures
RPS	Renewables Portfolio Standard
RTP	Regional Transportation Plan
SACM	Southern California Association of Governments
SCE	Southern California Edison
scf	standard cubic feet
SDG&E	San Diego Gas & Electric
SES	Stirling Energy Systems
SF_6	Sulfur hexafluoride
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SO_4	Sulfate
SOx	Oxides of Sulfur
SSAB	Salton Sea Air Basin
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resource Control Board
tpy	tons per year
U.S.EPA	United States Environmental Protection Agency
VDE	Visible Dust Emission
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds
WECC	Western Electricity Coordinating Council

C.2 - BIOLOGICAL RESOURCES

Testimony of Joy Nishida

C.2.1 SUMMARY OF CONCLUSIONS

The Bureau of Land Management (BLM) and Energy Commission staff has reviewed the proposed Stirling Energy Systems Solar Two project (SES Solar Two) in accordance with the requirements of the National Environmental Quality Act (NEPA) and the California Environmental Quality Act (CEQA). This section addresses biological resources issues and compatibility with applicable laws, ordinances, regulations, and standards (LORS).

Much of the 6,185-acre SES Solar Two plant site consists of Sonoran creosote bush scrub habitat, including approximately 1,039 acres of dirt and off highway vehicle (OHV) roads on BLM administered lands. The site supports a diversity of mammals, birds, and reptiles, including some special status wildlife species. Grading on the plant site would not directly or indirectly impact sensitive plant communities or wetlands, but would result in direct impacts to some special status animal species and possibly special status plant species through the removal of vegetation that provides cover, foraging, and breeding habitat for wildlife. Construction of linear facilities also has the potential for impacts to listed species; transmission line construction south of Interstate 8 would impact approximately 92.8 acres of Sonoran creosote bush scrub, which provides habitat for flat-tailed horned lizard (FTHL), which is currently a state species of special concern, a candidate for federal listing, and a BLM sensitive species. While construction of the 12-mile reclaimed water pipeline would occur mainly within the disturbed road shoulder, trenching and construction activities nevertheless could impact special status species such as burrowing owl and FTHL. These potential direct and indirect construction impacts to vegetation and wildlife at the plant site and along linear facilities can be reduced to less than significant levels under CEQA with avoidance and minimization measures described in staff's proposed Conditions of Certification **BIO-1** through **BIO-8**.

Though the FTHL is not currently listed, the U.S. Fish and Wildlife Service (USFWS) had been recently instructed by a federal district court to reinstate the proposal to list the FTHL under the federal Endangered Species Act (FESA). In case listing of this species should take place during the construction or operation of SES Solar Two, the potential take and loss of habitat for the FTHL would need to be addressed by the BLM, in conferencing with the USFWS. Measures from the issuance of a Conference Opinion from USFWS would be incorporated into staff's proposed Conditions of Certification **BIO-9** through **BIO-11**. The measures described in staff's proposed Condition of Certification **BIO-10** are adapted from the Flat-Tailed Horned Lizard Rangewide Management Strategy, which includes agreed upon compensation funds to mitigate for impacts to FTHL habitat by federal and state agencies (FTHL ICC 2003). In order for staff to conclude that fee payment reduces impacts to less than significant levels under CEQA, staff is in the process of evaluating if the use of compensation funds is sufficient for CEQA mitigation or if funds can be earmarked for specific actions which would reduce impacts to FTHL.

One of the significant biological impacts of the SES Solar Two is the impact to Waters of the U.S. and jurisdictional state waters (i.e., ephemeral washes) caused by the removal of vegetation for the placement of the SunCatchers and associated infrastructure in the bed of the ephemeral washes. Placement of the SunCatchers with its associated maintenance roads, debris basins, the electrical collection system, and the hydrogen distribution system would disrupt the physical (e.g., hydrological and sediment transport), chemical, and biological functions and processes of the ephemeral washes. Road crossings in large washes would include culverts. These activities would amount to a loss of approximately 165 acres of permanent impacts, 5 acres of temporary impacts, and 13 acres of indirect impacts to Waters of the U.S. and approximately 312 acres of permanent impacts to jurisdictional state waters. Permanent loss of jurisdictional state waters and fill to Waters of the U.S. is considered by staff to be a significant impact according to CEQA guidelines. In addition, the vegetation removal and placement of facilities in the washes would have indirect effects that have not been fully assessed. Vegetation in the desert wash contains a greater vegetative diversity and density than the areas outside of the washes. These washes are characterized by natural processes that support recruitment of native desert wash vegetation and provide wildlife habitat and movement corridors. Impacts to jurisdictional state waters would be mitigated to less than significant levels under the requirements of staff's proposed Condition of Certification **BIO-17**.

Fill of Waters of the U.S. would require authorization by the U.S. Army Corps of Engineers (USACE) pursuant to Section 404 of the federal Clean Water Act (CWA) under a Standard Individual Permit subject to CWA Section 404(b)(1) guidelines. The USACE would require mitigation for fill of Waters of the U.S. associated with the SES Solar Two project. The mitigation requirements for the CWA 404 permit are currently unresolved, but would typically include a minimum 2:1 ratio of mitigation to impacts, which can include credit for preservation of aquatic resources under the threat of development and restoration and enhancement of existing resources within the Salton Sea watershed for the remaining requirement. The USACE has proposed two on-site alternatives: 1) Drainage Avoidance #1, which prohibits permanent impacts within the ten "primary" ephemeral washes; and 2) Drainage Avoidance #2, which eliminates the eastern and westernmost portions of the applicant proposed project site with the largest ephemeral complexes.

An approximately 12-mile reclaimed water supply pipeline is proposed for construction from the Seeley Waste Water Treatment Facility to the project site along Evan Hewes Highway. The proposed reclaimed water line would either span or go under seven irrigation canals and the New River. Impacts to approximately 2.33 acres of Waters of the U.S. and 0.20 acres of jurisdictional state waters could potentially occur along this route. The CDFG is not anticipating impacts to jurisdictional state waters along the proposed water pipeline route. It is anticipated that Best Management Practices (BMPs) will be utilized to avoid impacts to Waters of the U.S. and jurisdictional state waters for the proposed reclaimed water line. The CDFG and USACE will require a Frac-Out Contingency Plan prior to the construction of the proposed water pipeline for horizontal directional drilling. Staff is awaiting the USACE draft 404(b)(1) analysis and provide draft special conditions of the permit for staff to consider including in the final EIS. Once the conditions required by the USACE are known, the requirements will be reflected into staff's proposed Condition of Certification **BIO-17**.

The SES Solar Two project includes two evaporation ponds (two acres total) that would collect reverse osmosis wastewater from the on-site water treatment facility. The ponds are a concern because they could attract ravens and other predatory bird species which in turn prey on flat-tailed horned lizard, and could also harm waterfowl, shorebirds, and other resident or migratory birds due to hyper-saline conditions. The applicant has addressed these concerns by proposing exclusionary fencing around the evaporation ponds and installing netting above the ponds that would exclude wildlife use (SES 2009f). Staff concurs and has incorporated the applicant's proposal into staff's proposed Condition of Certification **BIO-13**, which would require the project developer to install fencing around the evaporation ponds with netting above the ponds and monitor the effectiveness of exclusionary measures. Staff's proposed Condition of Certification **BIO-13** would minimize the potential adverse effects of the evaporation ponds to less than significant levels under CEQA.

State or federal listed plants or California Native Plant Society (CNPS) listed species were not included in the focused special status plant surveys conducted by the applicant, including one species which is known from the project site. Just over half the surveys were done in conjunction with FTHL surveys, utilizing biologists with varying degrees of botanical expertise to conduct the rare plant surveys. Staff would expect rare plant surveys to be conducted by qualified botanists without the distraction of looking for certain special status wildlife species. No special status plant surveys were conducted in the fall after the late summer/early fall monsoonal rains, which stimulate another bloom. Thus, survey results were not considered adequate to assess presence or absence of a species within the project area. Staff has proposed Condition of Certification **BIO-19** which requires botanical surveys to be conducted spring and fall of 2010 and avoidance of rare plants during project construction and operation. Implementation of this condition would reduce impacts to special status plants to less than significant levels under CEQA.

For purposes of CEQA compliance, the level of significance of each impact of the proposed project on biological resources is discussed in Section C.2.4.3. In summary, even with the implementation of staff's proposed conditions of certification, it is unknown if construction and operation of the SES Solar Two project would comply with all applicable laws, ordinances, regulations, and standards (LORS) relating to biological resources, and would be able to mitigate potential impacts to biological resources to less than CEQA significant levels. Similarly for purposes of NEPA compliance, it is unknown if the proposed SES Solar Two project would result in adverse impacts to biological resources due to the lack of information regarding mitigation for Waters of the U.S.

In review of the issues regarding mitigation for Waters of the U.S., staff considers the project alternatives proposed by the USACE preferable to the applicant proposed project. These alternatives would reduce development of permanent structures either within the primary drainages on the 6,063.1–acre site (Drainage Avoidance #1) or reduce the project site to 3,153 acres (Drainage Avoidance #2), avoiding the major ephemeral washes on the western and eastern end of the applicant proposed project site. Drainage Avoidance #1 Alternative would reduce permanent impacts from 165 acres to 48 acres and reduce energy production from 750 megawatts to 632 megawatts. Drainage Avoidance #2 Alternative would reduce permanent impacts from 165 acres to

71 acres and reduce energy production by 423 megawatts. However, due to the permanent impact the SES Solar Two project has on FTHL habitat, staff prefers Drainage Avoidance #2 Alternative as the impacts to FTHL habitat and to FTHL populations would be decreased by approximately 50%.

C.2.2 INTRODUCTION

This section of the Staff Assessment (SA)/Draft Environmental Impact Statement (DEIS) provides the California Energy Commission staff's and BLM analysis of potential impacts to biological resources from the construction and operation of the Stirling Energy Systems Solar Two project (SES Solar Two). Information provided in this document addresses potential impacts to special status species and areas of critical environmental concern. This analysis also describes the biological resources at the project site and at the locations of ancillary facilities. This document explains the need for mitigation, evaluates the adequacy of mitigation proposed by the applicant, and specifies additional mitigation measures designed to reduce impacts. It also describes compliance with applicable laws, ordinances, regulations, and standards (LORS) and includes staff's proposed conditions of certification.

This analysis is based, in part, upon information provided in the SES Solar Two Application for Certification (AFC) (SES 2008a) and Supplement to the AFC (SES 2008d and SES 2009q) and other submittals; responses to staff and intervenor data requests (SES 2008f, SES 2009h, SES 2009m, SES 2009n, and SES 2009t); staff workshops; site visits by Energy Commission staff on November 24, 2008 and November 10, 2009; and communications with representatives from the BLM, the CDFG, the USFWS, and the USACE.

C.2.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The analysis of proposed project effects must comply with both CEQA and NEPA requirements given the respective power plant licensing and land jurisdictions of the California Energy Commission and BLM. Because this document is intended to meet the requirements of both NEPA and CEQA, the methodology used for determining environmental impacts of the proposed project includes a consideration of significance as required by the regulations and guidance associated with both laws.

A significant impact is defined under CEQA as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project" (Cal Code Regs. tit. 14, [hereinafter CEQA Guidelines] section 15382). Thresholds for determining significance in this section are based on Appendix G of the CEQA Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission staff.

In 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) be prepared when the proposed federal action (project) as a whole has the potential to “significantly affect the quality of the human environment.” The thresholds that are used to identify potentially significant impacts under NEPA are identified the **Biological Resources Table 1** below.

Biological Resources Table 1
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.
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.
Clean Water Act (Title 33, United States Code, sections 1251 through 1376, and Code of Federal Regulations (CFR), 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 would not violate state and federal water quality standards.
U.S. Environmental Protection Agency (USEPA) Section 404 (b)(1) Guidelines (40 CFR 230 et seq.)	Requires the USACE to analyze alternatives in a sequential approach such that the USACE must first consider avoidance and minimization of impacts to the extent practicable to determine whether a proposed discharge can be authorized.
National Environmental Policy Act (NEPA), (Title 42, United States Code, section 4321 et seq.)	NEPA requires an evaluation of environmental impacts of projects proposed on federal lands or receiving federal funding.

Applicable Law	Description
California Desert Conservation Area Plan	The California Desert Conservation Area (CDCA) comprises one of two national conservation areas established by Congress at the time of the passage of the Federal Land and Policy Management Act (FLPMA). The FLPMA outlines how the BLM would manage public lands. Congress specifically provided guidance for the management of the CDCA and directed the development of the 1980 CDCA Plan.
Flat-tailed Horned Lizard Rangewide Management Strategy	Provides guidance for the conservation and management of sufficient habitat to maintain viable populations of flat-tailed horned lizards.
Federal Noxious Weed Act of 1974 (P.L. 93-629) (7 U.S.C. 2801 et seq.; 88 Stat. 2148)	Establishes a federal program to control the spread of noxious weeds. Authority is given to the Secretary of Agriculture to designate plants as noxious weeds by regulation, and the movement of all such weeds in interstate or foreign commerce was prohibited except under permit.
Executive Order 13112 of February 3, 1999 – Invasive Species (FR doc 99-3184; FR V. 64, No. 25, Presidential documents 6183-6186)	Federal agencies are mandated to take actions to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause.
Permit for take under the Bald and Golden Eagle Protection Act, (Title 50, Code of Federal Regulations, section 22.26)	Authorizes limited take of bald eagles and golden eagles under the Bald and Golden Eagle Protection Act, where the taking is associated with, but not the purpose of the activity, and cannot practicably be avoided.
Permit for take under the Bald and Golden Eagle Protection Act, (Title 50, Code of Federal Regulations, section 22.27)	Authorizes intentional take of eagle nests where: necessary to alleviate a safety hazard to people or eagles; necessary to ensure public health and safety; the nest prevents the use of a human-engineered structure; the activity, or mitigation for the activity, will provide a net benefit to eagles; and allows inactive nests to be taken only in the case of safety emergencies
State	
California Endangered Species Act of 1984 (Fish and Game Code, sections 2050 through 2098)	Protects California's rare, threatened, and endangered species.
California Code of Regulations (Title 14, section 460)	Lists state protected fur-bearing mammals.

Applicable Law	Description
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.
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	Unlawful to take, possess, or destroy any birds in the orders Falconiformes and Strigiformes or to take, possess, or destroy the nest or eggs of any such bird.
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.
Fur-bearing Mammals (Fish and Game Code sections 4000 and 4002)	Lists fur-bearing mammals which require a permit for take.
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.
Lake and Streambed Alteration Agreement (Fish and Game Code sections 1600 et seq.)	Regulates activities that may divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake in California designated by CDFG in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit. Impacts to vegetation and wildlife resulting from disturbances to waterways are also reviewed and regulated during the permitting process.
California 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.
California Food and Agriculture Code, section 403	The California Department of Food and Agriculture is designated to prevent the introduction and spread of injurious insect or animal pests, plant diseases, and noxious weeds.

Applicable Law	Description
Noxious Weeds (Title 3, California Code of Regulations, section 4500)	List of plant species that are considered noxious weeds.
Local	
Imperial County General Plan (Imperial County 1993)	The Conservation and Open Space and Land Use Elements of the General Plan direct the county to evaluate the compatibility of proposed development projects with the preservation of biological resources and open space.
Imperial County Land Use Ordinance (Title 9, Division 10)	Provides grading regulations for proposed development projects throughout the unincorporated areas of the County.

C.2.4 PROPOSED PROJECT

C.2.4.1 SETTING AND EXISTING CONDITIONS

Proposed Project

SES Solar Two proposes to develop a 750-megawatt (MW) solar energy facility called Stirling Energy Systems Solar Two project (SES Solar Two) in Imperial County. The 6,063.1-acre facility would be primarily on federal land administered by BLM in the Imperial Valley, 14 miles west of El Centro. The site is situated in the Yuha Desert, which is a section of the Colorado Desert.

The project includes the plant site, 30,000 solar dish Stirling systems referred as SunCatchers, 230-kilovolt (kV) substation, administration buildings, support facilities, evaporation ponds, and access roads) and off-site reclaimed water supply pipeline along Evan Hewes Highway and the project's linear facilities (transmission line, switchyard, and access roads) to the south of the Interstate. The total area that would be fenced and subject to disturbance is approximately 6,063.1 acres. The major components of the project are described below.

The project would be constructed in two phases. Phase I would develop approximately 2,600 acres and would begin in the southwestern corner of the plant site west of the San Diego Gas & Electric (SDG&E) transmission line. Phase I development includes the construction and/or partial development of the following:

- Access roads;
- 12-mile off-site waterline;
- Installation of 12,000 SunCatchers;
- Main services complex;
- Hydrogen generator;
- Water treatment system;
- 230-kV substation;

- Two 2,500,000-gallon evaporation ponds;
- Retention basins;
- 10.35-mile transmission line; and
- 100-acre laydown area east of Dunaway Road.

Phase II development would encompass approximately 3,500 acres on the remainder of the project site. Phase II development would include the installation of 18,000 additional SunCatchers with accompanying access roads and would extend to the north and east of the Phase I area.

Plant Site and Surrounding Area

The project's plant site is bounded by the Union Pacific Railroad to the north and Interstate 8 to the south. The western edge would be located approximately one mile west of the junction of the Union Pacific Railroad and Interstate 8, and the eastern edge would be located west of Dunaway Road. The United States Gypsum Corporation (Plaster City) processing plant is just north of the project along Evan Hewes Highway. Sand and gravel operations occur north of Evan Hewes Highway. Off-highway vehicle (OHV) use is designated as limited within the project site to designated routes only. North of the project site is the Plaster City Open OHV Area which is designated by BLM as being open to off road travel. Areas to the west and south of the project site are undeveloped, whereas the area to the east includes sand and gravel operations and agricultural production. More sand and gravel operations occur five miles west of the site in unincorporated Ocotillo. Sand and gravel operations occurred in the past on the project site, but the site has been subsequently revegetated. The plant site consists of Sonoran creosote bush scrub habitat.

Water Pipeline

Reclaimed water from the Seeley Waste Water Treatment Facility would be used for SES Solar 2 construction and plant operations. An approximately 12-mile-long, 6-inch-diameter water pipeline would be constructed within a 30-foot right-of-way (ROW). The pipeline would connect the Seeley Waste Water Treatment facility to the proposed water treatment plant on the project site along Evan Hewes Highway. The following habitats are within the 30-foot construction ROW: Sonoran creosote bush scrub, disturbed Sonoran creosote bush scrub, desert saltbush scrub, disturbed desert saltbush scrub, arrowweed scrub, tamarisk scrub, agricultural, disturbed, developed, ornamental, and open channel. The open channel habitat consists of seven irrigation canals and the New River. The proposed reclaimed water pipeline would either span or be placed under these open channels.

Transmission Line and Towers

An approximately 10.35-mile transmission line would be constructed to interconnect the project to the existing SDG&E 230-kV Imperial Valley Substation, located 7.56 miles southeast of the project site. Approximately 2.79 miles of the proposed 10.35-mile transmission line would be within the 6,063.1-acre plant site boundary. Approximately 7.56 miles of the transmission line would be built outside of the project site within an existing utility corridor in the Yuha Desert Flat-tailed Horned Lizard Management Area (MA) south of Interstate 8. The transmission line would be constructed in Sonoran creosote bush scrub habitat and in already developed areas comprised of dirt and OHV roads along an existing transmission line corridor.

Vegetation and Wildlife

Plant Communities

Eleven vegetation communities were mapped within the plant site and along linear facilities (SES 2008a and SES 2009q).

The Sonoran creosote bush scrub community covers the plant site, the transmission line alignment, and approximately three miles of the western end of the proposed reclaimed water pipeline alignment. This plant community is dominated by creosote bush (*Larrea tridentata*), bursage (*Ambrosia dumosa*), and brittlebush (*Encelia farinosa*). Other plant species observed include ocotillo (*Fouquieria splendens*) and silver cholla (*Opuntia echinocarpa*). Mesquite (*Prosopis glandulosa*) and three species of non-native tamarisk (*Tamarix* spps.), mixed with creosote are found primarily within the dry washes that transect the project site. Other non-native plants observed on-site include Sahara mustard (*Brassica tournefortii*), red brome (*Bromus madritensis* ssp. *rubens*), and Mediterranean schismus (*Schismus barbatus*). Shrub density varied from low to moderate density, in which shrub spacing ranges from several feet to tens of feet (SES 2008a). Disturbed Sonoran creosote bush scrub has had some ground disturbance in the past and contains many of the same species of plants at lower shrub densities.

The desert saltbush scrub community occurs on fine-textured, poorly drained soils with high alkalinity and salinity along the proposed reclaimed water pipeline corridor. Desert saltbush (*Atriplex polycarpa*) is the dominant shrub with mesquite and bush seepweed (*Suaeda nigra*) as common species also found in this vegetation community. Shrub density varied from low to moderate density. Disturbed saltbush scrub community has had some ground disturbance in the past and contains many of the same species of plants, in addition to non-native plants, trash, and bare ground.

The arrowweed scrub community is comprised almost entirely of arrowweed (*Pluchea sericea*) and occurs in small stands associated with the irrigation canals along the proposed reclaimed water pipeline corridor.

The tamarisk scrub community is dominated by one or more species of tamarisk (*Tamarix* spp.). Tamarisk is highly invasive and usually associated with disturbance. Other species that occur with tamarisk include arrowweed, quailbush (*Atriplex lentiformis*), and salt grass (*Distichlis spicata*). The tamarisk scrub occurs near the canals, ditches, drainages, and along the New River within the proposed reclaimed water pipeline corridor.

Agricultural areas occur along the proposed reclaimed water pipeline corridor. These areas are either actively being cultivated for row and farm crops or are currently fallow.

The disturbed areas have compacted soils and are usually dominated by non-native plants such as common sow thistle (*Sonchus oleraceus*), horehound (*Marrubium vulgare*), mustard (*Brassica* sp.) and various annual grasses. Disturbed areas are limited to the road shoulders along the Evan Hewes Highway and on sparsely vegetated roads associated with agricultural and developed areas.

The developed areas include paved, OHV, and dirt roads, the rail line, transmission line, and buildings within the study area.

The ornamental areas consist of landscape plantings associated with development along the Evan Hewes Highway occur along the proposed reclaimed water pipeline corridor. Common cultivars include oleander (*Nerium oleander*), Canary Island date palm (*Phoenix canariensis*), small-leaved palo verde (*Cercidium microphyllum*), and various species of eucalyptus (*Eucalyptus* spp.).

Open channel areas are characterized by constant flowing water, which includes the seven irrigation canals and the New River that occur along the proposed reclaimed water pipeline corridor. Cattail (*Typha* sp.), annual beard grass (*Polypogon monspeliensis*), giant reed (*Arundo donax*), and nutsedge (*Cyperus squarrosus*) were present in scarce quantities along the channel banks.

Sensitive Habitats

No sensitive natural vegetation communities occur in the survey area or within one mile of the proposed project boundaries (CDFG 2009). The natural vegetative communities that occur in the project area are not considered to be of high priority in the California Natural Diversity Database (CNDDB) (CDFG 2003). These vegetative communities are generally considered common enough to not be of concern (CDFG 2007). However, the BLM Yuha Desert FTHL Management Area is located immediately south of Interstate 8, on the south edge of the project site and USFWS-designated critical habitat for Peninsular bighorn sheep is located approximately six miles west of the project site.

Ephemeral Drainages/Waters of the U.S./Jurisdictional State Waters

The project site is located on gently sloping alluvial sediments from alluvial fans. The project area gradually slopes to the northeast. The slopes on the western side of the project site generally vary from 2% to 5%, whereas the slopes on the eastern side vary from 0.5% to 1%. The western side of the project site varies from steep hills to level valleys. Ancient Lake Cahuilla, a prehistoric freshwater lake created from the floodwaters of the Colorado River, borders the eastern edge of the project site.

Several dry desert washes traverse the site and convey flows following a substantial rainfall. The vegetation community type of the washes, classified as Sonoran creosote bush scrub, also contain sparse stands of mesquite and tamarisk (SES 2008a). The ephemeral washes generally contain a greater vegetative diversity and density than the creosote bush scrub habitat outside of the washes (SES 2009s). The ephemeral washes on the western edge of the project site drain towards Coyote Wash north of the project site, washes in the center of the project site drain north towards Coyote Wash, but are estimated to return flow towards the northeastern portion of the project site, the ephemeral washes on the eastern half of the project site drain east across the project site to the Westside Main Canal. The Westside Main Canal and Coyote Wash are tributaries to the New River and eventually to the Salton Sea, which is currently the nearest Traditionally Navigable Waterbody (TNW) as defined by the USACE. There is overlap between Waters of the U.S. and jurisdictional state waters. For the SES Solar Two project site, the USACE jurisdictional waters of the U.S. is approximately 878 acres and jurisdictional state waters is approximately 620 acres..

Off-site linear features, such as the reclaimed water pipeline, would either span the seven irrigation canals and the New River via attachment to bridge crossings or other structures or go under the waterbodies via directional boring. The canals and the New River are considered Waters of the U.S. and jurisdictional state waters. The estimated acreage of jurisdictional state waters is 0.20 acres (SES 2009q). Seepage from some of the canals has created adjacent wetlands with large stands of tamarisk scrub and arrowweed scrub, which are under federal jurisdiction. The estimated acreage of Waters of the U.S. is 2.33 acres (SES 2009q).

Wildlife

The proposed plant site, the transmission line corridor, and the reclaimed waterline west of the Main Canal mainly consist of native vegetation. Whereas the proposed reclaimed waterline east of the Main Canal consists mainly of developed and disturbed habitats associated with road construction. The project site supports a diversity of wildlife species. Reptiles detected during the 2007/2008 surveys include flat-tailed horned lizard (*Phrynosoma mcallii*), side-blotched lizard (*Uta stansburiana*), desert iguana (*Dipsosaurus dorsalis*), Great Basin whiptail (*Cnemidophorus tigris tigris*), zebra-tailed lizard (*Callisaurus draconoides*), desert horned lizard (*Phrynosoma platyrhinos*), and Colorado Desert sidewinder (*Crotalus cerastes*). Mammals recorded during the surveys include black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), California ground squirrel (*Spermophilus beecheyi*), coyote (*Canis latrans*), and desert kit fox (*Vulpes macrotis arsipus*) (SES 2008a). Along the proposed reclaimed water pipeline extension, commonly observed reptiles and mammals include the side-blotched lizard, whiptail lizard, desert cottontail, and California ground squirrel (SES 2009q).

The project area provides forage, cover, roosting, and nesting habitat for a variety of bird species, despite the moderate to low shrub density. Common resident and migratory birds detected in and near the SES Solar 2 site in 2007 and/or 2008 surveys include lesser nighthawk (*Chordeiles acutipennis*), mourning dove (*Zenaida macroura*), black-tailed gnatcatcher (*Polioptila melanura*), white-crowned sparrow (*Zonotrichia leucophrys*), California horned lark (*Eremophila alpestris actia*), verdin (*Auriparus flaviceps*), cliff swallow (*Hirundo pyrrhonota*), common raven (*Corvus corax*), great-tailed grackle (*Quiscalus mexicanus*), house finch (*Carpodacus mexicanus*), mourning dove (*Zenaida macroura*), lesser goldfinch (*Carduelis psaltria*), northern mockingbird (*Mimus polyglottos*), rock dove (*Columba livia*), western kingbird (*Tyrannus verticalis*), western meadowlark (*Sturnella neglecta*), and white-winged dove (*Zenaida asiatica*). Raptors detected at the site include American kestrel (*Falco sparverius*), red-tailed hawk (*Buteo jamaicensis*), and turkey vulture (*Cathartes aura*). Burrowing owls (*Athene cunicularia*) were also detected along the transmission line route with potential burrows on the project site (SES 2008a). Along the proposed reclaimed water pipeline extention, commonly observed birds include the killdeer (*Charadrius vociferous*), song sparrow (*Melospiza melodia*), cliff swallow (*Petrochelidon pyrrhonota*), common raven, house finch, and mourning dove (SES 2009q). The highest densities of burrowing owls would most likely occur in the agricultural areas along the proposed water pipeline route.

Special Status Species

Biological Resources Table 2 includes special status species that are known to occur in the project area and vicinity according to the California Natural Diversity Database (CNDDB) (CDFG 2009) or have the potential of occurring. There is no indication that a special status species list was solicited from the USFWS. None of the special status plant species listed below was detected during the 2007 and 2008 surveys (SES 2008a and SES 2009q), although those surveys had limitations to the extent that staff is requiring additional surveys to be conducted in 2010. Five special status wildlife species were detected during the surveys, and are discussed in more detail below. Species observed during the 2007/2008 surveys are indicated by **bold-face type.**

Biological Resources Table 2
Special Status Species Known or Potentially Occurring in the SES Solar 2 Area

PLANTS		
Common Name (*Scientific Name*)	Status State/Fed/BLM/CNPS	Potential for Occurrence
chaparral sand verbena (*Abronia villosa* var. *aurita*)	__/__/S/1B.1	**Low**—not observed though not specifically targeted during surveys along proposed water pipeline during the appropriate blooming period. Historic CNDDB occurrence in Seeley in the area of the proposed water pipeline.
Harwood's milk-vetch (*Astragalus insularis* var. *harwoodii*)	__/__/__/2.2	**Moderate**—Surveys insufficient to determine presence or absence. Closest CNDDB occurrence two miles southwest of project site. Suitable habitat occurs on project site.
pink fairy duster (*Calliandra eriophylla*)	__/__/__/2.3	**Moderate**—Surveys insufficient to determine presence or absence. Suitable habitat occurs on the project site. Nearest CNDDB record is from 1989 approximately 4 miles southwest of the project site.
crucifixion thorn (*Castela emoryi*)	__/__/__/2.3	**Moderate**—Surveys insufficient to determine presence or absence. Nearest CNDDB record is from 1997 from the BLM Crucifixion Thorn Natural Area approximately 5.5 miles south of the project site. Suitable habitat occurs on the project site.

PLANTS		
Common Name (*Scientific Name*)	Status State/Fed/BLM/CNPS	Potential for Occurrence
flat-seeded spurge (*Chamaesyce platysperma*)	__/__/S/1B.2	**Moderate**—Surveys insufficient to determine presence or absence. Nearest CNDDB record is from the vicinity of Superstition Mountain approximately 14 miles north of the project site. Suitable habitat occurs on the project site.
Wiggins' croton (*Croton wigginsii*)	_R/__/S/2.2	**Moderate**—Surveys insufficient to determine presence or absence. Known to occur in the Yuha Desert south of the project site (Trouette 2010). Suitable habitat occurs on the project site.
annual rock nettle (*Eucnide rupestris*)	__/__/__/2.2	**Low**—Surveys insufficient to determine presence or absence. Nearest CNDDB record is approximately 4.5 miles northwest of the project site. Suitable habitat occurs on the project site; however, the site is located below the typical elevation range that this species usually occurs.
Baja California ipomopsis (*Ipomopsis effusa*)	__/__/__/2.1	**Moderate**—Surveys insufficient to determine presence or absence. Nearest CNDDB record is from Pinto Wash immediately north of Highway 98 approximately 9 miles southeast of the project site. Suitable habitat occurs on the project site.
slender-leaved ipomopsis (*Ipomopsis tenuifolia*)	__/__/__/2.3	**Low**—Surveys insufficient to determine presence or absence. Nearest CNDDB record is a historic record (1927) from the summit of Mountain Springs Grade approximately 10 miles southwest of the project site. Suitable habitat occurs on the project site; however, the site is located below the typical elevation range that this species usually occurs.

PLANTS		
Common Name (*Scientific Name*)	Status State/Fed/BLM/CNPS	Potential for Occurrence
Mountain springs bush lupine (*Lupinus excubitus* var. *medius*)	__/__/S/1B.3	**Low**—Surveys insufficient to determine presence or absence. Nearest record is from Myers Valley approximately 9 miles southwest of the project site. Suitable habitat does not occur on the project site.
brown turbans (*Malperia tenuis*)	__/__/__/2.3	**Moderate**—Surveys insufficient to determine presence or absence. The nearest CNDDB record is from the Yuha Desert, south of Pinto Wash, approximately 5 miles south-east of the project site. Suitable habitat occurs within the site.
hairy stickleaf (*Mentzelia hirsutissima*)	__/__/__/2.3	**Moderate**—Surveys insufficient to determine presence or absence. The nearest CNDDB occurrence is from Mountain Spring Grade approximately 11 miles southwest of the project site. Suitable habitat occurs within the project site.
slender woolly-heads (*Nemacaulis denudata* var. *gracilis*)	__/__/__/2.2	**Moderate**—Surveys insufficient to determine presence or absence. The nearest CNDDB record is approximately 3 miles west of the site. Suitable habitat occurs within the project site.
Thurber's pilostyles (*Pilostyles thurberi*)	__/__/__/4.3	**High**—Surveys insufficient to determine presence or absence. Historic CNDDB occurrence on northwest edge of project site. Suitable habitat is present as three species of *Psorothamnus* spp., the host plants for Thurber's pilostyles, occur on project site.
dwarf germander (*Teucrium cubense* ssp. *depressum*)	__/__/__/2.2	**Moderate**—Surveys insufficient to determine presence or absence. Nearest CNDDB occurrence six miles southwest of project site. Suitable habitat occurs on project site.

PLANTS		
Common Name (*Scientific Name*)	Status State/Fed/BLM/CNPS	Potential for Occurrence
Orcutt's woody-aster (*Xylorhiza orcuttii*)	__/__/S/1B.3	**Moderate**—Surveys insufficient to determine presence or absence. Nearest CNDDB record is from Basin Wash into Tule Wash in the Anza-Borrego State Park approximately 12.5 miles northwest of the project site. Suitable habitat occurs on project site.

WILDLIFE		
Common Name (*Scientific Name*)	Status State/Fed/BLM/CNPS	Potential for Occurrence
Reptiles		
barefoot banded gecko (*Coleonyx switaki*)	ST/__/__	**Low**—not observed; nearest CNDDB occurrence approximately six miles northwest of project site. Lack of rocky habitat makes the project site unsuitable for this species.
flat-tailed horned lizard (*Phrynosoma mcallii*)	CSC/__/S	**High**—observed on project site during surveys.
Birds		
golden eagle (*Aquila chrysaetos*)	SFP/__/__	**Moderate**—not observed though within winter range of this species. Rarely seen in Imperial County, only five known occurrences documented in Imperial County; nearest occurrence approximately two miles northeast of Seeley (McCaskie 2010). Suitable nesting habitat does not occur on the project site; however, suitable foraging habitat does occur on the project site.
burrowing owl (*Athene cunicularia*)	CSC/BCC/S	**High**—observed on project site during surveys.
California horned lark (*Eremophila alpestris*)	CSC/__/__	**High**—observed on project site during surveys.

WILDLIFE		
Common Name (*Scientific Name*)	Status State/Fed/BLM/CNPS	Potential for Occurrence
bald eagle (*Haliaeetus leucocephalus*)	SE/FT-D/__	**Low**—not observed though within winter range of this species. Nearest occurrence is from the south shore of the Salton Sea, approximately 18 miles northeast of the project site (Patten et al. 2003). Suitable foraging and nesting habitat does not occur on the project site.
loggerhead shrike (*Lanius ludovicianus*)	CSC/BCC/__	**High**—observed on project site during surveys.
black-tailed gnatcatcher (*Polioptila melanura*)	WL/__/__	**High**—observed on project site during surveys.
vermillion flycatcher (breeding) (*Pyrocephalus rubinus*)	CSC/__/__	**Moderate**—not observed; nearest CNDDB occurrence two miles south of proposed water pipeline. Suitable habitat occurs in the riparian areas associated with the irrigation canals and New River.
Yuma clapper rail (*Rallus longirostris yumamensis*)	SE, SFP/FE/__	**Low**—not observed during field surveys; nearest CNDDB record for this species is from 2005 from the southern end of the Salton Sea at the mouth of New River approximately 25 miles northwest of the project site. Suitable large areas of open water, marsh habitat, and adjacent upland areas do not occur in the project site for this species.
Le Conte's thrasher (*Toxostoma lecontei*)	WL/BCC/__	**High**—observed on project site during surveys. Several CNDDB records within the vicinity of the site.
Mammals		

WILDLIFE		
Common Name (*Scientific Name*)	Status State/Fed/BLM/CNPS	Potential for Occurrence
pallid bat (*Antrozous pallidus*)	CSC/__/S	**Moderate**—no roost sites observed during field survey although focused surveys for bat roosts were not conducted; nearest CNDDB record is 20 miles northwest of the project site at Fish Creek Wash at the south end of Split Mountain in Anza Borrego State Park in 1996. Suitable foraging habitat occurs in the project area and suitable roosting habitat occurs along the Evan Hewes Highway for the proposed recycled water pipeline.
western yellow bat (*Lasiurus xanthinus*)	CSC/__/__	**High**—no roost sites observed during field surveys although focused surveys for bat roosts were not conducted; nearest CNDDB occurrence is 11 miles east of the project site in El Centro during 1989-1990. Suitable roosting and foraging habitat occurs along the proposed recycled water pipeline.
big free-tailed bat (*Nyctinomops macrotis*)	CSC/__/__	**Low**—no roost sites observed during field survey although focused surveys for bat roosts were not conducted; nearest CNDDB occurrence is near El Centro during 1987 approximately 12 miles east of the project site. Though the project site may be suitable foraging habitat, roosting habitat does not occur on the project site.
Peninsular bighorn sheep (*Ovis canadensis nelsoni*)	ST/FE/S	**Moderate**—observed on project site, but considered an unusual occurrence. Habitat on project site is not optimal for bighorn sheep due to lack of cover, escape routes, human recreational OHV use, but the project site provides marginal foraging habitat.

WILDLIFE		
Common Name (*Scientific Name*)	Status State/Fed/BLM/CNPS	Potential for Occurrence
American badger (*Taxidea taxus*)	CSC/__/__	**High**—not observed though potential burrows observed on project site during surveys. Nearest occurrence south across Interstate 8 from project site.

Sources: CDFG 2009; CNPS 2009; SES 2008a

Biological Resources Table 2 – Notes

STATUS CODES:

State
CSC: California Species of Special Concern. Species of concern to CDFG because of declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction.
SE: State listed as endangered
ST: State listed as threatened
SFP: Fully protected
WL: Watch List: includes species formerly on California Species of Special Concern List (Remsen 1978) but which did not meet the criteria for the current list of special concern bird species (Shuford and Gardali 2008).

Federal
FE: Federally listed endangered: species in danger of extinction throughout a significant portion of its range
FT: Federally listed, threatened: species likely to become endangered within the foreseeable future
BCC: Fish and Wildlife Service: Birds of Conservation Concern: Identifies migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent highest conservation priorities http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf
D: Delisted taxon that is considered recovered

BLM
S - Sensitive

California Native Plant Society (CNPS)
List 1B: Rare, threatened, or endangered in California and elsewhere
List 2: Rare, threatened, or endangered in California but more common elsewhere
0.1: Seriously threatened in California (high degree/immediacy of threat)
0.2: Fairly threatened in California (moderate degree/immediacy of threat)
0.3: Not very threatened in California (low degree/immediacy of threats or no current threats known)

Potential to Occur:

High – Suitable habitat is present within the proposed site: occurrence records exist for species in proximity to the site; species expected to occur on site

Moderate – Low quality suitable habitat is present within or near the proposed site; species was not identified during reconnaissance surveys of the site; species may occur on site

Low – Suitable habitat is not present on site; species not expected to occur on site

Special Status Plants

The project area is known to support a variety of special status plant species. Of the 16 special status species identified in Table 2, none are federally listed, five are BLM Sensitive species, and one is state listed. Due to the suitable habitat being present, most of the special status plant species listed in Table 3 have a moderate potential of occurring on the project site, though they were not detected during surveys. The low potential for occurrence for other species, with the exception of chaparral sand verbena, is mainly due to the project site being located below the typical elevation range for the particular species. During a California Natural Diversity Database search (CDFG 2009), staff identified four additional special status plant species with the potential to occur on the project site. These four species include chaparral sand verbena, pink fairy duster, Thurber's pilostyles, and dwarf germander, which were not targeted during special status plant surveys. Another species, Wiggins' croton, was also identified with the potential to occur on the site as it is known to occur in the Yuha Desert south of the proposed SES Solar Two site (Trouette 2010). Since element occurrences of chaparral sand verbena and Thurber's pilostyles have been recorded on the project site by the CNDDB, both species are discussed in more detail below.

Eleven of the 21 special status plant survey days were conducted concurrently with the FTHL surveys during March and May of 2007 and 2008 (SES 2008a) during the corresponding blooming season. Surveyors, in teams of two to three biologists, were spaced evenly apart while conducting meandering transects.

Though the estimated 75% coverage rate for the site and the 100% coverage rate for habitats which have a greater chance of special status plant species occurrences, such as ephemeral washes, were targeted for the surveys, the possibility of missing or overlooking special status plant species is increased for the following reasons: the varying degree of botanical expertise (trained botanists to those with little or no botanical experience), 11 of the 21 rare plant survey days conducted concurrently with the FTHL surveys, an incomplete list of potential special status plants that may occur on the project site, and not conducting special status plant surveys in the fall after the late summer/early fall monsoonal rains. Staff is concerned that the applicant utilized wildlife biologists to conduct many of the rare plant surveys. Although many wildlife biologists are well trained in plant identification, not only were wildlife biologists conducting rare plant surveys, they were conducting them during wildlife surveys where the focus and methods may be different. Also, many ephemerals bloom after the summer monsoonal rains in the desert so the documentation of the occurrence of many additional plant species may be lacking. Thus, survey results were not considered adequate to assess presence or absence of a species within the project area.

Chaparral Sand Verbena (Abronia villosa var. aurita)

Chaparral sand verbena is an annual herb found in Los Angeles, Orange, and San Diego Counties and the Sonoran Desert in San Bernardino, Riverside, and Imperial Counties. It occurs in chaparral, coastal scrub, and desert dune habitats from 260 to 5,250 feet in elevation and blooms from January to September (CNPS 2009). The California Natural Diversity Database (CNDDB) (CDFG 2009) shows a historic occurrence of this species from 1949 in the Seeley area. Though general biological surveys were conducted when chaparral sand verbena would be identifiable, no focused special status species surveys were conducted for this species within the study area during the site visits. The sensitive species table in the AFC Supplement (SES 2009q) failed to list chaparral sand verbena with the potential to occur in the vicinity even though the CNDDB historic record shows it may occur along the reclaimed water pipeline.

The potential for the chaparral sand verbena to occur in the project area is low due to unsuitable habitat conditions caused by roadway and agricultural development. Also, this species would have been identifiable if sighted during the general surveys along the reclaimed water pipeline corridor as the surveys were conducted during the blooming period for this species.

Thurber's Pilostyles (Pilostyles thurberi)

Thurber's pilostyles is a perennial herb parasite that flowers on the stems of the indigobush (*Psorothamnus* spp.), especially Emory indigobush (*P. emoryi*). It occurs in

Sonoran desert scrub habitat in San Diego and Imperial Counties (CDFG 2009) from 0 to 1,200 feet in elevation and blooms in January (CNPS 2009). CNDDB (CDFG 2009) shows a historic element occurrence of this species from 1957 in the project area two miles west of Plaster City. The sensitive species table in the AFC (SES 2008a) failed to list Thurber's pilostyles with the potential to occur in the vicinity even though the CNDDB historic record shows it has occurred on the project site. Three species of *Psorothamnus* spp., including Emory indigobush, have been observed on the project site, thus increasing the potential of Thurber's pilostyles occurrence. Over half of the special status plant species surveys were conducted concurrently with the FTHL surveys. During FTHL surveys, the search for special status species would focus on the soil surface rather than the interior of indigobush shrubs, thus missing possible occurrences of Thurber's pilostyles.

Special Status Wildlife

The project area is known to support a variety of special status wildlife species. Due to the suitable habitat being present, most of the special status wildlife species listed in **Biological Resources Table 2** have a moderate potential of occurring on the project site, though they were not detected during surveys. Species which were detected onsite, the detection of wildlife signs (i.e., scats, burrows, or tracks), or those species with a high potential for occurrence are discussed in more detail below.

Flat-Tailed Horned Lizard (Phrynosoma mcallii)

The flat-tailed horned lizard's range includes southeastern California, southwestern Arizona, and adjacent portions of Baja California and Sonora, Mexico in the Lower Colorado River Valley Subdivision of the Sonoran Desert (Foreman 1997). Typical habitat for the FTHL is sandy desert hardpan or gravel flats with fine, windblown sand. The vegetation is scattered and sparse vegetation with low species diversity (Foreman 1997; Nafis 2009).

Some FTHLs may be active when temperatures are warm with peak activity occurring in spring, early-summer, and in the fall (Marlow 2000). Winter dormancy normally begins mid-November and continues until mid-February (Muth and Fisher 1992), but may begin as early as October and continue until March (NatureServe 2009). The FTHL primarily feed on harvester ants. They obtain water from their food source, and FTHL generally do not use free-standing water (Foreman 1997), however, rain harvesting has been noted in FTHL that have been opportunistically sprayed with water (Grant 2005).

Annual home ranges have been estimated between 0.15 and 146.3 acres and are sex and rainfall dependent and possibly resource density dependent (NatureServe 2009). During their active period, FTHL retreat to shallow burrows and aboveground shade to escape the heat of the day (Marlow 2000), and also bury themselves just beneath the surface of the sand at nighttime (NatureServe 2009).

The FTHL populations have declined throughout their range because of loss and degradation of habitat caused by urbanization, agricultural development, military activities, recreational OHV use, and Border Patrol and illegal drive-through traffic (68 FR 341). The FTHL has also been impacted by increased predation by loggerhead shrikes, roadrunners, raptors, round-tailed squirrels, common ravens, coyotes, kit foxes, and collisions with vehicles on paved and unpaved roads (Marlow 2000, Grant 2005).

Survey Results for Flat-Tailed Horned Lizard

A habitat assessment was conducted in March 2007 to determine suitability for flat-tailed horned lizard (FTHL). Due to the occurrence of harvester ants (*Pogonomyrmex* spp.) a primary food source for FTHL throughout the project area, and suitable soil and vegetation to support FTHL, it was determined that surveys in accordance with the FTHL Rangewide Management Strategy (FTHL ICC 2003) would be necessary. From May 1, 2007, to May 7, 2008, modified project evaluation protocol surveys were conducted for FTHL (increased plot size from 1 hectare [approximately 2.5 acres] to 4 hectares [approximately 9.9 acres]). The project site was divided into 26-acre plots. Within each 26-acre plot, a 4-hectare survey plot was surveyed for one hour by two or three biologists, giving a sample-survey coverage rate of 38% (SES 2009m). For the linear features (water line and transmission line), four transects were surveyed on each side of center. Live or dead horned lizards, their scats and tracks were recorded and mapped on a Global Positioning System (GPS) receiver with 5-meter accuracy. Photographs were taken and survey forms were completed for each horned lizard sighting. A total of eight FTHLs were observed during the biological surveys in 2007. Five of the eight FTHLs were observed within the site boundary and one was observed just outside the eastern boundary. Two dead FTHLs were observed along the off-site transmission line. During the surveys in 2008, two FTHLs were detected in the project site (SES 2008a).

Flat-Tailed Horned Lizard Habitat in the Project Area

The 6,063-acre plant site and the 92.8-acre off-site transmission line provide suitable habitat and food source to support FTHLs (SES 2008a). Furthermore, FTHLs were observed on the project site during surveys. Therefore, FTHLs are known to be present throughout the project site. Based on data collected by the BLM and analyzed by William Kristan, assistant professor of Biological Sciences at California State University, San Marcos, and Grant (2005), there could be potentially 2,000 to 5,000 FTHLs in the project area.

Though Interstate 8 may serve as a barrier for movement between the Yuha Desert FTHL Management Area (MA) and the proposed project site, the large culverts under the highway which are in excess of 200 feet, may allow wildlife movement between the two suitable FTHL areas. It is unlikely that FTHL would use the culverts to move between the MA and the proposed project site due to the long distance between these areas and lack of light along the length (Painter and Ingraldi 2007).

Yuha Desert Flat-Tailed Horned Lizard Management Area

The plant site is located north of Interstate 8 outside the Yuha Desert FTHL Management Area (MA). The 92.8-acre off-site transmission line is located within the MA. The Yuha MA is one of five established by the FTHL Interagency Coordinating Committee, consisting of representatives from federal, state, and local governments who have entered into a conservation agreement with the objective of reducing threats to a candidate species or its habitat. The goal of designating the MAs is to maintain or increase self-sustaining FTHL populations within the MAs (FTHL ICC 2003).

American Badger (Taxidea taxus)

American badgers were once fairly widespread throughout open grassland habitats of California. They are now rare, permanent residents throughout most of the state, with the exception of the northern North Coast area. Known to occur in the Colorado 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 creosote bush scrub and sagebrush. Mating occurs in late summer or early fall and two to three young are born 183 to 265 days later in March or April (Long 1973). Badgers are fossorial, digging large burrows in dry, friable soils and would use multiple dens/cover burrows within its home range. It typically uses a different den every day, although it 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 three 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 much lower in highly disturbed areas (Sullivan 1996).

No American badgers were detected during project surveys in 2007 or 2008, although several potential burrows occurred on-site. The CNDDB indicates occurrences in the adjacent Coyote Wells and Seeley quads with the closest occurrence immediately south of Interstate 8 from the project site (CDFG 2009). The project site provides high habitat potential for this species.

Peninsular Bighorn Sheep (Ovis canadensis nelsoni) Distinct Population Segment

The Peninsular bighorn sheep are a Distinct Population Segment (DPS) of desert bighorn sheep (63 FR 13134) which occupies the Peninsular Ranges of southern California ranging from the San Jacinto Mountains in California south to the Volcan Tres Virgenes Mountains in Baja California, Mexico (Beacham 2000). 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 to 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 Peninsular bighorn sheep is typically between January and June (Beacham 2000).

Surface water is another element of desert bighorn habitat considered to be 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).

In 1971, it was estimated that there were 1,171 individuals, but their numbers may have been reduced to 280 individuals by 1996. Ostermann et al. (2001) found between 1987 and 1998, the decline in numbers was primarily due to a low recruitment of lambs (13.7 lambs per 100 ewes) combined with mountain lion predation. Population estimates for Peninsular bighorn sheep 2006 showed an increase of 793 individuals (72 FR 57740). The CNDDB records indicate that this species was documented approximately 9 miles southwest of the project site in the vicinity of the Pinto/In-Ko-Pah Drainage in 1986, when approximately 20 sheep were recorded (CDFG 2009). Weaver's 1986 studies of bighorn sheep also documented approximately 85 individuals 14 miles west of the project site in the In-Ko-Pah Mountains (CDFG 2009).

The U.S. Fish and Wildlife Service designated a total of 376,938 acres of critical habitat for Peninsular bighorn sheep in the Peninsular Ranges along the northwestern edge of the Sonoran Desert. A 79,220-acre area of critical habitat in the Carrizo Canyon area of San Diego and Imperial Counties west of the proposed project site is referred to as "Unit 3" (72 FR 57740). Unit 3 encompasses the Carrizo Canyon area and the surrounding In-Ko-Pah Mountains, Tierra Blanca Mountains, and the Jacumba and Coyote Mountains near the project site in San Diego and Imperial Counties, extending south to the U.S.-Mexico border. The primary constituent elements (PCE) in Unit 3 which are physical and biological features that are essential to the conservation of Peninsular bighorn sheep include: PCE 1─steep to very steep, rocky terrain with elevations and slopes that provide for sheltering, lambing, mating, movement among and between ewe groups; PCE 2─a range of vegetation types; PCE 3─predator evasion; and PCE 4 and 5─foraging and watering areas including alluvial fans (74 CFR 17288). The recovery objective for Peninsular bighorn sheep is to "secure and manage habitat in order to alleviate threats so that population levels will increase to the point that this species may be reclassified to threatened status and ultimately delisted" (USFWS 2000).

The presence of Peninsular bighorn sheep on the project site was confirmed this year. A group of five ewes and/or juveniles were sighted in spring of 2009 in an ephemeral wash (SES 2009m) approximately one mile southwest of Plaster City. Peninsular bighorn sheep do use lowland habitat periodically for foraging and dispersal. Movement by bighorn sheep of this distance from known habitat approximately six miles to the west of the project site has not been previously documented. Biologists for the BLM and consultants for the applicant have speculated that the bighorn sheep sited at the project location could have been flushed by OHV activity and possibly became disoriented and wandered onto the project site. According to Steve Torres (2009) of the CDFG, this is the furthest east that a sighting of Peninsular bighorn sheep has been documented.

Western Yellow Bat (Lasiurus xanthinus)

Western yellow bat is an uncommon species which ranges from southwestern U.S. into northern Mexico (WBWG 2005). In California, western yellow bats have been reported below 2,000 feet elevation in valley foothill riparian, desert riparian, desert wash and palm oasis habitats (Harris 2008). The species shows a particular association with palm oases and is believed to expanding their range and abundance with the increased usage of ornamental palms in landscaping (WBWG 2005 and Harris 2008). Western yellow bats in California can either occur year-round or individuals or populations can be migratory (WBWG 2005). This species feeds on flying insects and forages over water and among trees (Harris 2008) and commonly roosts in the skirt of dead fronds of palm trees (WBWG 2005).

No western yellow bats were observed during the surveys, but no surveys were specifically conducted for this species or any other bats. A western yellow bat specimen was collected approximately 11 miles east of the project site in 1977. Other specimens were collected in El Centro from 1980 to 1999 (CDFG 2009). Due to the lack of palms on the project site and the off-site transmission line route, staff considers it unlikely that western yellow bats occur there. However, ornamental palms planted along the Evan Hewes Highway where the reclaimed water pipeline is proposed serve as potential roosting sites for the bats. Given that western yellow bats are in the project area, there is high potential for this species to be present along the reclaimed water pipeline corridor.

Western Burrowing Owl (Athene cunicularia)

Western burrowing owls inhabit arid lands throughout much of the western United States and southern interior of western Canada (Haug et al. 1993). In many other areas, this species has declined because of habitat modification, poisoning of its prey, and introduced nest predators. However, the Imperial Valley has been a population strong-hold for burrowing owls. It is estimated that 71% of the state's burrowing owl pairs occur in the Imperial Valley (SCPBRG 1998-2007). The burrowing owl is diurnal and usually non-migratory in this portion of its range.

Burrowing owls are unique among the North American owls in that they nest and roost in abandoned burrows, especially those created by ground squirrels, kit fox (*Vulpes macrotis*), and other wildlife. Burrowing owls have a strong affinity for previously occupied nesting and wintering habitats. They often return to burrows used in previous years, especially if they were successful at reproducing there in previous years (Gervais et al. 2008). The southern California breeding season (defined as from pair bonding to fledging) generally occurs from February to August with peak breeding activity from April through July (Haug et al. 1993).

In the Imperial Valley, burrowing owls generally occur in high densities near agricultural lands where rodent and insect prey tend to be more abundant (Gervais et al. 2008). Burrowing owls tend to be opportunistic feeders. Large arthropods, mainly beetles and grasshoppers, comprise a large portion of their diet. Small mammals, especially mice and voles (*Microtus*, *Peromyscus*, and *Mus* spp.), are also important food items for burrowing owls. Other prey animals include reptiles and amphibians, young cottontail rabbits (*Sylvilagus* sp.), bats, and birds, such as sparrows and horned larks (*Eremophila* *alpestris actia*). Consumption of insects increases during the breeding season (Haug et al. 1993).

Habitat within the project area and along the linear features is suitable for burrowing owls. Nine burrows with burrowing owl sign were identified within the survey area (SES 2008a). Three active burrowing owl burrows were located on the project site, one along the transmission line corridor, one near the off-site reclaimed waterline, and four at adjacent off-site locations (SES 2008a). Surveys conducted in 2009 along the proposed reclaimed water pipeline extension did not detect burrowing owls or potential burrows (SES 2009q). There is potential for presence of burrowing owls as the pipeline would cross suitable habitat such as agricultural fields and canal banks with ground squirrel burrows (SES 2009q).

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). 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).

Loggerhead shrikes are fairly common breeding residents in the Imperial Valley, and are typically associated with desert scrub. Agricultural areas, which are common in the Imperial Valley, are used during the non-breeding season (Rosenberg et al. 1991). Surveys conducted since 1966 have shown a decreasing trend in the population of loggerhead shrikes in Mojave and Sonoran Deserts (Sauer et al. 2008). Suitable habitat for loggerhead shrike occurs throughout the scrub habitats within the project survey area, and loggerhead shrikes were observed during the 2007 and 2008 surveys (SES 2008a).

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). 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. 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 is declining due in part to the conversion of habitat to agriculture and urbanization (Laudenslayer et al. 1992). LeConte's thrasher is one of the focal bird species identified by The Desert Bird Conservation Plan (CalPIF 2009) that is vulnerable to habitat loss and fragmentation. LeConte's thrashers are also affected by off-highway use during nesting season (Remsen 1978), which occurs on designated unimproved roads throughout the project site.

One LeConte's thrasher was observed just west of the project boundary within the one-mile buffer survey area during the 2007 surveys (SES 2008a). There is some confusion as to the resident status of this species in the Imperial Valley (Patten et al. 2003). Kimball Garrett of Los Angeles County Museum of Natural History Section of Ornithology considers LeConte's thrashers to be a resident species and the reason for the low species counts is possibly due to the lack of birding done in these areas (2009). There is high potential for LeConte's thrashers to utilize the project area for foraging and cover.

California Horned Lark (Eremophila alpestris actia)

Horned larks prefer areas with sparse vegetation and exposed soil. In western North America, this species is associated with desert brushlands, grasslands, and similar open habitats, as well as alpine meadows (Garrett and Dunn 1981). Throughout their range, horned larks avoid all habitats dominated by dense vegetation and become scarce and locally distributed in heavily forested areas. Horned larks are also commonly found in agricultural areas where they breed in fallow fields (Audubon California 2007). The nests are destroyed by planting and other agricultural activities, which has contributed to an 84% decline in horned lark populations since 1967. As a result, Audubon California (2007) considers this species one of California's most vulnerable common bird.

Multiple individuals of this species were observed frequently throughout the survey area during the 2007 and 2008 surveys (SES 2008a).

Vermilion Flycatcher (Pyrocephalus rubinus)

Vermilion flycatchers are a tropical species which barely extends into southwestern U.S. In the Colorado Desert, the vermillion flycatchers are uncommon residents, whereas in the colder Mojave Desert, this species disperses outside of the breeding range during the winter and spring (Myers 2008). This species was fairly widespread and a common breeder throughout the Sonoran Desert as it was associated with open, low-lying riparian areas mainly dominated by mesquite with accessible water (Patten 1997). Population declines in vermilion flycatcher numbers can be attributed to the destruction of native riparian habitat and the replacement of native riparian tree species with the non-native tamarisk (Patten 1997). Even though range expansion for the flycatcher has occurred westward through the Mojave Desert, the total number of individuals may have decreased (Patten 1997).

During breeding season, this species can be found within arid scrub, agricultural areas, savanna, and riparian woodland with open water (Myers 2008). Vermilion flycatchers prefer open riparian areas and tend to avoid dense riparian growth (Myers 2008). In general, vermilion flycatchers prey upon insects and other arthropods (Myers 2008).

Suitable habitat for vermilion flycatcher occurs in the riparian areas associated with the irrigation canals and New River along the proposed reclaimed waterline. This species has been documented as a regular winter visitor at Fig Lagoon, south of Seeley adjacent to the New River (McCaskie 2009) approximately two miles south of the reclaimed waterline.

Black-tailed Gnatcatcher (Polioptila melanura)

Black-tailed gnatcatchers are restricted to arid and semiarid zones in the Sonoran and Mojave deserts (Kucera 1997). This species requires areas with native vegetation and prefers to breed in desert thorn scrub and thickets, densely lined arroyos, and washes dominated by creosote bush and saltbush (Tinant 2006). This species is a year-round resident in the deserts. The North American Breeding Bird Survey Results and Analysis from 1966 to 2007 indicated that black-tailed gnatcatchers were in decline, but this decline is not considered statistically significant (Sauer et al. 2008). However, there is some cause for long-term concern due to agricultural conversion of habitat and the spread of invasive nonnative tamarisk (Tinant 2006). Black-tailed gnatcatcher is one of the focal bird species identified by The Desert Bird Conservation Plan (CalPIF 2009) that is vulnerable to habitat loss and fragmentation.

Black-tailed gnatcatchers were commonly observed throughout the SES Solar Two project site during the surveys (SES 2008a).

C.2.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Construction Direct and Indirect Impacts and Mitigation

Direct impacts are 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.

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, permanent impacts 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 resprout 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). In this analysis, an impact is considered temporary only if there is evidence to indicate that pre-disturbance levels of biomass, cover, density, community structure, and soil characteristics could be achieved within five years.

Overview of Impacts to Vegetation and Wildlife

Due to the placement of the SunCatchers, grading would not occur on the entire 6,063.1-acre SES Solar Two plant site. Sensitive plant communities as defined by CDFG (2009) would not be impacted, but grading would directly affect wildlife and other special status species by removal of shrubs and herbaceous vegetation, resulting in loss and fragmentation of cover, breeding, and foraging habitat. During construction, wildlife could be crushed or entombed in dens or burrows, and could collide with vehicles. The plant site supports a diversity of mammals, birds, reptiles, special status wildlife species, and possibly special status plant species. Construction on the plant site would permanently eliminate approximately 5,024.4 acres of Sonoran creosote bush scrub and approximately 1,038.7 acres of disturbed/developed Sonoran creosote bush scrub (SES 2009s).

The project includes 30,000 SunCatchers, two 2,500,000-gallon evaporation ponds, a 230-kV substation, Main Services Complex with facilities such as an administration building and warehouse, hydrogen generator, water treatment system, yard tanks, two laydown areas, and an on-site 2.79-mile transmission line. The SunCatchers would be oriented in north-south rows with unpaved access roads between a 112-foot-wide strip of vegetation between every other row of SunCatchers. An approximately 74-foot-wide row of vegetation would be left intact between the unpaved access roads. The vegetation row would be subject to brush trimming as needed. The SunCatchers would be located in areas where the slopes are less than a 5% grade, including the beds of the ephemeral washes. Approximately 27 miles of paved road, 14 miles of unpaved perimeter roads, and approximately 500 miles of unpaved access roads would be constructed on the project site to provide access to the SunCatchers and support facilities. Approximately 6,063.1 acres of the project would be fenced with 8-foot-tall chain link with single strand barbed-wire on top (SES 2009f).

Onsite facilities also include two, 2,500,000-gallon evaporation ponds, each an acre in area, to receive the wastewater discharge from the project's reverse osmosis water treatment system (SES 2009f). The evaporation ponds would feature either a concrete liner or a double liner system and be monitored for a year before the ponds can be used. The evaporation ponds would be designed to contain one year of wastewater discharge and allowed to evaporate the following year while the other evaporation pond accumulates the wastewater discharge. After undergoing the evaporation process, the accumulated bottom solids would be tested and disposed in an appropriate waste disposal facility as nonhazardous waste in accordance with applicable laws and regulations. As the wastewater in the evaporation ponds would attract wildlife in a xeric environment, the applicant has proposed to design the ponds to discourage wildlife use by constructing perimeter fencing and installing wire mesh screens above the ponds (SES 2009f).

Construction of an approximately 10.35-mile transmission line and spur access roads south of Interstate 8 would result in impacts to 92.7 acres of Sonoran creosote bush scrub and 0.1 acre of developed habitat (SES 2008a). The transmission line would be constructed to interconnect the project to the existing San Diego Gas & Electric (SDG&E) 230-kV Imperial Valley Substation, located 12 miles west-northwest of the City of Calexico. Approximately 2.79 miles of the 10.35-mile line would be within the 6,063.1-acre plant site boundary. Approximately 7.56 miles of the transmission line would be built outside of the project site within an existing utility corridor in the Yuha Desert Flat-tailed Horned Lizard Management Area (MA) south of Interstate 8. These impact acreage calculations are the impacts from construction of access roads, pole pads and pull/splicing sites. All of these transmission line construction activities would occur in occupied FTHL habitat. The transmission line would be installed on 85 to 100 new lattice steel transmission towers and/or tubular steel poles. Spur roads to new transmission towers would be built off an existing access road for the existing 500-kV transmission line located in the existing utility corridor in the MA. The applicant anticipates five pulling sites are required to install conductors along the transmission line, which would be located on existing access roads or newly constructed access roads for the transmission line (SES 2009f). Approximately 50 feet on either side of the transmission line would be disturbed during construction.

Construction of an approximately 12-mile, 6-inch reclaimed water pipeline that would be connected to the Seeley Waste Water Treatment facility would be required to provide reclaimed water for construction and operation activities. It is anticipated that this pipeline would be constructed within a 30-foot right-of-way (ROW), along the Evan Hewes Highway, primarily in developed or disturbed areas in and along the road. Potentially, a total of 29.22 acres, including 13 acres of native vegetation along the 30-foot-wide ROW could be temporarily impacted. The water pipeline would intersect seven irrigation canals and the New River. It is currently unknown what method of construction will be used to cross the water features. The applicant has proposed either spanning or using directional drilling to go beneath the water bodies. Even in disturbed, developed, or agricultural areas, construction and trenching pose some risk to wildlife, including disturbance to nesting birds and trapping wildlife in open trenches. Burrowing owls and FTHLs could occur in the vicinity of the reclaimed water pipeline alignment; potential impacts to these species are discussed in more detail below. The following staff-proposed conditions of certification would reduce the construction impacts of the proposed reclaimed water pipeline to less than significant levels under CEQA:

- **BIO-1** (Designated Biologist Selection) which states the minimum qualifications to the satisfaction of Compliance Project Manager and BLM’s Authorized Officer;
- **BIO-2** (Designated Biologist Duties) which outlines the duties performed during any site mobilization, ground disturbance, grading, construction, operation, closure, and restoration activities;
- **BIO-3** (Biological Monitor Qualifications);
- **BIO-4** (Biological Monitor Duties) in which the Biological Monitor assists the Designated Biologist during any site mobilization, ground disturbance, grading, construction, operation, closure, and restoration activities;
- **BIO-5** (Designated Biologist and Biological Monitor Authority) in which the Designated Biologist and Biological Monitor can call a halt to any activities that would be an adverse impact to biological resources;
- **BIO-6** (Worker Environmental Awareness Program) in which workers on the project site or any related facilities are informed about sensitive biological resources;
- **BIO-7** (Biological Resources Mitigation Implementation and Monitoring Plan) which identifies all biological resources mitigation, monitoring, compliance measures, Conditions of Certification, and permits; and

- **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; and in other proposed conditions of certification.

  Though staff's proposed Conditions of Certification BIO-1 through BIO-8 would apply to all construction related impacts, construction in FTHL habitat along the transmission line corridor and within the project site would require additional measures. These additional measures are discussed below in this section on the Overview of Impacts to Vegetation and Wildlife.

Vegetation Impacts

Impacts to vegetation communities/cover types are summarized in **Biological Resources Table 3**. No sensitive plant communities would be directly impacted by the proposed project. Even though there would be rows of vegetation approximately 74 feet wide between the rows of SunCatchers, these strips of vegetation are expected to have very little habitat value associated with them (SES 2008a). Only common species of lizards, snakes, and bird species such as the house finch with small area requirements, are expected to possibly utilize these vegetated strips (SES 2008a). Direct impacts to vegetation communities/cover types are discussed below.

Biological Resources Table 3
Impacts to Vegetation Communities/Cover Types – Acreage Impacts

Vegetation Communities/Cover Type	Impact Area (acres)
Plant Site	
Sonoran creosote bush scrub	5,024.4
Developed (Dirt and OHV roads)	1,038.7
Subtotal Plant Site	6,063.1 acres
Off-Site Transmission Line	
Sonoran creosote bush scrub	92.7
Developed (Dirt and OHV roads)	0.1
Subtotal Off-Site Transmission Line	92.8 acres
Off-Site Waterline (30-foot-wide ROW)	
Sonoran creosote bush scrub	9.28
Disturbed Sonoran creosote bush scrub	0.91
Desert saltbush scrub	0.20
Disturbed desert saltbush scrub	1.95
Arrowweed scrub	0.65
Tamarisk scrub	1.48
Agricultural	0.87
Disturbed	4.94
Developed	8.73
Ornamental	0.10
Open channel	0.20
Subtotal Off-Site Waterline	29.22 acres
TOTAL	6,185 acres

Noxious Weeds

Construction activities and soil disturbance could introduce new noxious weeds to lands adjacent to the SES Solar Two plant site and its linear facilities, and could further spread weeds already present in the project vicinity, including Sahara mustard, red brome, and Mediterranean schismus. Noxious weeds can easily colonize areas of disturbance. Therefore, the spread of invasive plants is a major threat to biological resources in the Colorado Desert because non-native plants can displace native plants, increase the threat of wildfire, and supplant wildlife foods that are important to herbivorous species. In order to promote ecosystem health to their public lands, BLM would require the eradication or control of noxious weeds. The BLM requires a Noxious Weed Management Plan as the spread of invasive plants destroy wildlife habitat and forage, threaten endangered species and native plants, and increase soil erosion and groundwater loss. The federal government initially recognized the threat caused by invasive plants and established the Federal Noxious Weed Act of 1974 (U.S.C. 2801 et seq.; 88 Stat.2148) to control the spread of noxious weeds. Federal and state agencies entered into a Memorandum of Understanding (MOU) to further the intent of the Federal Noxious Weed Act in 1991 entitled “The Agreement on Biological Diversity”. The goal for all parties that entered into the MOU is to minimize the populations of undesirable and noxious plants and to enhance ecosystem natural biodiversity. As a result of the MOU, the management of undesirable plants on federal and state lands is to be coordinated (BLM 2008).

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 2009e) to avoid and minimize the spread of noxious weeds. Staff concurs with the recommendations in the applicant’s noxious weed management plan and has incorporated them into staff’s proposed Condition of Certification **BIO-18** (Noxious Weed Management Plan). The Noxious Weed Management Plan includes a discussion of weeds targeted for eradication or control and a variety of weed control measures such as establishing weed wash stations for construction vehicles, rapid implementation of control measures to ensure early detection and eradication for noxious weed invasions, and revegetation of disturbed areas with weed free native seed mix. Implementation of this condition/weed management plan would reduce potential impacts from introduction and spread of noxious weeds to less than significant levels under CEQA.

Dust

Disturbance of the soil’s surface caused by construction traffic and other activities 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. 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). Soil erosion from construction activities and vehicle activity, which affects vegetation and soil properties, could have an adverse effect on both foraging and burrowing potential for FTHL. The applicant has proposed the use of Soiltac™ as a soil binder in areas where vehicular traffic is anticipated. The impacts of increased dust and other construction impacts can be minimized with implementation of staff’s proposed

Condition of Certification **BIO-8** (Impact Avoidance and Minimization Measures) to less than CEQA significant levels. Measures to minimize dust impacts in staff's proposed Condition of Certification **BIO-8** include minimizing vegetation and soil disturbance, limiting the speed limit to 15 mph for vehicular traffic, and applying water to dirt roads. Similar measures have been applied on past projects and have shown that they are effective in minimizing dust impacts.

Noise

Noise from construction activities could temporarily discourage wildlife from foraging and nesting immediately adjacent to the project area. Many bird species rely on 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. The wildlife species most likely to be affected by noise include the burrowing owl, FTHL, desert bighorn sheep, loggerhead shrike, and LeConte's thrasher.

As discussed in **C.10−Noise and Vibration** section of the SA/DEIS, a maximum construction noise level of 74 dBA Ldn is estimated to occur at a distance of 3,300 feet (1 kilometer) from the acoustic center of the construction activity (the Main Services Complex) and attenuate to 58 dBA Leq or less at the closest sensitive receptor 3,300 feet west of the project site boundaries. The loudest noise likely to occur with SES Solar Two construction is 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. In order to minimize noise levels from project equipment, the applicant has proposed various noise-reducing features, such as mufflers on internal combustion engines, air-inlet silencers, shrouds, or shields would be employed to minimize noise levels (SES 2008a), which has been incorporated into staff's proposed Condition of Certification **NOISE-6** (Construction Time Restrictions). Similar measures have been applied on past projects and have shown that they are effective in minimizing noise impacts on wildlife. With the implementation of staff's proposed Condition of Certification **BIO-16**, staff concludes that noise impacts to nesting birds and other wildlife would be less than significant under CEQA.

Impacts to Waters of the U.S. and Jurisdictional State Waters

Ephemeral drainages in the project area provide beneficial functions and services typical of high quality, low disturbance desert scrub systems. Riverine functions are generally categorized into hydrologic, physical, and biologic. Functions performed include, but are not limited to groundwater recharge, flood peak attenuation, floodwater storage, sediment trapping and transport, nutrient trapping, and maintenance of wildlife corridors and habitat. These functions would be impaired by construction and operation of the SES Solar Two project. Permanent impacts to the ephemeral washes result from the placement of SunCatchers on 24-inch bases, the construction of debris/sediment basins, the construction and regular maintenance of access roads to the SunCatchers, the placement of culverts and Arizona crossings in the streambeds, construction of rip-rap/retaining wall/gabion for bank stabilization after bioengineering/recontouring, and the construction of storm drain outfall structures. These structures are considered fill by the U.S. Army Corps of Engineers (USACE) when built within Waters of the U.S. Temporary impacts to the ephemeral streambeds include the underground placement of the electrical collection system, the hydrogen distribution system, a 428-foot length of impacted streambeds for the placement of the reclaimed waterline, and the mowing of brush down to a height of 3 inches (SES 2009u). An indirect effect of the SunCatchers in the washes would be the scour created around the pedestals after a rain event due to the obstruction in the flow path and due to the bare soil following vegetation removal. It has been estimated that a 24-inch-diameter foundation in the bed of the desert wash would have a scour depth of approximately five feet for flow velocities of 8 to 10 feet per second (a 100-year storm event). At more common flow velocities of 2 to 5 feet per second, the scour depths are estimated from 2 to 3.5 feet (SES 2009u). More detailed analysis on the scour is presented in **C.7 Hydrology, Water Use, and Water Quality (Soil and Water Resources)** section. It is anticipated that scour repair and removal of sediment from the debris/sediment basins with heavy equipment would be ongoing throughout the life of the project.

The potential project impacts caused by the placement of the SunCatchers in ephemeral washes to Waters of the U.S. and the jurisdictional state waters are the same. According to correspondence with the USACE (Mattson 2009), data provided by the applicant's consultant estimate the potential permanent impacts to ephemeral washes caused by the placement of the SunCatchers and associated infrastructure would be 109,376 linear feet for Phase 1 construction and 95,790 linear feet for Phase 2 construction, a total of 205,166 linear feet. The potential temporary impacts to ephemeral washes would be 5,116 linear feet for Phase 1 construction only. No additional temporary impacts are anticipated for Phase 2 construction. The total amount of acreage impacted in the ephemeral washes would be approximately 165 acres of permanent impacts, 5 acres of temporary impacts, and 13 acres of indirect impact to Waters of the U.S. and approximately 312 acres of permanent impacts to jurisdictional state waters. Permanent loss of jurisdictional state waters and fill to Waters of the U.S. is considered by staff to be a significant impact according to CEQA guidelines.

An estimate of the acres of Waters of the U.S. and the jurisdictional state waters for the proposed reclaimed water pipeline along Evan Hewes Highway which would either span or go under seven irrigation canals, the New River, and adjacent wetlands, is 0.20 acres for jurisdictional state waters and 2.33 acres for Waters of the U.S. (SES 2009q). The CDFG does not expect any impacts to jurisdictional state waters along the proposed water pipeline route, but would require approval of a Frac-Out Contingency Plan prior to horizontal directional drilling taking place should there be an inadvertent release of drilling lubricant into the waterway. At a minimum, Best Management Practices (BMPs) will be utilized to maximize avoidance of impacts to Waters of the U.S. and jurisdictional state waters for the proposed reclaimed water pipeline. The USACE would also require a Frac-Out Contingency Plan prior to the start of construction of the water pipeline. Any temporary impacts to Waters of the U.S. associated with trenching would require restoration of the stream to existing elevations and contours immediately following construction. Any permanent impacts to Waters of the U.S. would require mitigation in the form of creation, restoration, or enhancement elsewhere (Mattson 2010). Staff is awaiting the USACE draft 404(b)(1) analysis, which will identify the least environmentally damaging project alternative (LEDPA) and establish the need for mitigation for unavoidable impacts. The Corps will also provide draft special conditions of the permit for staff to consider including in staff's proposed Condition of Certification **BIO-17** in the Staff Assessment/Final Environmental Impact Statement.

Staff's proposed Condition of Certification **BIO-17** (Lake and Streambed Impact Minimization and Compensation Measures) specifies that, in addition to minimizing impacts to drainages where feasible, the replacement of the functions and services of the jurisdictional state waters similar to those on the SES Solar Two project site at a 1:1 mitigation ratio should be required. This mitigation could be integrated with the requirement to acquire off-site FTHL habitat. As discussed later in this analysis, the compensation acreage for FTHL can be converted to a monetary equivalent in which off-site FTHL habitat would be acquired. The applicant must demonstrate that the acquired FTHL habitat includes ephemeral washes that can be used to fulfill their streambed mitigation requirement. Even if the acquired off-site FTHL habitat includes ephemeral washes, the time frame in which the BLM is able to acquire the mitigation lands is dependent on parcels available for sale. Should not enough FTHL habitat be available for sale, the FTHL Interagency Coordinating Committee (ICC) has charged the BLM with other suitable uses for the FTHL compensation funds as directed by the FTHL Rangewide Management Strategy (FTHL ICC 2003). This will be discussed in more detail in the **Impacts to Flat-tailed Horned Lizard** section. If appropriate lands with 312 acres of ephemeral washes cannot be purchased within one year under the FTHL mitigation requirements, staff, in conjunction with the CDFG, would require the remainder of the acreage, up to a total of 312 acres, to be acquired independent of the acquisition of FTHL habitat under this circumstance. Thus, the applicant would be required to: 1) acquire Sonoran creosote scrub habitat with up to 312 acres of jurisdictional state waters; 2) prepare a Management Plan for site-specific enhancement of the acquired land; and 3) delegate the land acquisition to CDFG or an approved third party. With implementation of this proposed condition of certification, impacts to the project area's jurisdictional state waters would be reduced to less than CEQA significant levels.

Whereas the CDFG recommends requiring a 1:1 mitigation ratio for impacts to ephemeral washes, the USACE has indicated they typically require a minimum of a 2:1 mitigation ratio for unavoidable impacts, with up to half (1:1 ratio) of the mitigation dedicated to preservation and the other half to enhancement or restoration within the New River watershed. Mitigation ratios typically increase if proposed outside of the watershed. Thus, mitigation within the Salton Sea watershed would likely be a 3:1 ratio or higher depending on the type and location of the proposed mitigation (e.g., restoration versus enhancement). Precise details of the required mitigation will be determined after the federal CWA 404(b)(1) Alternative Analysis is complete. When this occurs, staff's proposed Condition of Certification **BIO-17** would be updated to reflect mitigation requirements by the USACE.

Impacts to Special Status Plants

Some state and federally listed plant species and California Native Plant Society (CNPS) list species were not identified within the SES Solar Two project area during the spring surveys conducted by the applicant in 2007 and 2008. A review of the botanical data suggests that four CNPS list plant species were never mentioned as having the potential to occur, thus overlooked during the survey and assessment of potential impacts to biological resources. Staff is also concerned that the applicant conducted just over half of the rare plant surveys in concurrence with FTHL surveys and utilized biologists not specifically trained in botany to conduct many of the special status plant surveys. Another concern of staff is the lack of fall surveys conducted after the late summer/early fall monsoonal rains prevalent to the area. The monsoonal rains would stimulate another bloom. Although special status plant species were not observed, staff considers there to be a potential for some of these plants to occur in the project footprint.

Ground-disturbing activity associated with the SES Solar Two has the potential to disturb either individual plants or populations of special status plant species should they be present in the project area. Direct impacts to sensitive plant species could occur from construction activities that remove vegetation, grade soils, or cause sedimentation, including the construction of the proposed SES Solar Two project, the placement of transmission lines, maintenance of construction equipment and supplies, staging of equipment and materials, the use or improvement of existing access roads, and the construction of access roads. Indirect impacts could include the disruption of native seed banks through soil alterations, the accumulation of fugitive dust, increased erosion and sediment transport, and the colonization of non-native, invasive plant species.

Only one of the plants in **Biological Resources Table 2,** Wiggin's croton, is listed under the California Endangered Species Act (CESA). The remainder of the plants on the CNPS List 1A, 1B, and 2 meet the definitions of an "endangered" or "threatened" species under Sections 2062 and 2067 of the California Fish and Game Code, and are eligible for state listing (CNPS 2001). CNPS List 1B species are considered Sensitive by the BLM in California (BLM 2009). Even if a species is not a state or federally listed plant species, it still may be considered state endangered, rare, or threatened, if the species can be shown to meet the criteria in Section 15380 of the CEQA Guidelines. 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. Plants appearing on CNPS List 1B or 2 meet CEQA's Section 15380 criteria, and affects on these species are generally considered "significant". The species that would fall in this category with a moderate potential of occurring in the proposed SES Solar Two project area are listed in **Biological Resources Table 2** and include Harwood's milk-vetch, pink fairy duster, crucifixion thorn, flat-seeded spurge, Baja California ipomopsis, brown turbans, hairy stickleaf, slender wooly-heads, dwarf germander, and Orcutt's woody-aster.

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. The California Natural Diversity Database (CNDDB) has a recorded occurrence for Thurber's pilostyles, a CNPS List 4 species, on the project site. This species was over-looked during the 2007 and 2008 surveys. Very few CNPS List 4 plants meet the definition for state listing (CNPS 2001). Nevertheless, many are significantly locally if, for example, they occur at the periphery of a species' range, exhibit unusual morphology, or occur in atypical habitats, and should be evaluated in a CEQA analysis.

The applicant has not proposed specific avoidance measures to reduce potential impacts to special status plant species because none were observed during the 2007 and 2008 spring surveys. The failure to locate special status plant species does not constitute evidence that they do not exist on the site. Because Energy Commission staff and BLM conclude there is a potential for special status plants to occur in the project area, staff and BLM have proposed mitigation that requires surveys for special status plants in the spring and fall of 2010, avoidance of populations of special status plants if any are found, preparation of a Special-Status Plant Protection Plan, and compensatory mitigation ratio of up to 2:1 if special status plants cannot be avoided. These compensation measures are described in staff's proposed Condition of Certification **BIO-19** (Special Status Plant Survey and Protection Plan). Implementation of this condition would reduce impacts to special status plants to less than significant levels under CEQA.

Impacts to Raptors and Migratory/Special Status Bird Species

Vegetation at the plant site and along linear facilities provides foraging, cover, and/or breeding habitat for migratory birds, including a number of special status bird species confirmed to be present at the site. Loggerhead shrike, LeConte's thrasher, and California horned lark are special status species known to breed and forage at the site. Western burrowing owls, which also occur at the SES Solar Two plant site and linear facilities, are discussed below. Power plant construction would eliminate nesting habitat for these and other species, and could result in direct and cumulative impacts to these species due to habitat loss or injury/fatality of individuals. No impacts to raptors are anticipated because these species occur only infrequently at the SES Solar Two area, and do not breed there.

The loss of active bird nests or young is regulated by the federal Migratory Bird Treaty Act and California Fish and Game Code section 3503, which protects active nests or eggs of California birds. The applicant has proposed mitigation measures to avoid and minimize impacts to nesting birds that have been incorporated into staff's proposed Conditions of Certification **BIO-8** (Impact Avoidance and Minimization Measures) and **BIO-14** (Pre-construction Nest Surveys and Impact Avoidance Measures), which states guidelines for performing the pre-construction surveys. Measures to minimize impacts to nesting birds in staff's proposed Condition of Certification **BIO-8** include minimizing vegetation disturbance and clearance, flagging disturbed areas to confine equipment and vehicles within the flagged areas, and reducing the likelihood of large bird electrocutions and collisions by following the Avian Power Line Interaction Committee guidance (APLIC 2006). Measures in staff's proposed Condition of Certification **BIO-14** which would minimize impacts to nesting birds include conducting ground-disturbing activities outside the bird nesting season (February 1 through July 31) if practicable, conducting a pre-construction survey should construction activities occur during bird nesting season, and establishing a no disturbance buffer zone should a nest be present. Similar measures have been applied on past projects and have shown that they are effective in minimizing impacts to nesting birds. Implementation of staff's proposed conditions of certification would avoid direct impacts to nests, eggs, or young of migratory birds, and would minimize the impacts to less than CEQA significant levels for construction disturbance to nesting birds.

Impacts to Burrowing Owls

Burrowing owls nesting on the project site could be directly impacted by construction of the SES Solar Two. Burrowing owl adults, eggs or young could be crushed or entombed by grading activities, and nesting and foraging activities would be directly and indirectly impacted by construction and operation of the project. The project would also result in permanent loss of 6,185 acres that is currently used by burrowing owls for nesting and foraging. Staff considers these potential impacts significant under CEQA.

In addition to the potential direct impacts to burrows, the SES Solar Two project would permanently eliminate a large expanse of habitat on the plant site and along the linear facilities that is currently available for foraging and breeding by burrowing owls. Habitat loss is one of the primary threats to California's burrowing owl population (Gervais et al. 2008), and the SES Solar Two project would contribute incrementally to this significant loss under CEQA.

To avoid potential impacts to burrowing owls that might be nesting within the project impact area, the applicant has proposed conducting pre-construction surveys on the plant site and along all linear facilities, using methods recommended by the California Burrowing Owl Consortium (CBOC) (1993). To avoid and offset potentially significant impacts to nesting owls, the applicant has also proposed passive removal. Passive removal involves encouraging owls to move from occupied burrows to alternate natural or artificial burrows that are at least 150 feet from the impact zone and that are within or contiguous to a minimum of 6.5 acres of foraging habitat for each pair of relocated owls (CDFG 1995). Passive relocation of owls is only implemented during the non-breeding season (CDFG 1995) unless a qualified biologist can verify through non-invasive methods that egg laying/incubation has not begun or juveniles are foraging independently and able to fly. The unoccupied burrows would be collapsed in accordance with CDFG-approved guidelines (CBOC 1993).

The applicant has also proposed ground-disturbing activities occurring outside the burrowing owl breeding season (February 1 through August 30) when practicable and clearance surveys prior to each phase of project construction.

Though the applicant's proposal to conduct pre-construction surveys, ground-disturbing activities outside burrowing owl breeding season, and clearance surveys prior to each phase of project construction has been incorporated into staff's proposed Condition of Certification **BIO-16** (Burrowing Owl Impact Avoidance and Minimization Measures), the applicant's proposed impact avoidance, minimization, and mitigation measures would not be sufficient to reduce impacts to less than significant levels under CEQA. Staff and BLM propose that surveys and monitoring of burrowing owl burrows within 500 feet of construction activity be conducted. Staff's proposed Condition of Certification **BIO-16** requires a temporary noise barrier shall be placed to reduce noise levels near burrows should nesting burrowing owls be within 500 feet of active construction. Though staff and BLM had initially proposed that burrowing owl would be actively relocated outside of nesting season (February 1 through August 31), active relocation is not allowed by the CDFG code (California Fish and Game Code section 3503.5). In compliance with CDFG regulations, burrowing owls can only be passively relocated followed by the collapsing of burrows. Implementation of staff's proposed Condition of Certification **BIO-16** in addition to staff's proposed Condition of Certification **BIO-8** (Impact Avoidance and Minimization Measures) would reduce potential impacts to burrowing owls to less than significant levels under CEQA.

Impacts to Special Status Mammals

Impacts to American Badger and Desert Kit Fox

American badgers were not detected on the SES Solar Two site, but several potential burrows were discovered onsite in addition to a documented occurrence across the

Interstate 8 from the project site. The site includes moderately suitable foraging and denning habitat for this species. The American badger is protected under Title 14, California Code of Regulations sections 670.2 and 670.5, and potential impacts to individuals of this species must be mitigated to less than significant levels under CEQA. Construction of the SES Solar Two project could kill or injure American badgers by crushing them with heavy equipment, or could entomb them within a den. Construction activities could also result in disturbance or harassment of individuals. Staff's proposed Condition of Certification **BIO-15** (American Badger and Desert Kit Fox Impact Avoidance and Minimization Measures) requires that concurrent with the FTHL clearance survey, a qualified biologist would perform a pre-construction survey for badger dens in the project area, including areas within 250 feet of all project facilities, utility corridors, and access roads. Should a badger occur onsite, the applicant shall initiate passive removal of the badger and collapse the burrow after its removal per guidance provided in **BIO-15**. Active relocation would involve trapping (take), which is not allowed by CDFG code (California Fish and Game Code section 4000). Take is only allowed for those with fur trapping permits only and not for possible take by impacts caused by projects. In compliance with CDFG regulations, badgers can only be passively relocated followed by the collapsing of burrows.

The desert kit fox (*Vulpes macrotis*) is not a special status species, but it is protected under Title 14, California Code of Regulations section 460, which states that "Fisher, marten, river otter, desert kit fox, and red fox may not be taken at any time". These fur-bearing mammals are state Protected. Therefore, potential impacts to individuals of this species must be avoided. Desert kit fox sign were detected on the SES Solar Two site, and the site includes marginally suitable foraging and denning habitat for this species. Construction of the SES Solar Two project could kill or injure desert kit fox by crushing them with heavy equipment, or could entomb them within a den. Construction activities could also result in disturbance or harassment of individuals. Staff's proposed Condition of Certification **BIO-15** requires that concurrent with the FTHL clearance survey, a qualified biologist would perform a pre-construction survey for kit fox dens in the project area, including areas within 250 feet of all project facilities, utility corridors, and access roads. Should a desert kit fox occur onsite, the applicant shall initiate passive removal of the kit fox and collapse the burrow after its removal per guidance provided in **BIO-15**. Active relocation would involve trapping (take), which is not allowed by CDFG code (California Fish and Game Code section 4000) and Title 14, California Code of Regulations section 460. Take is not allowed for this species. In compliance with CDFG regulations, desert kit foxes can only be passively relocated followed by the collapsing of burrows. Staff's proposed Condition of Certification **BIO-15** would mitigate impacts to American badger and desert kit fox to less than significant levels under CEQA by avoiding take of these species.

Impacts to Peninsular Bighorn Sheep

A group of five female/yearling Peninsular bighorn sheep have been observed in an ephemeral wash on the western half of the project site (SES 2009m), and could use the SES Solar Two project site as foraging habitat and as a possible migratory corridor. CURE asserts that the project would reduce the availability of seasonal forage for Peninsular bighorn sheep and interfere with their activities as they move between the nearby Peninsular mountain range and the Yuha Desert. The response provided to

CURE's data requests (SES 2009m) suggests that use of the site by Peninsular bighorn sheep is transitory at best. As the proposed project site is located on flat terrain, sheep entering the area are far from escape habitat and would be in a highly stressed state which could put them at great risk as the site is already surrounded by busy highways and the railroad. The site may provide marginally adequate forage and may possibly function as a corridor for bighorn sheep movement, but it is highly unlikely. The USFWS, CDFG, and BLM biologists are in agreement that the siting of bighorn sheep on the site in spring 2009 was an unusual occurrence and is unlikely to occur again. As no known lambing sites or water sites are known near the proposed project site, nor have other bighorn sheep occurrences been documented in the vicinity of the proposed project, staff concurs with the BLM assessment of project impacts that this project may affect, but is not likely to adversely affect Peninsular bighorn sheep. With implementation of avoidance and minimization measures of staff's proposed Condition of Certification **BIO-8** (i.e., erecting fences and gates to prevent wildlife access and contain construction equipment; and covering excavated areas or installing wildlife escape ramps in the excavated areas should sheep wander onsite), staff concludes that impacts to Peninsular bighorn sheep would be at less than significant levels under CEQA.

Impacts to Flat-tailed Horned Lizard (FTHL)

Surveys conducted in 2007 and 2008 indicate that FTHL inhabits the 6,063-acre plant site and the 92.8-acre off-site transmission corridor (SES 2008a). The 12.34 acres of Sonoran creosote bush scrub and salt bush scrub located along the off-site reclaimed water line also provides suitable habitat for FTHL (SES 2008a). Construction activities within these areas would result in permanent loss of habitat.

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 FTHLs being crushed or entombed in their burrows, collection or vandalism, disruption of FTHL behavior during construction or operation of facilities, and disturbance by noise or vibrations from the heavy equipment. Increased human activity and vehicle travel would occur from the construction and improvement of access roads, which could disturb, injure, or kill individual FTHLs.

After construction is complete additional project related impacts (increased levels of predation on FTHL from increased avian predators and roundtail ground squirrel, increased levels of disturbance, and incidence of vehicle strikes) could continue to adversely affect FTHL. These potential operations impacts are discussed in more detail later in this subsection.

Though the FTHL is not currently listed by the USFWS or CDFG, the possibility for listing this species is likely. The FTHL was first proposed for listing by the USFWS in 1993, but the notice was withdrawn in 1997. The withdrawal of the listing proposal was litigated and remanded to USFWS. This was followed by a second withdrawal of the proposal to list the FTHL by the USFWS in 2001. A lawsuit was filed in 2003 challenging the USFWS withdrawal of the proposed listing, and in 2005, a federal court ordered the USFWS to restore the proposed listing of FTHL. The proposal for listing was withdrawn by USFWS in 2006, which was challenged in court. The court upheld the USFWS withdrawal of a proposal for listing in 2007, but in May of 2009, the Ninth Circuit Appeals Court overruled the trial court and ordered the agency to consider listing the species. In

November of 2009, a federal district court entered judgment consistent with the Ninth Circuit Court of Appeals decision. In anticipation of the FTHL being federally listed, the BLM has undergone conferencing with the USFWS to address the potential take and loss of habitat. When the FTHL becomes listed, the Conferencing Opinion would be converted to a Biological Opinion with a take statement if no changes have occurred or if no new information is learned since the issuance of the Conferencing Opinion.

The applicant has recommended impact avoidance and minimization measures to reduce construction impacts to FTHL, including clearance surveys prior to each phase of project construction and relocation of any FTHL observed within the construction area to suitable habitat outside of the development effect footprint. The FTHL Interagency Coordinating Committee (ICC), consisting of USFWS, CDFG, BLM, U.S. Marine Corps, U.S. Navy, Arizona Game and Fish, and California State Parks, developed a Flat-tailed Horned Lizard Rangewide Management Strategy (Strategy) in 1997, which was updated in 2003. As the USFWS and the BLM are signatory agencies to the FTHL ICC, the BLM expects USFWS to follow the recommendations of the Strategy (FTHL ICC 2003) for the Conference Opinion. Measures from the issuance of a Conference Opinion from the USFWS would be incorporated into the following proposed Conditions of Certification: **BIO-9** (Flat-tailed Horned Lizard Clearance Surveys) which states the FTHL removal protocol; **BIO-10** (Flat-tailed Horned Lizard Compensatory Mitigation) which identifies the compensation costs to mitigate for habitat loss and potential take of FTHL and selection criteria for compensation lands; and **BIO-11** (Flat-tailed Horned Lizard Compliance Verification) in which the Designated Biologist verifies for the Energy Commission staff and the BLM that all FTHL impact avoidance, minimization, and compensatory measures have been implemented.

According to the Strategy (FTHL ICC 2003), the FTHL ICC has recommended the installation of FTHL exclusionary fencing which the applicant has also proposed for impact avoidance and minimization measures to FTHL. However, the BLM believes that this action may not be practicable due to the large size of the project. The FTHL Strategy was initially based on the recovery plan for desert tortoise, which requires exclusionary fencing for projects impacting desert tortoise. As the detection level during clearance surveys for desert tortoise is greater than FTHL due to the cryptic coloration and the freeze and/or bury behavior to escape detection, the FTHL exclusionary fencing would trap more organisms within the so called “cleared” areas rather than excluding them. The BLM consulted with the ICC, and all other signatories agreed with BLM to disregard the FTHL exclusionary fencing recommendation for the SES Solar Two project (Steward 2009). Staff has incorporated these recommendations into staff’s proposed conditions of certification. These include staff’s proposed Conditions of Certification **BIO-1** through **BIO-8**, which apply to protection of FTHL and other biological resources in and near the SES Solar Two and staff’s proposed Conditions of Certification **BIO-9** and **BIO-11**.

The FTHL would be moved out of harm’s way in coordination with the FTHL ICC. The FTHL ICC may choose to relocate the salvaged FTHL from the SES Solar Two project to several suitable sites within protect FTHL habitat or possibly conduct field research on FTHL. Decisions regarding the salvaged FTHL should be determined by the BLM in cooperation with the FTHL ICC prior to publication of the Staff Assessment/Final Environmental Impact Statement (Steward 2010).

A stated goal in the Strategy (2003) is to prevent the net loss of FTHL habitat. In order to achieve this goal, compensation for habitat lost outside of a FTHL Management Area (MA), which would include the 6,063.1-acre project site, including the 1,038.7 of dirt and OHV roads that already exist on site, would be at a 1:1 ratio. The BLM considers the 1,038.7 acres of narrow dirt and OHV roads which traverse the site equivalent habitat to the undeveloped areas as the horned lizards utilize all areas within the 6,063.1 acres site. Even though the applicant would retain some vegetation in rows next to the SunCatchers, BLM and staff consider the entire site impacted and the applicant would be required to compensate for the loss of 6,063.1 acres. The 7.56-mile transmission line outside of the project site is located in the Yuha Desert Flat-tailed Horned Lizard Management Area (MA). As 92.8 acres would be impacted within an MA, the compensation for habitat lost would be increased to a 6:1 ratio (FTHL ICC 2003), thus requiring compensation for 556.8 acres (92.9 acres x 6 = 556.8 acres). The BLM is not calculating the impact acreages along the proposed reclaimed water pipeline route for the FTHL mitigation. Though approximately 1.7 miles of the proposed reclaimed water pipeline west of the Imperial Irrigation District Westside Main Canal is on BLM administered land, the construction activities would occur mainly in the developed/disturbed portions in and along the Evan Hewes Highway. Even though FTHL habitat borders the Evan Hewes Highway, it is anticipated that direct pipeline construction impacts to vegetation and wildlife would be temporary and can be reduced to less than CEQA significant levels with implementation of impact avoidance and minimization measures described in staff-proposed Conditions of Certification **BIO-1** through **BIO-9**. In lieu of the applicant acquiring any of the compensation lands, compensation acreage can be converted to a monetary equivalent (including administrative costs) that is required to replace the acreage or adjusted acreage. The per acre dollar figure for compensation fees would be based on the cost of acquiring lands prioritized for acquisition by the FTHL ICC. The funds would be calculated and paid to BLM under the direction of the FTHL ICC. The primary use of the compensation funds is to acquire, protect, or restore FTHL habitat both within and contiguous with MAs. If there are no more lands available for acquisition, the FTHL ICC can charge fair market value of impacted land and any costs associated with appraising the impacted land. Other uses of funds authorized by the FTHL ICC should acquisition opportunities be exhausted include:

- transfer of funds to other MAs to purchase FTHL habitat;
- construct and maintain fences to exclude OHVs;
- educate people and organizations about OHV effects to FTHLs;
- restore degraded FTHL habitat; and
- fund other management actions deemed necessary by the FTHL ICC.

The compensation funds are based on the following calculations in **Biological Resources Table 4** and are incorporated in staff's proposed Condition of Certification **BIO-10**. The costs are based on BLM's best estimate of current cost per acre. The amounts shown in **Biological Resources Table 4** are subject to changing real estate acquisition costs.

Biological Resources Table 4
Breakdown of Compensation Costs for FTHL

	Project Site (1:1 Ratio) Total Acreage	Off Site Transmission Line (6:1 Ratio) Acres Impacted: 92.8	TOTAL
Compensated Acres	6,063.1	(92.8 x 6) = 556.8	6,619.9
Price/acre at no less than $500/acre	$3,031,550	$278,400	$3,309,950
Pre-acquisition Liability Survey (PALS) at no less than $2,500/parcel[1] (approximately 40 acres/parcel)	No. of parcels: (6,063.1/40) = 151.5775 parcels	No. of parcels: (556.8/40) = 13.92 parcels	
No. of parcels (acres/40) x $2,500/parcel cost	151.5775 parcels x $2,500 = $378,943.75	13.92 parcels x $2,500 = $34,800	$413,743.75
Appraisal at no less than $3,000/parcel (No. of parcels x $3,000)	151.5775 parcels x $3,000 = $454,732.50	13.92 parcels x $3,000 = $41,760	$458,908.50
Fee to clean up, restore, and enhance FTHL habitat at no less than $25/acre	6063.1 acres x $25/acre = $151,577.50	556.8 acres x $25/acre = $13,920	$165,497.50
BLM direct costs[2] at no less than 15%	$3,031,550 x 15% = $454,732.50	$278,400 x 15% = $41,760	$458,908.50
Subtotal	$4,471,536.25	$410,640	$4,882,176.25
Denver Business Center[3] fee at no less than 17.1%	$4,471,536.25 x 17.1% = $764,632.70	$410,640 x 17.1% = $70,219.44	$834,852.14
TOTAL (Subtotal + Denver Business Center)	**$5,236,168.90**	**$480,859.44**	**$5,717,028.34**

1 - The Pre-acquisition Liability Survey (PALS) is charged by the parcel. Each parcel is estimated at 40 acres. The total compensated acreage is divided by 40 to figure the number of parcels. The number of parcels is then multiplied by the $2,500 per parcel fee.

2 - The "BLM direct costs" covers the overhead costs by realty staff and other specialists to complete realty and other work to complete land acquisition (Stein 2009).

3 - The "Denver Business Center" fee covers administrative costs to the BLM for administering the projects. These costs are general in nature and cannot be directly attributed to the project such as building rentals, utilities, computers, changing records to reflect change in ownership, and work done by those who are not directly involved in acquisition as examples (Stein 2009).

In order for staff to conclude that fee payment reduces any impacts to less than significant levels under CEQA, the analysis must "identify facts and analysis supporting its conclusion that the contribution (to a significant cumulative impact) will be rendered less than cumulatively considerable (by payment of the fee).” Thus so called “hard measures,” i.e., purchase of compensation lands, construction of fencing to exclude OHVs from FTHL habitat, and restoration of FTHL habitat with compensation funds with impact avoidance and minimization measures incorporated into staff’s proposed Conditions of Certification **BIO-8**, **BIO-9**, and **BIO-11** would reduce impacts to FTHL to less than significant levels under CEQA. Staff is in the process of evaluating if the use of compensation funds is sufficient for CEQA mitigation or if funds can be earmarked for specific actions such as the “hard measures” mentioned previously.

Operation Impacts and Mitigation

Potential operation impacts to biological resources include increased risk of avian predation on FTHL and wildlife, impacts to birds due to hazardous conditions at the evaporation ponds, increased levels of onsite vehicular traffic and disturbance, and potential collisions with structures, effects of disturbance and lighting, and noxious weeds. These impacts are discussed below.

Avian Predators

Construction and operation of the SES Solar Two project could provide new sources of food, water, and nesting and perching sites that might attract unnaturally high numbers of FTHL predators such as the common raven, loggerhead shrikes, and American kestrel. 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. Common raven populations in the Colorado and Mojave deserts increased 1,000% from 1968 to 1992 in response to expanding human use of the desert (Boarman and Berry 1995). This increase has had a negative impact on sensitive species such as the desert tortoise and flat-tailed horned lizard.

Construction and operation of the SES Solar Two would provide new attractants and subsidies that might result in changes in raven population or behavior, which could subsequently affect the FTHL population in the region by increased predation. The following have been identified as raven attractants and subsidies:

- Water in evaporation ponds;
- Creation of new perching/roosting/nesting sites;
- Water ponding due to dust suppression; and
- Construction/operation waste.

The potential impacts to FTHL populations and other species resulting from operation of the SES Solar Two’s evaporation ponds are discussed later in this subsection. Impacts and mitigation for the remaining three factors are discussed below.

Perching, Roosting, and Nesting Sites. Most raven predation on FTHL is thought to take place during the spring, most likely by breeding birds that spend most of their time foraging within 1,300 feet of their nests (Kristan and Boarman, 2003). Therefore, SES Solar Two structures such as towers, transmission poles and lines, maintenance buildings, facility fencing, and 30,000 SunCatcher units that offer new nesting and/or perching substrates could facilitate increased risk of predation to FTHL populations by avian predators. The applicant has proposed project design features to reduce nesting and includes physical deterrents to nesting such as bird spikes and nest removal, and monitoring to make sure these design features were working as intended. These measures are described in more detail in staff's proposed Condition of Certification **BIO-12**, which describes development of the Raven Monitoring and Management Plan.

Ponding. During construction, water would be applied to the graded areas, construction right-of-way, dirt roads, trenches, spoil piles, and other areas of ground disturbance to minimize dust emissions and topsoil erosion. Ponding water resulting from these dust suppression activities has the potential to attract ravens and other predators of FTHL, thereby potentially resulting in increased FTHL predation. As described in staff's proposed Condition of Certification **BIO-8** (Impact and Avoidance Minimization Measures), this potential impact would be minimized by using the minimal amount of water needed for dust abatement.

Food Waste. Ravens are scavengers that forage at landfills, dumpsters behind restaurants and grocery stores, open garbage drums and plastic bags placed on the curb for garbage pickup, and on roadkills. Both construction and operation of the SES Solar Two would result in increased waste generation in the project area and improper management of food waste could attract ravens. This potential impact can be avoided with implementation of measures described in staff's proposed Condition of Certification **BIO-8**, which requires that all food-related waste be placed in self-closing containers and removed daily from the site, and that plastic bags containing trash would not be left out for pickup. In addition, to discourage scavenger activity, animal roadkills would be promptly removed from the project site.

Cumulative/Regional Impacts of Avian Predators. Construction and operation of the SES Solar Two project and subsequent increases in avian predation could contribute incrementally to the cumulatively significant impacts under CEQA to the population of FTHL. The development of the site would increase predation on FTHL with the increased opportunities for perching by avian predators.

To reduce the impacts of increased avian predator presence at the proposed SES Solar Two project site, the applicant has prepared a draft Raven Management Plan (SES 2009f) and has recommended impact avoidance and minimization measures, which staff has incorporated into proposed Condition of Certification **BIO-12**. If implemented, **BIO-12** would minimize the effects of increased predation on FTHL population to less than significant levels under CEQA.

Staff's proposed Condition of Certification **BIO-12** specifies that the applicant complete a final Raven Management and Monitoring Plan in consultation with staff, BLM, CDFG, and USFWS. Condition of Certification **BIO-12** would reduce the impact that ravens and other avian predators have on FTHL numbers through reducing access to anthropogenic food and water resources (subsidies), discouraging nesting and roosting, and adaptive management of raven management measures should adopted measures become ineffective in controlling predation on FTHL. These measures have been applied on past projects with desert tortoise as prey items and have been modified for the FTHL (SES 2009f).

The USFWS (2008) wrote an Environmental Assessment (EA) on the recovery effort for desert tortoise by reducing common raven predation on juvenile tortoise. The EA was prepared in cooperation with the California Desert District of the BLM. The BLM had identified the need to reduce raven predation to increase the survival of juvenile desert tortoises. In 1994, an EA was written to assess an experimental program to shoot ravens (BLM 1994). It was determined that the No Action Alternative in which there was no management or take of ravens could not be considered for the following reasons: 1) the information yielded by this program is important for designing a full-scale raven management program; and 2) the populations of the desert tortoises were rapidly declining and predation by ravens was still occurring on juvenile tortoises. Implementation of Raven Management and Monitoring Plan would reduce impacts on FTHL from ravens by removing subsidies and discouraging roosting and nesting. Staff anticipates that the applicant would be able to produce a final Raven Monitoring and Management Plan that would meet the approval of BLM, CDFG, USFWS and staff well before licensing of the SES Solar Two project and updated in the Final Environmental Impact Statement.

Other Predators

In addition to avian predators, roundtail ground squirrels (*Spermophilus tereticaudus*) have emerged as significant predators of the FTHL (SES 2009k). A potential effect of the SunCatchers is increased shade and water from the periodic washing beneath the structure. The increase in water would increase the amount of vegetation. Even though roundtail ground squirrels were not observed on the project site, they are known to occur in the project area (Hoefler and Harris 1995). The higher density of vegetation, specifically perennials, could attract roundtail ground squirrels that may not have previously been sustained under the current arid conditions (Grant 2005). The possibility of roundtail ground squirrels inhabiting the site would also increase predators species which prey on them, and in turn, could also prey on FTHLs. Implementation of staff's proposed Conditions of Certification **BIO-8**, the Impact Avoidance and Minimization Measures, and **BIO-18**, the Noxious Weed Management Plan, would reduce the potential for these impacts. Measures to minimize impacts from noxious weeds in staff's proposed Condition of Certification **BIO-8** include minimizing soil disturbance so habitat is decreased for disturbance adapted invasive species and maintaining a vehicle wash and inspection stations to prevent the spread of potential invasive weeds. In staff's proposed Condition of Certification **BIO-18**, measures to minimize impacts from noxious weeds include reestablishing vegetation on disturbed sites with native seed mixes that are weed free and monitoring and rapid implementation of control measures to ensure early detection and eradication for noxious weed invasions. Implementation of the measures in the Noxious Weed Management Plan described above and other impact avoidance and minimization measures would reduce impacts from these FTHL predators to less than significant levels under CEQA by controlling the establishment of noxious weeds, thus reducing the possibility of the roundtail ground squirrel from being established on the site. Controlling the establishment of roundtail ground squirrels would also discourage foraging at the site by predators of the ground squirrel, thereby decreasing predation rates on FTHL.

Impacts of Evaporation Ponds

The SES Solar Two includes two evaporation ponds that would collect wastewater from the reverse osmosis water treatment system. The applicant has proposed two 2,500,000-gallon ponds (SES 2009f), each one acre in size.

Staff is concerned about the wildlife threats posed by the evaporation ponds. First, creation of a new water source in an area where water is scarce would attract predators to the SES Solar Two site, potentially increasing predation rates on FTHL. Second, waterfowl, shorebirds, and other resident or migratory birds that drink or forage at the ponds might be harmed by hyper-saline conditions that could result in high total dissolved solids (TDS) concentrations. Monitoring results from the summer of 2007 at Harper Lake Solar Electric Generating System in the Mojave Desert revealed numerous waterfowl deaths at the evaporation ponds due to salt toxicosis (Luz 2007). The Harper Lake ponds are similar to those proposed by the SES Solar Two applicant. Although Harper Lake is near a wetland area, the evaporation ponds and associated risk to birds are a source of significant concern. Another concern is the location of the evaporation ponds near the proposed transmission towers on the project site where attraction to the ponds by birds would increase the possibility of collision.

As the evaporation ponds create an attractive nuisance for wildlife, a possible project design feature would be locating the evaporation ponds away from potential collision sites, such as the transmission towers. Other project design features proposed by the applicant for the evaporation ponds to discourage wildlife use would include construction of exclusionary fencing and installation of netting to cover the evaporation ponds (SES 2008f and SES 2009f).

Staff concurs with the applicant's proposal to install exclusionary fencing around the evaporation ponds and netting over the ponds to exclude wildlife and has incorporated them into staff's proposed Condition of Certification **BIO-13** (Evaporation Pond Fencing, Netting, and Monitoring). In addition to the installation of the fencing and netting, the evaporation ponds would be monitored should any corrective action be needed. Implementation of measures which exclude wildlife from evaporation ponds is preferable to allowing wildlife access to the hyper-saline conditions in the pond water, which has been known to cause death in water fowl. Implementation of **BIO-13** would reduce evaporation pond impacts to birds to less than significant levels under CEQA.

Increased Risk from Roads/Traffic

Vehicle traffic would increase as a result of SES Solar Two construction and improvement of access roads, increasing the risk of injuring or killing FTHL and other wildlife. Construction of the SES Solar Two would be completed over an estimated 40-month period, with a peak at Month 7 of approximately 731 workers per day (SES 2008a and SES 2009n). Assuming an average of 240 construction personnel vehicles with 1.5 passengers each (SES 2009n), it is anticipated an average of approximately 405 workers per day is expected over the course of construction. Construction is also forecast to generate an average of approximately 270 total one-way vehicle trips, mainly from trucks, per day with a peak of approximately 529 trips per day (SES 2009n). During operations approximately 60 trucks, 4 forklifts, and 7 man lifts would be in use continuously throughout the 24-hour period; 5 delivery truck trips per week are expected, with an estimate of vehicular traffic from 100 workers and 8 visitors on a daily basis (SES 2008a p. 5.2-27).

The potential for increased traffic-related FTHL mortality is greatest along unpaved roads in between the rows of SunCatchers, although FTHL on paved roads may also be affected due to increased vehicle frequency and higher speed.

To minimize the risks of increased traffic fatality and other hazards associated with roads at the SES Solar Two project site, staff has proposed Condition of Certification **BIO-8**, Impact Avoidance and Minimization Measures. 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 15 miles per hour on routes within the project site for the life of the project. In addition, staff's proposed Condition of Certification **BIO-9** (Flat-Tailed Horned Lizard Clearance Surveys) would remove FTHLs prior to construction and set up barrier fencing to exclude the FTHL. Similar measures have been applied on past projects and have shown that they reduce impacts from traffic.

Collisions and Electrocution

Birds and bats are known to collide with communication towers, transmission lines, and other elevated structures. The tallest structures at the plant site would be the assembly building, which would be approximately 78 feet tall. All other structures except for the transmission line support structures are 50 feet or less in height. Two types of transmission line towers are proposed for use in SES Solar Two. The 71-foot H-frame towers would be placed at the undercrossing of the existing 500-kV transmission line, whereas the double-circuit lattice steel towers and/or steel poles, which are a height of 90 to110 feet, would be used elsewhere. These structures at the SES Solar Two site are unlikely to pose a collision risk because they are shorter than those typically associated with bird collision events and do not require guy wires. The number of birds that utilize native habitat would be even lower after the solar fields are built as the patchy habitat would only attract birds that are adapted to living under disturbed conditions and in close proximity to development. Since the evaporation ponds create an attractive nuisance, in order to decrease the collision and electrocution risk for birds, the evaporation ponds shall be located away from the transmission towers, which serve as potential collision sites as addressed in staff's proposed Condition of Certification **BIO-13** (Evaporation Pond Fencing, Netting, and Monitoring).

Large raptors such as golden eagles can be electrocuted by transmission lines when a bird's wings simultaneously contact two conductors of different phases, or a conductor and a ground. This happens most frequently when a bird attempts to perch on a structure with insufficient clearance between these elements. The proposed transmission lines would be 230 kV. To minimize risk of electrocution, staff recommends that "raptor-friendly" construction design for the transmission line with conductor wire spacing greater than the wingspans of large birds to help prevent electrocution as described in Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006 (APLIC 2006). With implementation of the proposed mitigation in staff's proposed Conditions of Certification **BIO-8** and **BIO-13**, staff concludes that the proposed transmission lines would not pose a significant threat to birds under CEQA.

Lighting

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). SES Solar Two operations would require onsite nighttime lighting for safety and security, which can disturb nocturnal wildlife. To reduce offsite lighting impacts, the applicant has proposed the lighting at the SES Solar Two facility would be restricted to areas required for safety, security, and operation. Exterior lights would be hooded, and lights would be directed onsite so that light or glare would be minimized. Low-pressure sodium lamps and fixtures of a non-glare type would be specified. Switched lighting would be provided for areas where continuous lighting is not required for normal operation, safety, or security; this would allow these areas to remain un-illuminated (dark) most of the time and thereby minimizing the amount of lighting potentially visible offsite (SES 2008a). The measures are described in Visual staff's proposed Condition of Certification **VIS-2**. These measures will significantly reduce the attraction of birds, and with their implementation, lighting at the SES Solar Two would have no adverse effects on wildlife under CEQA.

Noise

The primary noise sources associated with operation of the SES Solar Two include the reciprocating Stirling Engines (including generator, cooling fan, and air compressor) utilized on each of the SunCatchers, step-up transformers, and substation. The proposed SES Solar Two power plant would only operate during the daytime hours when sufficient solar insulation is available. As discussed in the **Noise and Vibration** section, power plant noise levels are predicted to be less than 52 dBA Ldn CNEL (45 dBA L_{eq}) at the nearest sensitive receptor during daytime hours. The measured ambient noise levels are higher than the predicted operational noise levels so there would be very little change from the current ambient noise levels. The impact on operational noise on surrounding wildlife is expected to be less than significant under CEQA.

Dust

Disturbance of the soil's surface caused by operations traffic and other activities such as mirror washing would result in increased wind erosion of the soil. The applicant has proposed the use of Soiltac™ as a soil binder in areas where vehicular traffic is anticipated. The impacts of increased dust and other operation impacts can be minimized with implementation of staff's proposed Condition of Certification **BIO-8** (Impact Avoidance and Minimization Measures) to less than significant levels under CEQA.

Noxious Weeds

It is anticipated that noxious weeds would follow in the wake of disturbance along the linears and project boundary, and could further spread weeds already present in the project vicinity. The introduction of artificial shading caused by the SunCatchers in an arid environment where light availability was not considered a limiting factor would result in changes to the micro-environments under these structures 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). The shading and wind deflection caused by the structures decrease the soil temperature extremes and also decrease evaporation from the soil surface. The addition of water due to a regular mirror washing regimen 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). Smith's (1984) study also demonstrated that plant biomass had substantially increased in and around the solar structures, possibly resulting in an increase of rodents and their predators. The increased vegetation around the solar structures would also potentially attract roundtail ground squirrel, which preys on FTHL. Predators of roundtail ground squirrels would also potentially prey on the FTHL.

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 provided a draft noxious weed management plan (SES 2009e) to avoid and minimize the adverse effects of noxious weeds. Staff concurs with the recommendations in the applicant's weed management plan, and has incorporated them into staff's proposed Condition of Certification **BIO-18**, (Noxious Weed Management Plan). The Noxious Weed Management Plan will include a discussion of weed eradication and control methods, preventative measures to be implemented during operation such as weed monitoring and management, weed control in areas where irrigation and mirror washing take place, reestablishing vegetation on disturbed sites with native seed mixes that are weed free, and long-term reporting requirements. In addition, staff's proposed Condition of Certification **BIO-8,** the Impact Avoidance and Minimization Measures, includes measures to minimize soils disturbance so habitat is decreased for disturbance adapted invasive species and maintaining a vehicle wash and inspection stations to prevent the spread of potential invasive weeds. Implementation of the Noxious Weed Management Plan and other impact avoidance and minimization measures would reduce impacts of noxious weeds to less than significant levels under CEQA.

Project Closure/Decommissioning

In the future, SES Solar Two would experience either a planned closure in approximately 40 years or be unexpectedly (either temporarily or permanently) closed. Temporary closure would be a result of necessary maintenance, hazardous weather conditions, or damage due to a natural disaster. Permanent closure would be a result of damage that is beyond repair, adverse economic conditions, or other significant reasons. When facility closure occurs, it must be done in such a way as to protect the environment and public health and safety.

A contingency plan, for a temporary closure, or a decommissioning plan, for a permanent closure, would be required of the applicant to submit to the Energy Commission Compliance Project Manager (CPM) and BLM's Authorized Officer for approval (staff's proposed Condition of Certification **BIO-20** for a Decommissioning and Reclamation Plan). A contingency plan would be implemented to ensure compliance with applicable LORS, and appropriate shutdown procedures depending on the length of the cessation. A decommissioning plan would be implemented to ensure compliance with applicable LORS, removal of equipment and shutdown procedures, habitat restoration, potential decommissioning alternatives, and the costs and source of funds associated with decommissioning activities. 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 Applicant submitted an outline of a Closure Plan (SES 2008f) in November 2008 in response to staff's data request (CEC 2008f) for the likely components of a facility closure plan (e.g., decommissioning methods, timing of any proposed restoration, restoration performance criteria) with a discussion of each relative to biological resources. Staff also requested a description of potential funding (e.g., bond) and/or legal mechanisms for decommissioning and restoration of the project site that could be used at the end of operations.

The applicant's data response (2008f)) does not provide sufficient information to guide the decommissioning of the project disturbance area, nor does it provide adequate information regarding the funding needed for those activities. Regulations promulgated by BLM at 43 CFR 3809.550 et seq. require a more detailed reclamation plan and an estimate. Page 5 of BLM's Instructional Memo for Oregon/Washington BLM Policy for 43 CFR 3809 Notice and Plan-level Occupations, 43 CFR 3715 Use and Occupancy and Reclamation Cost Estimates (BLM 2009b) lists the requirements for a reclamation plan as follows:

> *"(c) Reclamation Plan. A plan for reclamation to meet the standards in §3809.420 with a description of the equipment, devices, or practices proposed for use including, where applicable, plans for:*
>
> > *(i) drill-hole plugging;*
> >
> > *(ii) regrading and reshaping;*
> >
> > *(iii) mine reclamation, including information on the feasibility of pit backfilling that details economic, environmental, and safety factors;*
> >
> > *(iv) riparian mitigation;*
> >
> > *(v) wildlife habitat rehabilitation;*
> >
> > *(vi) topsoil handling;*
> >
> > *(vii) revegetation;*
> >
> > *(viii) isolation and control of acid-forming, toxic, or deleterious materials;*
> >
> > *(ix) removal or stabilization of buildings, structures, and support facilities; and*
> >
> > *(x) post-closure management."*

Page 3 of the same document also explicitly requires an estimate of the costs of reclamation, as follows:

> *"Reclamation Cost Estimate. An estimate of the cost to fully reclaim disturbances created during the proposed operations as required by §3809.552. The reclamation cost estimate must be developed as if the BLM were to contract with a third party to reclaim the operations according to the reclamation plan."*

Staff's proposed Condition of Certification **BIO-20** (Decommissioning and Reclamation Plan) requires the applicant to develop a Decommissioning and Reclamation Plan and cost estimate that meets the requirements of BLM's 43 CFR 3809.550 et seq.

Activities for project closure/decommissioning are anticipated to be similar to construction impacts. Discussion of impacts from project closure/decommissioning and additional mitigation which would be incorporated into the Decommissioning and Reclamation Plan, follows.

Noxious Weeds

Decommissioning/project closure activities and soil disturbance could introduce new noxious weeds to lands adjacent to the SES Solar Two plant site and could further spread weeds already present in the project vicinity, including Sahara mustard, red brome, and Mediterranean schismus. Noxious weeds can easily colonize areas of disturbance. 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 2009e) to avoid and minimize the spread of noxious weeds. Staff concurs with the recommendations in the applicant's noxious weed management plan and has incorporated them into staff's proposed Condition of Certification **BIO-18** (Noxious Weed Management Plan). The Noxious Weed Management Plan includes a discussion of weeds targeted for eradication or control and a variety of weed control measures such as establishing weed wash stations for vehicles, rapid implementation of control measures to ensure early detection and eradication for noxious weed invasions, and revegetation of disturbed areas with weed free native seed mix. Implementation of this condition/weed management plan would reduce potential impacts from introduction and spread of noxious weeds.

Dust

Disturbance of the soil's surface caused by decommissioning/project closure traffic and other activities 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. 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). Soil erosion from decommissioning/project closure activities and vehicle activity affects vegetation and soil properties. The applicant has proposed the use of Soiltac™ as a soil binder in areas where vehicular traffic is anticipated. The impacts of increased dust and other decommissioning/project closure impacts can be minimized with implementation of staff's proposed Condition of Certification **BIO-8** (Impact Avoidance and Minimization Measures). Measures to minimize dust impacts in staff's proposed Condition of Certification **BIO-8** include minimizing vegetation and soil disturbance, limiting the speed limit to 15 mph for vehicular traffic, and applying water to dirt roads. Similar measures have been applied on past projects and have shown that they are effective in minimizing dust impacts.

Noise

Noise from decommissioning/project closure activities could temporarily discourage wildlife from foraging and nesting immediately adjacent to the project area. 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. The wildlife species most likely to be affected by noise include the burrowing owl, FTHL, desert bighorn sheep, loggerhead shrike, and LeConte's thrasher.

As discussed in **C.10−Noise and Vibration** section of the SA/DEIS, the impacts from decommissioning/project closure activities would be similar to construction activities, with the loudest noise created by the operation of the equipment. In order to minimize noise levels from project equipment, the applicant has proposed various noise-reducing features, such as mufflers on internal combustion engines, air-inlet silencers, shrouds, or shields would be employed to minimize noise levels (SES 2008a), which has been incorporated into staff's proposed Condition of Certification **NOISE-6** (Construction Time Restrictions). Similar measures have been applied on past projects and have shown that they are effective in minimizing noise impacts on wildlife. With the implementation of staff's proposed Condition of Certification **BIO-16**, staff concludes that noise impacts to nesting birds and other wildlife would be minimized.

Waters of the U.S. and Jurisdictional State Waters

Permanent impacts to the ephemeral washes would have resulted from the placement of SunCatchers on 24-inch bases, the construction of debris/sediment basins, the construction and regular maintenance of access roads to the SunCatchers, the placement of culverts and Arizona crossings in the streambeds, construction of rip-rap/ retaining wall/gabion for bank stabilization after bioengineering/recontouring, and the construction of storm drain outfall structures for the proposed project. The underground electrical collection system, the hydrogen distribution system, and a 428-foot length of the reclaimed waterline in the ephemeral washes would be removed during decommissioning/plant closure. It is anticipated that after the removal of all structures, the washes would be recontoured to the original condition. The washes would be restored by replanting with native vegetation and weeding for a minimum of five years. Monitoring and success criteria would need to be function-based, scientifically defensible, explicit, and measurable. These measures would be incorporated into the Decommissioning and Reclamation Plan required by staff's proposed Condition of Certification **BIO-20**.

The reclaimed water pipeline along Evan Hewes Highway is anticipated to remain in place, therefore, no new impacts are expected from decommissioning/plant closure activities for the pipeline.

Special Status Plants

No impacts are expected to special status plants from decommissioning/plant closure activity as none are expected to be present after construction and operation of the power plant. Special status plant surveys would be conducted prior to decommissioning/plant closure activity. Should any special status plants occur on the site, avoidance measures described in staff's proposed Condition of Certification **BIO-19** (Special Status Plant Survey and Protection Plan) would be implemented.

Migratory/Special Status Bird Species

Construction and operation of the power plant would have eliminated nesting and foraging habitat for many migratory/special status birds, though western burrowing owls could exist near the periphery of the plant site. Any burrowing owls nesting on the plant site could be directly impacted by decommissioning/plant closure activities. Burrowing owl adults, eggs or young could be crushed or entombed, and nesting and foraging activities would be directly and indirectly impacted by decommissioning/plant closure activities. To avoid potential impacts to burrowing owls that might be nesting within the impact area, surveys would be conducted on the plant site using methods recommended by the California Burrowing Owl Consortium (CBOC) (1993) prior to decommissioning/ plant closure activities. To avoid and offset potentially significant impacts to nesting owls, passive removal would be utilized. Passive removal involves encouraging owls to move from occupied burrows to alternate natural or artificial burrows that are at least 150 feet from the impact zone and that are within or contiguous to a minimum of 6.5 acres of foraging habitat for each pair of relocated owls (CDFG 1995). Passive relocation of owls is only implemented during the non-breeding season (CDFG 1995) unless a qualified biologist can verify through non-invasive methods that egg laying/incubation has not begun or juveniles are foraging independently and able to fly. The unoccupied burrows would be collapsed in accordance with CDFG-approved guidelines (CBOC 1993). Ground-disturbing activities would occur outside the burrowing owl breeding season (February 1 through August 30) with clearance surveys prior to each phase of decommissioning/project closure activity. In addition, monitoring of burrowing owl burrows within 500 feet of construction activity would be conducted. Staff's proposed Condition of Certification **BIO-16** requires a temporary noise barrier shall be placed to reduce noise levels near burrows should nesting burrowing owls be within 500 feet of decommissioning/plant closure activities. Staff's proposed Conditions of Certification **BIO-16** and **BIO-8** (Impact Avoidance and Minimization Measures) would reduce potential impacts to burrowing owls.

Special Status Mammals

Construction and operation of the power plant would have eliminated denning and foraging habitat for desert kit fox and American badger. The exclusionary fencing of the power plant would also prevent Peninsular bighorn sheep entering the site. Therefore, no impacts are expected from decommissioning/plant closure activities to desert kit fox, badger, and bighorn sheep.

Flat-tailed Horned Lizard (FTHL)

The potential for FTHLs to occur on the plant site to be low due to the continual operations activities conducted prior to decommissioning/plant closure. However, should the FTHL be present, decommissioning/plant closure 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 FTHLs being crushed or entombed in their burrows, collection or vandalism, disruption of FTHL behavior during decommissioning/plant closure activities, and disturbance by noise or vibrations from the heavy equipment. Increased human activity and vehicle travel would occur from the construction and improvement of access roads, which could disturb, injure, or kill individual FTHLs.

Impact avoidance and minimization measures to reduce impacts to FTHL, including clearance surveys prior to each phase of decommissioning/plant closure activity and relocation of any FTHL observed within the impact area to suitable habitat outside of the development impact area. Measures from the issuance of a Conference Opinion from the USFWS would be incorporated into the following proposed Conditions of Certification:

BIO-9 (Flat-tailed Horned Lizard Clearance Surveys) which states the FTHL removal protocol and **BIO-11** (Flat-tailed Horned Lizard Compliance Verification) in which the Designated Biologist verifies for the Energy Commission staff and the BLM that all FTHL impact avoidance, minimization, and compensatory measures have been implemented.

The FTHL would be moved out of harm's way in coordination with the FTHL ICC. The FTHL ICC may choose to relocate the salvaged FTHL from the SES Solar Two project to several suitable sites within protect FTHL habitat or possibly conduct field research on FTHL. Decisions regarding the salvaged FTHL should be determined by the BLM in cooperation with the FTHL ICC.

Avian Predators and Other Predators of FTHL

Closure of the power plant would remove sources of food waste and water ponding from mirror washing and dust suppression operational activities that would attract predators of FTHL. The water that was originally used during plant operations would no longer be available for the propagation of noxious weeds. The removal of structures such as buildings, transmission towers, and SunCatchers would eliminate perching, roosting, and nesting sites for avian predators of FTHL. Removal of transmission towers will eliminate collision and electrocution hazards to birds and bats.

C.2.5 COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

A summary of the LORS applicable to the proposed project is provided in **Biological Resources Table 1** in **Section C.2.3**.

The proposed project must comply with state and federal laws, ordinances, regulations, and standards (LORS) (see summary in **Biological Resources Table 1**) 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 jurisdiction over 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*.), but not federal permits. The 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 CDFG, as well as the BLM, USACE, and USFWS. Staff would incorporated all terms and conditions that would otherwise be included in state permits into staff's proposed conditions of certification and can be included in the Energy Commission's license. 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:

Incidental Take Permit: California Endangered Species Act (Fish and Game Code §§2050 et seq.) The California Endangered Species Act (CESA) prohibits the "take" (defined as "to hunt, pursue, catch, capture, or kill") of State-listed species except as otherwise provided in state law. The bighorn sheep is listed as threatened under CESA and is also a State Fully Protected species. Due to the Peninsular bighorn sheep being listed as a Fully Protected species, take cannot be authorized for this species and must be avoided. Therefore, no take authorization will be issued by the Energy Commission for the Peninsular bighorn sheep.

Lake and Streambed Alteration Agreement: California Fish and Game Code §§1600-1607. Pursuant to these sections, CDFG typically regulates all changes to the natural flow, bed or bank, of any river, stream, or lake that supports fish or wildlife resources. Construction of the SES Solar Two would result in permanent impacts to 840 acres of jurisdictional state waters. Staff is reviewing information supplied by the applicant and is coordinating with CDFG to develop staff's proposed Condition of Certification **BIO-17**. Implementation of this condition would minimize and offset impacts to jurisdictional state waters, and would assure compliance with CDFG requirements that provide protection to jurisdictional state waters.

Federal LORS

The SES Solar Two project is located on federal land under BLM's jurisdiction and is therefore subject to the provisions of BLM's California Desert Conservation Area (CDCA) Plan (Revised 1999). The BLM has worked with the USFWS to develop a variety of land designations as tools to protect sensitive biological resources, including the FTHL and Peninsular bighorn sheep. The siting of the SES Solar Two project considered the management direction of these designations, as described below:

Yuha Desert Flat-tailed Horned Lizard Management Areas (MA): The goal of the establishment of these areas is to secure and/or manage sufficient habitat to maintain self-sustaining FTHL populations. The closest MA is south across Interstate 8 from the SES Solar Two project site. A 7.56-mile segment of the proposed transmission line would be built in an existing utility corridor in the MA.

Critical Habitat: Consists of specific areas defined by the USFWS as areas designated for the conservation of the listed species, which support physical and biological features essential for survival and that may require special management considerations or protection. Critical habitat for the Peninsular bighorn sheep was designated in 2001 and revised in 2009 to encompass a smaller area. The SES Solar Two project would be approximately six miles east of the closest Peninsular bighorn sheep critical habitat.

Area of Critical Environmental Concern (ACEC): These areas are specific, legally defined, BLM designations where special management is needed to protect and prevent irreparable damage to important historical, cultural, scenic values, fish and wildlife, and natural resources or to protect life and safety from natural hazards. The SES Solar Two project would not impact any ACEC.

BLM provides management direction for species such as FTHL within the CDCA and the FTHL MA, by identifying five designated management areas within California and Arizona (FTHL ICC 2003). The FTHL Interagency Coordinating Committee has developed the Flat-tailed Horned Lizard Rangewide Management Strategy (FTHL ICC 2003) to provide guidance for the conservation and management of sufficient habitat to maintain extant populations of FTHL in the five management areas. Guidelines on mitigation and compensation to limit the loss of habitat and effects on FTHL populations within and outside the management areas are described in the FTHL Rangewide Management Strategy.

The BLM permit/consultation/conferencing required for the SES Solar Two is with the USFWS to comply with the federal Endangered Species Act (ESA) for potential take of the Peninsular bighorn sheep and FTHL and with the USACE impacts to Waters of the U.S. “Take” of a species listed under the federal SA (16 USC §§1531 et seq.) is prohibited except as authorized through consultation with USFWS and issuance of an Incidental Take Statement under Section 7 or under Section 10 of the ESA, depending on whether there is federal agency action required for the proposed project (i.e., a federal permit required or funding involved). Since federal agency action has been identified for the SES Solar Two, Section 7 consultation/conferencing between BLM and the USFWS would therefore be obtained for take authorization under ESA Section 7. The Carlsbad Field Office of the USFWS oversees ESA permitting actions in the project area and the BLM has submitted a Biological Assessment for take of Peninsular bighorn sheep and FTHL for the SES Solar Two project. It is expected that the USFWS Biological Opinion will conclude that the project “may affect, not likely to adversely affect” Peninsular bighorn sheep. Though the FTHL is not federally listed at this time, it is anticipated that this species may be listed during the construction or operation of the proposed SES Solar Two project. In order to decrease possible time constraints, the FTHL was included in the Biological Assessment should this species become federally listed. As the FTHL is not yet listed, the BLM is undergoing conferencing, rather than consultation with the USFWS for this species. Since the BLM and USFWS are signatories in the FTHL ICC, it is anticipated that the recommendations stated in the FTHL Rangewide Management Strategy (FTHL ICC 2003) will be in the USFWS conferencing opinion.

Permit for Take Under the Bald and Golden Eagle Protection Act (Eagle Act): The USFWS requires a take permit to be issued for “take” of bald or golden eagles where the taking is associated with, but not the purpose of the activity, and cannot be practicably avoided. Take under the terms of the act is defined as “to pursue, shoot, shoot at, wound, kill, capture, trap, collect, molest, or disturb.” Disturb is defined 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, injury to an eagle; a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior.” Golden eagles were not detected on the SES Solar Two project site, but are unlikely to nest there because of the absence of suitable nesting habitat. There are only five occurrences of golden eagles known to Imperial County. According to Guy McCaskie (2010), one of the occurrences was less than two miles northwest of Seeley. The SES Solar Two site provides suitable foraging habitat. Due to the potential loss of foraging habitat for golden eagles, it is possible that a permit for take under the Eagle Act may be needed. The USFWS is currently drafting guidelines regarding whether and to what degree removal of foraging habitat for golden eagles would meet the definition of “disturb” under the act and therefore require issuance of a take permit.

Federal Clean Water Act 404 Permit: Fill of Waters of the U.S. would require a Standard Individual Permit subject to CWA Section 404(b)(1) guidelines. The U.S. Environmental Protection Agency (USEPA) Section 404(b)(1) Guidelines (40 CFR 230 et seq.) are substantive environmental criteria used by the USACE to evaluate permit applications.

Under these guidelines, an analysis of practicable alternatives is the primary tool used to determine whether a proposed discharge can be authorized. An alternative is considered practicable if it is available and capable of being implemented after considering cost, existing technology, and logistics in light of the overall project purpose (40 CFG Part 230[a][2]). The guidelines suggest a sequential approach to project planning such that the USACE must first consider avoidance and minimization of impacts to the extent practicable. Mitigation for unavoidable impacts to Waters of the U.S. is addressed only after the analysis has determined the Least Environmentally Damaging Practicable Alternative (LEDPA). A formal 404(b)(1) analysis is still pending; however requirements of the 404(b)(1) analysis would be incorporated into staff's proposed Condition of Certification **BIO-17** when available.

CEQA LEVEL OF SIGNIFICANCE

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. The CEQA Lead Agency is responsible for determining whether an impact is significant and is required to adopt feasible mitigation measures to minimize or avoid each significant impact. Conclusions in this section are presented to identify the level of significance of each identified impact (as required by CEQA) as follows: less than significant (i.e., adverse, but not significant); less than significant with mitigation (i.e., significant without mitigation, but can be mitigated to a level that is not significant); or significant and unavoidable (i.e., cannot be mitigated to a level that is not significant). **Biological Resources Table 5** summarizes the impacts to biological resources that would result from SES Solar Two construction and operation and mitigation measures.

Biological Resources Table 5
Summary of Impacts/Mitigation

Biological Resource	Impact/Mitigation
Colorado Desert Plant Communities & Wildlife Habitat	**Impacts:** Permanent loss of 6,155.9 acres (6,063.1 acres from plant site and 92.8 acres of off-site transmission line) of wildlife habitat, including 1,038.9 acres of disturbed habitat; potential direct impacts to terrestrial wildlife by heavy equipment and grading; increased risk of roadkill; increased disturbance/dust to nearby vegetation and wildlife; spread of non-native invasive weeds. **Mitigation**: Avoidance and minimization measures (**BIO-8**); FTHL compensatory mitigation (**BIO-10**); and implement Noxious Weed Management Plan (**BIO-18**).

Biological Resource	Impact/Mitigation
Waters of the U.S. and Jurisdictional State Waters	**Impacts:** For the plant site—impacts to ephemeral desert washes, resulting in permanent impacts to 312 acres to jurisdictional state waters and 165 acres of permanent impacts, 5 acres of temporary impacts, and 13 acres of indirect impacts to Waters of the U.S.; loss of associated hydrological and biological functions. For the recycled water pipeline—potential impact to 0.20 acres of CDFG jurisdictional state waters and 2.33 acres of Waters of the U.S. **Mitigation**: For the plant site—jurisdictional state waters, replace functions and values of impacted desert wash with a 1:1 off-site acquisition (**BIO-10**) of FTHL acquisition land within one year under the FTHL mitigation requirements. Should the acquired FTHL acquisition land not meet the acreage requirement of 312 acres of ephemeral washes, the remainder of the acreage would be acquired independent of the acquisition of FTHL habitat (**BIO-17**). For Waters of the U.S., 2:1 mitigation with half the mitigation being preservation and the other half enhancement or restoration, but staff is awaiting the requirements of the federal Clean Water Act (CWA) 404(b)(1) Alternatives Analysis. Mitigation ratio could be higher based on the analysis. For the recycled water pipeline—CDFG does not anticipate impacts to jurisdictional state waters and would require Best Management Practices (BMPs) and a Frac-Out Contingency Plan for horizontal directional drilling which are incorporated in **BIO-17**. The USACE would also require BMPs and a Frac-Out Contingency Plan. Any other conditions required by the CDFG and USACE will be incorporated into **BIO-17**.

Biological Resource	**Impact/Mitigation**
Special Status Wildlife	
Flat-tailed horned lizard (FTHL)	**Impact:** Potential take of individuals; permanent loss of approximately 6063.1 acres of FTHL habitat (Sonoran creosote bush scrub, including disturbed Sonoran creosote bush scrub) on the plant site and impact to 92.8 acres of FTHL (Sonoran creosote bush scrub) habitat on the off-site transmission line; increased risk of predation; increased road kill hazard from construction and operations traffic. **Mitigation**: Impact avoidance and minimization measures (**BIO-8)**; FTHL clearance surveys (**BIO-9**); FTHL compensatory mitigation for 6,619.9 acres (**BIO-10**); FTHL compliance verification (**BIO-11**); and Raven Management Plan (**BIO-12**).
American badger	**Impact:** Potential loss and fragmentation of habitat, loss of foraging grounds, crushing or entombing of animals during construction. **Mitigation**: Impact avoidance and minimization measures (**BIO-8)**; and conduct pre-construction surveys and implement impact avoidance measures (**BIO-15**).
Western burrowing owl	**Impact**: Potential loss of nest, eggs, or young; loss of breeding and foraging habitat on the plant site; disturbance of nesting and foraging activities for populations on and near the plant site and linear facilities; **Mitigation**: Impact avoidance and minimization measures (**BIO-8)**; and conduct pre-construction surveys and implement burrowing owl impact avoidance and mitigation measures (**BIO-16)**.
Other special status birds: Loggerhead shrike California horned lark Le Conte's thrasher	**Impact**: Disturbance of nesting activities, potential loss of nest, eggs, or young; loss of breeding and foraging habitat. **Mitigation**: Impact avoidance and minimization measures (**BIO-8)**; and conduct pre-construction nesting surveys, implement impact avoidance measures (**BIO-14**).

Biological Resource	Impact/Mitigation
Special status plants	**Impact**: Potential direct or indirect impacts to special status plant species from construction and fragmentation of habitat. **Mitigation**: Impact avoidance and minimization measures (**BIO-8)**; implement of weed management plan (**BIO-18**); and conduct pre-construction surveys during spring and fall 2010 and Special Status Plant Protection Plan (**BIO-19**).

Even with implementation of staff's proposed conditions of certification, staff is still uncertain if construction and operation of the proposed SES Solar Two project would comply with all federal, state, and local laws, ordinances, regulations, and standards relating to biological resources. Staff recommends adoption of the Conditions of Certification to mitigate potential impacts for most sensitive biological resources to less than CEQA significant levels with the exception of impacts to Waters of the U.S. and compensation fund mitigation for loss of FTHL habitat. Staff is waiting on a federal Clean Water Act (CWA) 404(b)(1) Alternatives Analysis from the USACE to determine the least environmentally damaging project alternative and the mitigation required for permitting. For FTHL mitigation, a compensation fee would not reduce impacts to less than significant levels under CEQA unless it is demonstrated that the funds would be used for "hard measures", i.e., purchase of FTHL compensation lands, construction of fencing to exclude OHVs from FTHL habitat, or restoration of FTHL habitat. In order for staff to conclude that fee payment reduces impacts to less than significant levels under CEQA, staff is in the process of evaluating if the use of compensation funds is sufficient for CEQA mitigation or if funds can be earmarked for specific actions which would reduce impacts to FTHL.

C.2.6 300 MW ALTERNATIVE

The 300 MW Alternative would essentially be Phase 1 of the proposed 750 MW SES Solar Two Project. Compared to the proposed project, the area would be reduced to a 2,577-acre project site on the southwestern portion of the proposed project area and would consist of 12,000 SunCatchers, generating 300 MW. The substation would be reduced to 300 MW capacity; however, the linear transmission line and water pipeline routes would remain the same.

C.2.6.1 SETTING AND EXISTING CONDITIONS

The general setting and existing conditions would remain as described in **Section C.2.4.1 Setting and Existing Conditions** although the land requirements would be proportionately reduced to reflect the smaller project size. For this alternative, all the ephemeral washes have connections to Coyote Wash to the north of the site, with the exception of one. That particular ephemeral wash is located along the southern edge on the east side of the project area and connects to other ephemeral washes which flow to the northeast towards the Westside Main Canal.

C.2.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The 300 MW Alternative would permanently impact a total of 2,577 acres of Sonoran creosote bush scrub habitat with the OHV and dirt roadways. Mitigation for impacts to vegetation communities resulting from this alternative would be the same as mitigation proposed under the proposed project (i.e., staff's proposed Conditions of Certification **BIO-8** [Impact Avoidance and Minimization Measures], **BIO-10** [Flat-tailed Horned Lizard Compensatory Mitigation], **BIO-18** [Noxious Weed Management Plan], and **BIO-19** [Special Status Plant Surveys and Protection Plan]).

As with the proposed project, the 300 MW Alternative could result in potential impacts to individual FTHL, as well as permanent loss of approximately 2,577 acres of FTHL habitat. Other potential impacts to FTHL resulting from this alternative, similar to the proposed project, include increased risk of predation, increased road kill hazard from construction and operational traffic, fragmentation of habitat, and loss of connectivity would still occur. The mitigation compensation for impacts to FTHL habitat on the plant site would be reduced to 2,577 acres at a 1:1 mitigation ratio. The off-site transmission line compensation for impacts to FTHL habitat would remain the same as the proposed project. Additional mitigation for impacts to FTHL would be the same as those for the proposed project and include: staff's proposed Conditions of Certification **BIO-8** (Impact Avoidance and Minimization Measures), **BIO-9** (Flat-tailed Horned Lizard Clearance Surveys), **BIO-10** (Flat-tailed Horned Lizard Compensatory Mitigation), and **BIO-11** (Flat-tailed Horned Lizard Compliance Verification).

Similar to the proposed project, the ephemeral washes would be impacted directly and indirectly by construction and operation of the SunCatchers with their associated infrastructure as described in **Section C.2.4.2 Impacts to Waters of the U.S. and Jurisdictional State Waters**. However, the permanent and temporary impacts would be decreased due to the reduction in project acreage. The acreage of both Waters of the U.S. and jurisdictional state waters would be reduced to 63 acres of permanent impact and 5 acres of temporary impact on the plant site from 165 acres of permanent impact and 5 acres of temporary impact for the proposed project. The linear feet of jurisdictional waters permanently impacted on the project site would be 109,376 feet and 5,116 feet of temporary impacts (Mattson 2009) for both jurisdictions. Mitigation for impacts to Waters of the U.S. and jurisdictional state waters resulting from this alternative would be similar to mitigation proposed under the proposed project (i.e., staff's proposed Conditions of Certification **BIO-8** [Impact Avoidance and Minimization Measures] and **BIO-17** [Lake and Streambed Impact Minimization and Compensation Measures]).

There would be a decrease in permanent acreage impacts to Waters of the U.S. and jurisdictional state waters, but this alternative would indirectly affect eight primary drainages outside of the site boundaries, including six of the eight which would be directly impacted by the development of the 300 MW Alternative, causing the disruption of the physical (e.g., hydrological and sediment transport), chemical, and biological functions and processes of the ephemeral washes. The use of ephemeral washes as a movement corridor for wildlife would still be disrupted for this alternative.

Although the 300 MW Alternative would result in reduced impacts to American badger and desert kit fox habitat as compared to the proposed project (from 6063.1 acres to 2,577 acres), impacts to these species due to loss and fragmentation of habitat and loss of foraging grounds would still occur. In addition, crushing or entombing these animals during construction could potentially occur. Mitigation for these impacts would be the same as that proposed under the proposed project (i.e., staff's proposed Condition of Certification **BIO-15** [American Badger and Desert Kit Fox Impact Avoidance and Minimization Measures]).

Impacts to western burrowing owl, loggerhead shrike, California horned lark, Le Conte's thrasher, or other special-status birds under this alternative would be reduced as compared to the proposed project given the reduction of impacts to Sonoran creosote scrub habitat. Regardless, the loss of nests, eggs, or young could potentially occur. In addition, loss of breeding and foraging habitat on the alternative site as well as disturbance of nesting and foraging activities near the alternative site and linear facilities would occur. Mitigation for these impacts would be the same as those proposed under the proposed project, as appropriate (i.e., staff's proposed Conditions of Certification **BIO-8,** and **BIO-14** [Pre-construction Nest Surveys] would avoid these potentially significant impacts to nesting birds. Potential impacts to burrowing owls would be further mitigated by Condition of Certification **BIO-16** (Burrowing Owl Impact Avoidance and Minimization Measures).

Several special-status plant species have the potential to occur within the project area, although none were observed within the project area. This alternative could potentially result in direct or indirect impacts to special-status plant species from construction and fragmentation of habitat. Mitigation for these potential impacts would be similar to those proposed under the proposed project (i.e., staff's proposed Conditions of Certification **BIO-18** [Noxious Weed Management Plan] and **BIO-20** [Special-Status Plant Survey and Protection Plan].

The impacts of evaporation ponds, bird collisions and electrocution would remain the same as the proposed project and the transmission line would not change with this alternative. Staff assumes that two evaporation ponds would still be needed at the plant site even though the need for water to clean the SunCatcher mirrors would be reduced. Plant operations would cycle one pond to fill with reverse osmosis (RO) water for a year and then evaporate the following year. The second pond will be on an alternate schedule so there is always a pond available for receiving RO water and another to allow evaporation of RO water. Mitigation for impacts would be the same as mitigation under the proposed project (i.e., staff's proposed Conditions of Certification **BIO-8** [Impact Avoidance and Minimization Measures] and **BIO-13** [Evaporation Pond Fencing, Netting, and Monitoring]).

The impacts from roads and traffic would be proportionately reduced with the smaller project size. Mitigation for impacts would be the same as mitigation under the proposed project (i.e., staff's proposed Condition of Certification **BIO-8** [Impact Avoidance and Minimization Measures]).

C.2.6.3 CEQA LEVEL OF SIGNIFICANCE

Staff is awaiting the results of the USACE federal CWA 404(1)(b) Alternatives Analysis before concluding that this alternative would comply with LORS. Currently, staff's proposed conditions of certification would not be sufficient to mitigate the potential impacts to biological resources to less than significant levels under CEQA until conditions required by the USACE for a federal Clean Water Act 404(1)(b) Impact Analysis are known. The conditions required by the USACE from the analysis would be incorporated into staff's proposed Condition of Certification **BIO-17**.

C.2.7 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The Drainage Avoidance #1 Alternative would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative would have the same outer project boundaries as the proposed project, but would prohibit installation of permanent structures within the drainages, thereby reducing the developed area from 6,063.1 acres to 4,690 acres, and reducing the generation capacity from 750 MW under the proposed project to 632 MW (84% of the proposed generation capacity). Rather than installation of 30,000 SunCatchers as identified under the proposed project, 25,000 SunCatchers would be installed.

C.2.7.1 SETTING AND EXISTING CONDITIONS

The general setting and existing conditions would remain as described in **Section C.2.4.1 Setting and Existing Conditions**.

C.2.7.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Drainage Avoidance Alternative #1 would impact 4,690 acres of Sonoran creosote bush scrub habitat as compared to the proposed project (see **Alternatives Figure 1B**), which impacts 6,063.1 acres. Mitigation for impacts to vegetation communities resulting from this alternative would be the same as mitigation under the proposed project for FTHL compensation due to the direct and indirect impacts (e.g., erosion) to the entire fenced project acreage of 6,063.1 acres with regards to FTHL. Other potential impacts to FTHL resulting from this alternative, similar to the proposed project, include increased risk of predation, increased road kill hazard from construction and operational traffic, fragmentation of habitat, and loss of connectivity would still occur. The compensation approach for impacts to FTHL habitat would remain the same as the proposed project (6,063.1 acres at a 1:1 mitigation ratio). The off-site transmission line compensation for impacts to FTHL habitat would remain the same as the proposed project. Compensation for impacts to vegetation communities and FTHL would be the same as those for the proposed project and include: staff's proposed Conditions of Certification **BIO-8** (Impact Avoidance and Minimization Measures), **BIO-9** (Flat-tailed Horned Lizard Clearance Surveys), **BIO-10** (Flat-tailed Horned Lizard Compensatory Mitigation), and **BIO-11** (Flat-tailed Horned Lizard Compliance Verification), **BIO-18** (Noxious Weed Management Plan), and **BIO-19** (Special Status Plant Surveys and Protection Plan).

Under this alternative, ten primary ephemeral washes would not be directly impacted by operation of the SunCatchers and associated infrastructure as described in **Section**

C.2.4.2 Impacts to Waters of the U.S. and Jurisdictional State Waters. However, site grading/recontouring, construction of roads (Arizona crossings), bank stabilization features (i.e., rip-rap, retaining walls, gabions), and storm drain outfall structures would still impact the ephemeral washes. Overall, there would be a substantial decrease in permanent impacts to Waters of the U.S. and jurisdictional state waters (from 165 acres to 48 acres) and a decrease in temporary impacts (from 5 acres to no impacts). As a result, mitigation for impacts to Waters of the U.S. and jurisdictional state waters would decrease as compared to the proposed project. The use of ephemeral washes as a movement corridor for wildlife would not be disrupted in this alternative. Mitigation for impacts to Waters of the U.S. and jurisdictional state waters resulting from this alternative would be similar to mitigation proposed under the proposed project (i.e., staff's proposed Conditions of Certification **BIO-8** [Impact Avoidance and Minimization Measures] and **BIO-17** [Lake and Streambed Impact Minimization and Compensation Measures]).

Drainage Avoidance #1 Alternative would result in impacts to the entire fenced acreage of 6,063.1 acres to American badger and desert kit fox habitat Impacts to these species such as loss and fragmentation of habitat and loss of foraging grounds would still occur. In addition, crushing or entombing these animals during construction could potentially occur. Mitigation for these impacts would be the same as that proposed under the proposed project (i.e., staff's proposed Condition of Certification **BIO-15** [American Badger and Desert Kit Fox Impact Avoidance and Minimization Measures]).

Impacts to western burrowing owl, loggerhead shrike, California horned lark, Le Conte's thrasher, or other special-status birds under this alternative would be slightly reduced as compared to the proposed project given the reduction of impacts to Sonoran creosote scrub habitat. Regardless, the loss of nests, eggs, or young could potentially occur. In addition, loss of breeding and foraging habitat on the alternative site as well as disturbance of nesting and foraging activities near the alternative site and linear facilities would occur. Mitigation for these impacts would be the same as those proposed under the proposed project, as appropriate (i.e., staff's proposed Conditions of Certification **BIO-8,** and **BIO-14** [Pre-construction Nest Surveys] would avoid these potentially significant impacts to nesting birds. Potential impacts to burrowing owls would be further mitigated by Condition of Certification **BIO-16** (Burrowing Owl Impact Avoidance and Minimization Measures).

Several special-status plant species have the potential to occur within the project area, although none were observed within the project area. This alternative could potentially result in direct or indirect impacts to special-status plant species from construction and fragmentation of habitat. Mitigation for these potential impacts would be similar to those proposed under the proposed project (i.e., staff's proposed Conditions of Certification **BIO-18** [Noxious Weed Management Plan] and **BIO-19** [Special-Status Plant Survey and Protection Plan]).

The impacts of evaporation ponds, bird collisions and electrocution would remain the same as the proposed project as the transmission line would not change with this alternative. Staff assumes that two evaporation ponds would still be needed at the plant site even though the need for water to clean the SunCatcher mirrors would be reduced. Plant operations would cycle one pond to fill with reverse osmosis (RO) water for a year and then evaporate the following year. The second pond will be on an alternate schedule so there is always a pond available for receiving RO water and another to allow evaporation of RO water. Mitigation for impacts would be the same as mitigation under the proposed project (i.e., staff's proposed Conditions of Certification **BIO-8** [Impact Avoidance and Minimization Measures] and **BIO-13** [Evaporation Pond Fencing, Netting, and Monitoring]).

The impacts from roads and traffic would be reduced with the decrease in the number of SunCatchers. Mitigation for impacts would be the same as mitigation under the proposed project (i.e., staff's proposed Condition of Certification **BIO-8** [Impact Avoidance and Minimization Measures]).

C.2.7.3 CEQA LEVEL OF SIGNIFICANCE

Staff is awaiting the results of the USACE federal CWA 404(1)(b) Alternatives Analysis before concluding that this alternative would comply with LORS. Currently, staff's proposed conditions of certification would not be sufficient to mitigate the potential impacts to biological resources to less than significant levels under CEQA until conditions required by the USACE for a federal Clean Water Act 404(1)(b) Impact Analysis are known. The conditions required by the USACE from the analysis would be incorporated into staff's proposed Condition of Certification **BIO-17**.

C.2.8 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 Alternative would eliminate both the eastern and westernmost portions of the proposed project, where the largest drainage complexes are located. It would reduce the overall size of the project area by approximately 50% (from 6,063.1 acres to 3,153 acres). It also would reduce the generation capacity from 750 MW to 423 MW (retaining only about 32% of the proposed number of SunCatchers). In this alternative, permanent structures would be allowed within all drainages inside the revised, smaller project boundary.

C.2.8.1 SETTING AND EXISTING CONDITIONS

The general setting and existing conditions would remain as described in **Section C.2.4.1 Setting and Existing Conditions** although the land requirements would be proportionately reduced to reflect the smaller project size.

C.2.8.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Drainage Avoidance Alternative #2 would permanently impact 3,153 acres of Sonoran creosote bush scrub as compared to the proposed project, which would impact 6,063.1 acres of habitat. Mitigation for impacts to vegetation communities resulting from this alternative would be the same as mitigation proposed under the proposed project (i.e., staff's proposed Condition of Certification **BIO-8** [Impact Avoidance and Minimization Measures], **BIO-10** [Flat-tailed Horned Lizard Compensatory Mitigation], **BIO-18** [Noxious Weed Management Plan], and **BIO-19** [Special Status Plant Surveys and Protection Plan]).

As with the proposed project, Drainage Avoidance Alternative #2 could result in potential impacts to individual FTHL, as well as permanent loss of approximately 3,153 acres of FTHL habitat. Other potential impacts to FTHL resulting from this alternative, similar to the proposed project, include increased risk of predation, increased road kill hazard from construction and operational traffic, fragmentation of habitat, and loss of connectivity would still occur. The mitigation compensation for impacts to FTHL habitat on the plant site would be reduced to 3,153 acres at a 1:1 mitigation ratio. The off-site transmission line compensation for impacts to FTHL habitat would remain the same as the proposed project. Additional mitigation for impacts to FTHL would be the same as those for the proposed project and include: staff's proposed Conditions of Certification **BIO-8** (Impact Avoidance and Minimization Measures), **BIO-9** (Flat-tailed Horned Lizard Clearance Surveys), **BIO-10** (Flat-tailed Horned Lizard Compensatory Mitigation), and **BIO-11** (Flat-tailed Horned Lizard Compliance Verification).

Under this alternative only the central portion of the proposed project area would be developed, thereby avoiding three primary and three secondary ephemeral washes at the western end of the proposed project area and three primary and several secondary ephemeral washes at the eastern end of the proposed project area (see **Alternatives Figure 1C).** The ephemeral washes within the central portion of the proposed project area would be impacted directly and indirectly by construction and operation of the SunCatchers with their associated infrastructure as described in **Section C.2.4.2 Impacts to Waters of the U.S. and Jurisdictional State Waters**. As such, there would be a substantial decrease in impacts (from 165 acres of permanent impacts and 5 acres of temporary impacts for the proposed project to 71 acres of permanent impacts and 1 acre of temporary impacts for this alternative) to Waters of the U.S. and jurisdictional state waters. Mitigation for impacts to Waters of the U.S. and jurisdictional state waters resulting from this alternative would be the same as those recommended for the proposed project (i.e., staff's proposed Condition of Certification **BIO-8** [Impact Avoidance and Minimization Measures] and **BIO-17** [Lake and Streambed Impact Minimization and Compensation Measures]).

There would be a decrease in acreage impacts to wildlife habitat, but use of ephemeral washes as a movement corridor for wildlife within the central portion of the proposed project area would still be disrupted under this alternative.

Although Drainage Avoidance #2 Alternative would result in reduced impacts (from 6063.1 acres to 3,153 acres) to American badger and desert kit fox habitat as compared to the proposed project, impacts to these species such as loss and fragmentation of habitat and loss of foraging grounds would still occur. In addition, crushing or entombing these animals during construction could potentially occur. Mitigation for these impacts would be the same as that proposed under the proposed project (i.e., staff's proposed Condition of Certification **BIO-15** [American Badger and Desert Kit Fox Impact Avoidance and Minimization Measures]).

Impacts to western burrowing owl, loggerhead shrike, California horned lark, Le Conte's thrasher, or other special-status birds under this alternative would be slightly reduced as compared to the proposed project given the reduction of impacts to Sonoran creosote scrub habitat. Regardless, the loss of nests, eggs, or young could potentially occur. In addition, loss of breeding and foraging habitat on the alternative site as well as disturbance of nesting and foraging activities near the alternative site and linear facilities would occur. Mitigation for these impacts would be the same as those proposed under the proposed project, as appropriate (i.e., staff's proposed Conditions of Certification **BIO-8,** and **BIO-14** [Pre-construction Nest Surveys] would avoid these potentially significant impacts to nesting birds. Potential impacts to burrowing owls would be further mitigated by Condition of Certification **BIO-16** (Burrowing Owl Impact Avoidance and Minimization Measures).

Several special-status plant species have the potential to occur within the project area, although none were observed within the project area. This alternative could potentially result in direct or indirect impacts to special-status plant species from construction and fragmentation of habitat. Mitigation for these potential impacts would be similar to those proposed under the proposed project (i.e., staff's proposed Conditions of Certification **BIO-18** [Noxious Weed Management Plan] and **BIO-19** [Special-Status Plant Survey and Protection Plan]).

The impacts of evaporation ponds, bird collisions and electrocution would remain the same as the proposed project as the transmission line would not change with this alternative. Staff assumes that two evaporation ponds would still be needed at the plant site even though the need for water to clean the SunCatcher mirrors would be reduced. Plant operations would cycle one pond to fill with reverse osmosis (RO) water for a year and then evaporate the following year. The second pond will be on an alternate schedule so there is always a pond available for receiving RO water and another to allow evaporation of RO water. Mitigation for impacts would be the same as mitigation under the proposed project (i.e., staff's proposed Conditions of Certification **BIO-8** [Impact Avoidance and Minimization Measures] and **BIO-13** [Evaporation Pond Fencing, Netting, and Monitoring]).

The impacts from roads and traffic would be reduced with the decrease in project acreage. Mitigation for impacts would be the same as mitigation under the proposed project (i.e., staff's proposed Condition of Certification **BIO-8** [Impact Avoidance and Minimization Measures]).

C.2.8.3 CEQA LEVEL OF SIGNIFICANCE

Staff is awaiting the results of the USACE federal CWA 404(1)(b) Alternatives Analysis before concluding that this alternative would comply with LORS. Currently, staff's proposed conditions of certification would not be sufficient to mitigate the potential impacts to biological resources to less than significant levels under CEQA until conditions required by the USACE for a federal Clean Water Act 404(1)(b) Impact Analysis are known. The conditions required by the USACE from the analysis would be incorporated into staff's proposed Condition of Certification **BIO-17**.

C.2.9 NO ACTION/NO ACTION ALTERNATIVES

C.2.9.1 NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on SES Solar Two project application and on California Desert Conservation Area (CDCA) land use plan amendment

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

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no new ground disturbance. As a result, none of the impacts to biological resources from construction or operation of the proposed project would occur. No impacts to special status plants and wildlife species would occur and no impacts to desert habitat would occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.2.9.2 NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on SES Solar Two project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed SES Solar Two 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, biological impacts would result from the construction and operation of the solar technology and resulting ground disturbance and would likely be similar to the biological impacts from the proposed project, including impacts to special status plants and wildlife and to desert habitat. Different solar technologies require different amounts of grading; however, it is expected that all solar technologies would require grading and maintenance. As such, this No Project/No Action Alternative could result in biological impacts similar to the impacts under the proposed project.

C.2.9.3 NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on SES Solar Two project application and amend the CDCA land use plan to make the area unavailable for future solar development

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

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

C.2.10 CUMULATIVE IMPACTS

Under CEQA, a project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (Cal. Code Regs, tit. 14, section 15130). NEPA states that "cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR section 1508.7).

There is the potential for substantial future development in the Imperial Valley area and throughout the California desert region. Analysis in the Imperial Valley and throughout the southern California desert region. Analysis of cumulative impacts is based on data provided in the following maps and tables (see **Section G.4 Cumulative Scenario**):

- Cumulative Impacts Figure 1, Regional Renewable Applications;
- Cumulative Impacts Figure 2, Imperial County Renewable Applications on BLM Land;
- Cumulative Impacts Figure 3, Plaster City – Existing and Future/Foreseeable Projects;
- Cumulative Impacts Table 1A, Renewable Energy Projects in the California Desert District;
- Cumulative Impacts Table 1B, Energy Projects on State and Private Lands;
- Cumulative Impacts Table 2, Existing Projects in the Plaster City Area; and
- Cumulative Impacts Table 3, Future Foreseeable Projects in the Plaster City Area.

Existing projects/future foreseeable projects figures and tables include both energy and non-energy projects.

The analysis in this section first defines the geographic area over which cumulative impacts related to biological resources could occur. The cumulative impact analysis itself describes the potential for cumulative impacts to occur as a result of implementation of the SES Solar Two project along with the listed local and regional projects.

C.2.10.1 GEOGRAPHIC SCOPE OF ANALYSIS

The geographic area considered for cumulative impacts on biological resources is FTHL habitat in California. The historical range of the FTHL in California encompassed approximately 1.8 to 2.2 million acres mainly in Imperial County, but also in central Riverside County and eastern San Diego County (FTHL ICC 2003), but is now reduced to approximately 50% of its historical range.

Effects of Past and Present Projects

For this analysis, the following projects or developments are considered most relevant to effects on biological resources:

- Recreational activities where OHV use is permitted;
- U.S. Gypsum Mining quarry and processing plant located at Plaster City;
- U.S. Naval Air Facility El Centro;
- California State Prison, Centinela;
- Agricultural development;
- U.S.−Mexico border fence;
- Sand and gravel mining operations; and
- Urban development.

Over the past two hundred years California southern deserts have been subject to major human-induced changes that have threatened native plant and animal communities by habitat loss, fragmentation, and degradation. Some of the most conspicuous threats are those activities that have resulted in large scale habitat loss due to urbanization, agricultural uses, landfills, military operations, mining activities, as well as activities that fragment and degrade habitats such as roads, off-highway vehicle activity, recreational use, and grazing (Berry et al. 1996; Avery 1997; Jennings 1997). The introduction of non-native plant species and increases in predators has also contributed to population declines and range contractions for many special status plant and animal species (Boarman 2002).

Approximately 50% of historical range of FTHL has been destroyed mainly by agricultural and urban development (FTHL ICC 2003). Agricultural practices, in particular irrigation, has altered FTHL habitat to such a degree to be unsuitable for this species. The agricultural and urban development also affected other wildlife and native plants by reducing native habitat. Other projects and activities that have reduced the range of FTHL in the Imperial Valley include: United States Gypsum Corporation (Plaster City) processing plant north of the project along Evan Hewes Highway; sand and gravel operations north of Evan Hewes Highway, five miles west of Ocotillo, and east of the project site; off-highway vehicle (OHV) use at the Plaster City Open OHV Area north of Evan Hewes Highway and limited use on designated routes within the project site; intensive agricultural production and urban development to the east of the project site; and former sand and gravel operations which occurred on the project site in the past, which has been subsequently reclaimed. Currently, the fence at the U.S.–

Mexico border approximately eight miles to the south of the project site is under construction. Even though the U.S.–Mexico border fence would eliminate the illegal drive-through traffic, thus lessening impacts to FTHL along the border, the large scale habitat loss associated with the currently proposed projects negates FTHL population gains in the region. In this context, staff assessed the potential of the SES Solar Two project to contribute to cumulative significant loss, degradation, and fragmentation of habitat, including loss of connectivity for desert plants and wildlife, including FTHL and other special status species.

Effects of Reasonably Foreseeable Future Projects

Biological resources are expected to be affected by reasonably foreseeable future projects. These projects, which are located within FTHL habitat, include all the future foreseeable projects in the Plaster City area listed in **Cumulative Analysis Table 3** and the following proposed renewable energy projects (from **Cumulative Analysis Table 1B**):

- Los Angeles Department of Water and Power and Optisolar Plant is a proposed 68 MW photovoltaic facility located in Imperial County on State Route 111.
- Bethel Solar Hybrid Power Plant is a proposed 49.4 MW hybrid solar thermal and biomass facility located in Seeley.
- Mt. Signal Solar Power Station is a proposed 49.4 MW hybrid solar thermal and biomass facility located eight miles southwest of El Centro.
- TelStar Energies, LLC, is a proposed 300 MW wind energy project located west of the SES Solar Two project site in Ocotillo Wells.
- Orni 18, LLC, Geothermal Power Plant is a proposed 49.9 MW geothermal facility in Brawley.

Proposed solar and wind energy projects have the potential to further reduce and degrade native plant and animal populations, in particular special status species such as FTHL. In comparison to solar projects which would permanently impact the entire project site for FTHL, the wind energy projects would not impact the FTHL habitat to the same extent as permanent ground disturbance would be limited to the bases of wind turbines and the corresponding access roads for maintenance. However, the wind turbines do impact birds and bats.

Contribution of the SES Solar Two Project to Cumulative Impacts

Construction. The construction of the SES Solar Two Project is expected to result in short term adverse impacts related to construction activities. It is expected that some of the cumulative projects described above which are not yet built may be under construction the same time as the SES Solar Two Project. As a result, there may be substantial short term impacts during construction of those cumulative projects related to biological resources.

The SES Solar Two Project would be expected to contribute only a small amount to the possible short term cumulative impacts related to biological resources because the proposed conditions of certification described below would minimize and offset the contributions of the SES Solar Two to the cumulative loss of habitat for native plant communities and wildlife, including special status species. Staff's proposed Condition of

Certification **BIO-10** requires the applicant to pay for the acquisition of 6,619.9 acres of suitable habitat for FTHL. This habitat would be connected to other suitable habitat for other special status species, and would offset any habitat loss associated with the SES Solar Two. Staff's proposed Conditions of Certification **BIO-16** requires protection and passive relocation for burrowing owls, and **BIO-12**, the Raven Management and Monitoring Plan, specifically includes measures that would address the cumulative regional increases in raven predation on FTHL. Staff's proposed Condition of Certification **BIO-19** requires pre-construction surveys and a special status plant protection plan. Finally, staff's proposed Condition of Certification **BIO-17** requires that the impacts to the desert washes be mitigated by offsetting cumulative losses to Waters of the U.S. and jurisdictional state waters. The cumulative impacts from all the projects would be significant under CEQA, but this project's contribution will be less than cumulatively considerable with appropriate levels of compensatory mitigation, as discussed in staff's proposed Conditions of Certification **BIO-10** and **BIO-17**. Similarly, the combined effect of the overall cumulative past, present, and proposed projects in the FTHL habitat would adversely affect biological resources, but can be mitigated with staff's proposed Conditions of Certification **BIO-10** and **BIO-17** under NEPA.

Operation. The operation of the SES Solar Two Project is expected to result in long term adverse impacts during operation of the project related to biological resources. It is expected that some of the cumulative projects described above may be operational at the same time as the SES Solar Two Project. As a result, there may be substantial long term impacts during operation of those cumulative projects related to biological resources. This is discussed in the **Operation Impacts and Mitigation** subsection of **Section C.2.4.2 Assessment of Impacts and Discussion of Mitigation**.

Decommissioning. The decommissioning of the SES Solar Two Project is expected to result in adverse impacts related to biological resources similar to construction impacts. It is unlikely that the construction or decommissioning of any of the cumulative projects would occur concurrently with the decommissioning of this project, because the decommissioning is not expected to occur for approximately 40 years. As a result, there may not be impacts related to biological resources during decommissioning of the SES Solar Two Project generated by the cumulative projects. As a result, the impacts of the decommissioning of the SES Solar Two Project would not be expected to contribute to cumulative impacts related to biological resources due to the biological resources having already been impacted by the initial construction and operation of the project. Staff's proposed Condition of Certification **BIO-20**, would require a Decommissioning and Reclamation Plan for restoration of the native habitat to the site.

C.2.11 NOTEWORTHY PUBLIC BENEFITS

Construction and operation of the SES Solar 2 power plant would not result in any noteworthy public benefits with regard to biological resources.

C.2.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

DESIGNATED BIOLOGIST SELECTION

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 BLM's Authorized Officer for approval in consultation with CDFG and USFWS.

The Designated Biologist must meet the following minimum qualifications:

- Bachelor's degree in biological sciences, zoology, botany, ecology, or a closely related field;
- 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; and
- At least one year of field experience with biological resources found in or near the project area.

In lieu of the above requirements, the resume shall demonstrate to the satisfaction of the CPM and BLM's Authorized Officer, 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: The project owner shall submit the specified information at least 90 days prior to the start of any project-related site disturbance activities. No site or related facility activities 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 the CPM and BLM's Authorized Officer at least ten working days prior to the termination or release of the preceding Designated Biologist. In an emergency, the project owner shall immediately notify the CPM and BLM's Authorized Officer to discuss the qualifications and approval of a short-term replacement while a permanent Designated Biologist is proposed to the CPM and BLM's Authorized Officer for consideration.

DESIGNATED BIOLOGIST DUTIES

BIO-2 The project owner shall ensure that the Designated Biologist performs the following during any site (or related facilities) mobilization, ground disturbance, grading, construction, operation, closure, and restoration activities. The Designated Biologist may be assisted by the approved Biological Monitor(s) but remains the contact for the project owner, BLM's Authorized Officer, and CPM. The Designated Biologist Duties shall include the following:

- Advise the project owner's Construction and Operation Managers on the implementation of the biological resources conditions of certification;

- Consult on the preparation of the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) to be submitted by the project owner;
- 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;
- Clearly mark sensitive biological resource areas and inspect these areas at appropriate intervals for compliance with regulatory terms and conditions;
- 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;
- Notify the project owner, BLM's Authorized Officer, and the CPM of any non-compliance with any biological resources condition of certification;
- Respond directly to inquiries of BLM's Authorized Officer and the CPM regarding biological resource issues;
- 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;
- Train the Biological Monitors as appropriate, and ensure their familiarity with the BRMIMP, Worker Environmental Awareness Program (WEAP) training, and all permits; and
- Maintain the ability to be in regular, direct communication with representatives of BLM's Authorized Officer, CDFG, USFWS, and CPM, including notifying these agencies of dead or injured listed species and reporting special status species observations to the California Natural Diversity Database.

Verification: The Designated Biologist shall submit in the Monthly Compliance Report to the BLM's Authorized Officer and the CPM copies of all written reports and summaries that document construction activities that have the potential to affect biological resources. 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 their duties cease, as approved by BLM's Authorized Officer and the CPM.

BIOLOGICAL MONITOR QUALIFICATIONS

BIO-3 The project owner's BLM- and CPM-approved Designated Biologist shall submit the resume, at least three references, and contact information of the proposed Biological Monitors to BLM's Authorized Officer and the CPM for approval. The resume shall demonstrate, to the satisfaction of BLM's Authorized

Officer and the CPM, the appropriate education and experience to accomplish the assigned biological resource tasks. Specifically, the Biological Monitors shall have experience and are capable of conducting FTHL field monitoring, have sufficient education and field experience to understand FTHL biology, to be able to identify FTHL scat, and to be able to identify and follow FTHL tracks.

Biological Monitor(s) training by the Designated Biologist shall include familiarity with the conditions of certification, BRMIMP, WEAP, and all permits.

Verification: The project owner shall submit the specified information to BLM's Authorized Officer and the CPM for approval at least 30 days prior to the start of any project-related site disturbance activities. The Designated Biologist shall submit a written statement to BLM's Authorized Officer and the CPM confirming that individual Biological Monitor(s) have 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 Authorized Officer and the CPM for approval at least ten 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 mobilization, ground disturbance, grading, construction, operation, closure, and restoration activities. The Designated Biologist shall remain the contact for the project owner, BLM's Authorized Officer, and the CPM.

Verification: The Designated Biologist shall submit in the Monthly Compliance Report to BLM's Authorized Officer and the CPM copies of all written reports and summaries that document biological resources activities, including those conducted or monitored 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 Authorized Officer 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.

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, construction, and operation activities in areas specified by the Designated Biologist. The Designated Biologist shall:

- 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;
- Inform the project owner and the construction/operation manager when to resume activities; and

- Notify BLM's Authorized Officer and the CPM if there is a halt of any activities and advise the CPM of any corrective actions that have been taken or would be instituted as a result of the work stoppage.

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 Authorized Officer 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 Authorized Officer 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 Authorized Officer 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 Authorized Officer 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 SES Solar Two-specific Worker Environmental Awareness Program (WEAP) and shall secure approval for the WEAP from BLM's Authorized Officer, USFWS, CDFG, 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 mobilization, ground disturbance, grading, construction, operation, and closure. The WEAP shall:

- Be developed by or in consultation with the Designated Biologist and consist of an on-site or training center presentation in which supporting electronic media and written material, including wallet-sized cards with summary information on special status species and sensitive biological resources, is made available to all participants;
- Discuss the locations and types of sensitive biological resources on the project site and adjacent areas, explain the reasons for protecting these resources, and the function of flagging in designating sensitive resources and authorized work areas;
- Place special emphasis on FTHL, including information on physical characteristics, distribution, behavior, ecology, sensitivity to human activities, legal protection and status, penalties for violations, reporting requirements, and protection measures;
- Include a discussion of fire prevention measures to be implemented by workers during project activities; request workers to dispose of cigarettes and cigars appropriately and not leave them on the ground or buried;
- Present the meaning of various temporary and permanent habitat protection measures;

- Identify whom to contact if there are further comments and questions about the material discussed in the program; and
- Include a training acknowledgment form to be signed by each worker indicating that they received the WEAP training and shall abide by the guidelines.

The specific program can be administered by a competent individual(s) acceptable to the Designated Biologist.

Verification: At least 60 days prior to the start of any project-related site disturbance activities, the project owner shall provide to BLM's Authorized Officer and the CPM a copy of the draft 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 ten days prior to site and related facilities mobilization, 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 six months after the start of commercial operation.

Throughout the life of the project, the worker education program 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 attend the program and understand all protection measures. These forms shall be maintained by the project owner and shall be made available to BLM's Authorized Officer and the CMP 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 six months following the termination of an individual's employment.

BIOLOGICAL RESOURCES MITIGATION IMPLEMENTATION AND MONITORING PLAN (BRMIMP)

BIO-7 The project owner shall develop a BRMIMP and submit two copies of the proposed BRMIMP to BLM's Authorized Officer and the CPM (for review and approval) and shall implement the measures identified in the approved BRMIMP. The BRMIMP shall incorporate avoidance and minimization measures described in final versions of the Raven Management Plan, the USFWS Biological Opinion, Burrowing Owl Mitigation and Monitoring Plan, and the Noxious Weed Management Plan, and the Closure Plan. The BRMIMP shall be prepared in consultation with the Designated Biologist and shall and shall include the following:

- All biological resources mitigation, monitoring, and compliance measures proposed and agreed to by the project owner;
- All biological resources conditions of certification identified as necessary to avoid or mitigate impacts in the Staff Assessment/Environmental Impact Statement;
- All biological resource mitigation, monitoring and compliance measures required in federal agency terms and conditions, such as those provided in the USFWS Biological Opinion/Conferencing Opinion and the federal Clean Water Act (CWA) 404 permit;
- All biological resource mitigation, monitoring, and compliance measures required in other state agency terms and conditions, such as those provided in the permits or agreements with CDFG;
- All sensitive biological resources to be impacted, avoided, or mitigated by project construction, operation, and closure;
- All required mitigation measures for each sensitive biological resource;
- A detailed description of measures that shall be taken to avoid or mitigate temporary disturbances from construction activities;
- A Frac-Out Contingency Plan approved by CDFG and the CPM prior to commencement of construction of the reclaimed water pipeline for horizontal directional drilling under the waterways;
- All locations on a map, at an approved scale, of sensitive biological resource areas subject to disturbance and areas requiring temporary protection and avoidance during construction;
- Aerial photographs, at an approved scale, of all areas to be disturbed during project construction activities; include one set prior to any site or related facilities mobilization disturbance and one set subsequent to completion of project construction. Provide planned timing of aerial photography and a description of why times were chosen. Provide a final accounting of the before/after acreages and a determination of whether additional habitat compensation is necessary in the Construction Termination Report;
- Duration for each type of monitoring and a description of monitoring methodologies and frequency;
- Performance standards to be used to help decide if/when proposed mitigation and conditions are or are not successful;
- All performance standards and remedial measures to be implemented if performance standards are not met;
- A discussion of biological resources-related facility closure measures including a description of funding mechanism(s); and
- A process for proposing plan modifications to the CPM and appropriate agencies for review and approval.

Verification: The project owner shall submit the BRMIMP to the BLM's Authorized Officer and the CPM at least 60 days prior to start of any project-related site disturbance activities. The BRMIMP shall contain all of the required measures included in all biological conditions of certification. No ground disturbance may occur prior to approval of the final BRMIMP by BLM's Authorized Officer and the CPM.

The BLM's Authorized Officer and the CPM, in consultation with other appropriate agencies, would determine the BRMIMP's acceptability within 45 days of receipt. If there are any permits that have not yet been received when the BRMIMP is first submitted, these permits shall be submitted to BLM's Authorized Officer and the CPM within five days of their receipt, and the BRMIMP shall be revised or supplemented to reflect the permit condition within at least ten 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 Authorized Officer and the CPM.

The project owner shall notify the CPM no less than five working days before implementing any modifications to the approved BRMIMP to obtain BLM's Authorized Officer and CPM approval.

Any changes to the approved BRMIMP must also be approved by BLM's Authorized Officer and the CPM in consultation with appropriate agencies to ensure no conflicts exist.

Implementation of BRMIMP measures (construction activities that were monitored, species observed) would 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 Authorized Officer and the CPM, for review and approval, a written construction termination report identifying which items of the BRMIMP have been completed, a summary of all modifications to mitigation measures made during the project's site mobilization, ground disturbance, grading, and construction phases, and which mitigation and monitoring items are still outstanding.

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 during construction and operation:

- 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. Spoils shall be stockpiled in disturbed areas lacking native vegetation or where habitat quality is poor. To the extent possible, disturbance of shrubs and surface soils due to stockpiling shall be minimized. All disturbances, vehicles and equipment shall be confined to the flagged areas. To the extent possible, surface disturbance shall be timed to minimize mortality to FTHL.
- The area of disturbance of vegetation and soils shall be the minimum required for the project. Clearing of vegetation and grading shall be minimized. Whenever possible, rather than clearing vegetation and grading the ROW, equipment and vehicles shall use existing surfaces or previously

disturbed areas. Where grading is necessary, surface soils shall be stock-piled and replaced following construction to facilitate habitat restoration.

- To the extent possible, existing roads shall be used for travel and equipment storage. 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 (e.g. new spur roads associated with both transmission line options) or the construction zone, the route would be clearly marked (i.e., flagged and/or staked) prior to the onset of construction.
- Where feasible and desirable, in the judgment of the lead agency, newly created access routes shall be restricted by constructing barricades, erecting fences with locked gates at road intersections, and/or by posting signs. In these cases, the project proponent shall maintain, including monitoring, all control structures and facilities for the life of the project and until habitat restoration is complete.
- Vehicular traffic during project construction and operation 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 shall not exceed 15 miles per hour on the project site.
- Transmission lines, access roads, pulling sites, storage and parking areas shall be designed, installed, and maintained with the goal of minimizing impacts to native plant communities and sensitive biological resources.
- Transmission lines and all electrical components shall be designed, installed, and maintained in accordance with the Avian Power Line Interaction Committee's (APLIC's) *Suggested Practices for Avian Protection on Power Lines* (APLIC 2006) and *Mitigating Bird Collisions with Power* Lines (APLIC 2004) to reduce the likelihood of large bird electrocutions and collisions.
- Road surfacing and sealants as well as soil bonding and weighting agents used on unpaved surfaces shall be non-toxic to wildlife and plants.
- Facility lighting shall be designed, installed, and maintained to prevent side casting of light towards wildlife habitat.
- Parking and storage shall occur where FTHL removal surveys have been conducted.
- At the end of each work day, the Designated Biologist shall ensure that all potential wildlife pitfalls (trenches, bores and other excavations) have been inspected for wildlife and then backfilled. If backfilling is not feasible, all trenches, bores, and other excavations shall be sloped at a 3:1 slope at the ends to provide wildlife escape ramps, or covered to completely prevent wildlife access. All trenches, bores and other excavations outside the permanently fenced area shall be inspected periodically throughout and at the end of each workday by the Designated Biologist or a Biological Monitor.

Should a FTHL or other wildlife become trapped, the Designated Biologist or Biological Monitor shall remove and relocate the individual to a safe location.

- During construction, examine areas of active surface disturbance periodically—at least hourly when surface temperatures exceed 29°C (85°F) for the presence of FTHL.
- Any construction pipe, culvert, or similar structure with a diameter greater than three inches, stored less than eight inches aboveground for one or more nights, would be inspected for wildlife 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.
- 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 FTHL predators to construction sites. During construction, a Biological Monitor shall patrol these areas to ensure water does not puddle and attract common ravens, and other wildlife to the site, and shall make recommendations for reduced water application rates where necessary.
- 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 would be 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.
- 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. Animal roadkills on the project site would be promptly removed to discourage scavenger activity. Except for law enforcement personnel, no workers or visitors to the site shall bring firearms or weapons.
- The project owner shall implement the following Best Management Practices to prevent the spread and propagation of noxious weeds:
    - Limit the size of any vegetation and/or ground disturbance to the absolute minimum, and limit ingress and egress to defined routes;
    - Prevent spread of non-native plants via vehicular sources by implementing methods of vehicle cleaning for vehicles coming and going from construction sites. Earth-moving equipment shall be cleaned prior to transport to the construction site. Sediment accumulated from the washing would be shoveled out daily, placed in a sealed container, disposed in an approved landfill; and

- o Only weed-free straw, hay bales and seed shall be used for erosion control and sediment barrier installations.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP and implemented. Implementation of the measures would 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 Authorized Officer and the CPM, for review and approval, a written construction termination report identifying how measures have been completed.

FLAT-TAILED HORNED LIZARD CLEARANCE SURVEYS

BIO-9 The project owner shall undertake measures to manage construction at the plant site and linear facilities in a manner to avoid or minimize impacts to FTHL consistent with those described in the *Flat-tailed Horned Lizard Rangewide Management Strategy* by the FTHL Interagency Coordinating Committee (FTHL ICC 2003) or more current guidance provided by the FTHL ICC. These measures include, but are not limited to, the following:

FTHL Removal Protocol: Removal surveys shall be conducted prior to construction activities. Surveys shall follow the guidelines described in Appendix 6 of the *Flat-tailed Horned Lizard Rangewide Management Strategy* (FTHL ICC 2003).

- Removal surveys would be conducted by experience biological monitors only during appropriate survey conditions. The surveys shall be conducted from April 1 through September 30 when air temperatures are between 25 and 37°C (75 and 100°F). Surveys would not be conducted during inclement weather conditions (e.g., rain, high winds) that could affect the movement of FTHLs. FTHL removal from the area could continue outside of protocol survey periods since the intent is to move animals from harm's way.
- Removal survey methods based on the protocols in the *Flat-tailed Horned Lizard Rangewide Management Strategy* (FTHL ICC 2003) would be implemented to maximize captures of FTHLs, would incorporate a systematic component (e.g., transects), and may include methods such as raking around shrubs and driving on roadways within the exclusion area to search for FTHLs. The minimum survey effort to establish an FTHL exclusion zone would be 0.5 hour per acre of FTHL habitat.
- Biological monitors may use temporary FTHL barrier fencing to isolate areas while FTHL exclusion surveys are being conducted to prevent FTHLs from reentering the area. Temporary barrier fencing would include 0.25-inch wire mesh screen held in place with stakes or posts.
- Removal surveys would be conducted in a manner that prevents FTHLs from reentering construction areas. This would be accomplished specifically through the use of temporary FTHL barrier fencing, continuous surveys during the FTHL's active period (i.e., surveys conducted seven days a week), and/or resurvey of previously surveyed habitat if continuous surveys could not be accomplished because of inclement weather, etc. If surveys were halted for one to two days, 200 yards back from the point where the

survey had previously ended would be resurveyed. If surveys were halted for more than two days, 400 yards back from the point where the survey had previously ended would be resurveyed.

- Accurate records would be maintained by biological monitors for each relocated FTHL, including sex, snout-vent length, weight, temperature, location, date, and time of capture and release, a close-up photo of the lizard, and a photo of the habitat where the lizard was first encountered. A sample of the lizard scat would be collected, if possible. A Horned Lizard Observation Data Sheet and a Project Reporting Form are to be used and are provided in the *Flat-tailed Horned Lizard Rangewide Management Strategy* (FTHL ICC 2003). This information would be included in an annual mitigation report and would also be needed for reports submitted to permitting agencies.
- If FTHL is detected during the clearance surveys the biological monitors shall move it to the nearest suitable habitat outside of harm's way or relocated off-site as approved by the FTHL ICC or hold the captured FTHL for later release. If surface temperatures in the sun are less than 30°C (86°F) or exceed 50°C (122°F), the biological monitor would hold the lizard for later release. Captured FTHLs held for later release would be kept in a cloth bag and cooler, or other appropriate clean, dry container from which the lizard cannot escape. Captured lizards would be held at temperatures between 25°C (77°F) and 35°C (95°F) and would not be exposed to direct sunlight. Release would occur as soon as possible after capture and during daylight hours when surface temperatures range from 32°C (90°F) to 40°C (104°F). If such conditions do not occur within 48 hours of capture, the lizard would be transferred to a terrarium containing at least two inches of sand from the project area. The terrarium would be maintained at 10°C (50°F) to 20°C (68°F) until conditions at the site are appropriate for release. Lizards would be allowed to acclimate to higher surface temperatures prior to release. The biological monitors would be allowed some judgment and discretion to ensure that survival of FTHLs found in the project area is likely. These procedures would be followed unless more current guidance is provided by FTHL ICC.
- The contractor would restrict all ground-disturbing activities, including staging, equipment storage, parking, and other construction related activities to areas which FTHLs have been excluded.
- Following the FTHL clearance and translocation, heavy equipment would be allowed to enter the project site to perform earth work such as clearing, grubbing, leveling, and trenching. A Biological Monitor would monitor initial clearing and grading activities to find and move FTHLs missed during the initial FTHL clearance survey. Should a FTHL be discovered, it would be relocated to an area approved by the FTHL ICC. Any pre-activity FTHL surveys for other construction areas would be performed within 72 hours of ground disturbing activities.

<u>Verification:</u> Within 30 days of completion of FTHL clearance surveys the Designated Biologist shall submit a report to the CPM, BLM's Authorized Officer, USFWS, and

CDFG describing how mitigation measures described above have been satisfied. The report shall include the FTHL survey results, capture and release locations of any FTHL encountered, and any other information needed to demonstrate compliance with the measures described above.

FLAT-TAILED HORNED LIZARD COMPENSATORY MITIGATION

BIO-10 To fully mitigate for habitat loss and potential take of FTHL, in lieu of the project owner acquiring compensation lands, shall pay BLM a monetary equivalent for 6,619.9 acres of land suitable for these species, at a cost of no less than $5,717,028.34 (see **Biological Resources Table 4** for the breakdown of costs) to replace the impacted acreage. The BLM may use the compensation funds to acquire, protect, or restore FTHL habitat within and contiguous with the FTHL Management Areas (MA) in coordination with the FTHL Interagency Coordinating Committee (ICC). Responsibilities for habitat acquisition and management of the compensation lands are delegated to BLM. If habitat disturbance exceeds that described in this analysis, the project owner shall be responsible for additional in-lieu fees for habitat acquisition and management of additional compensation lands or additional funds required to compensate for any additional habitat disturbances. Additional funds shall be based on the fair market value of compensation lands at the time of construction to acquire habitat. The acquisition and management of compensation lands shall include the following elements:

<u>Selection Criteria for Compensation Lands.</u> The compensation lands selected for acquisition should:

- be within in holdings of the nearest Management Area (MA);
- be in the Colorado Desert;
- provide moderate to good quality habitat for FTHL with capacity to regenerate naturally when disturbances are removed, though poor quality habitat is acceptable near protected FTHL habitats;
- be near larger blocks of lands that are either already protected or planned for protection, or which could feasibly be protected by a public resource agency or a non-governmental organization dedicated to habitat preservation; and
- be connected to lands currently occupied by FTHL, ideally with populations that are stable, recovering, or likely to recover;

Other approved uses of the compensation funds should acquisition opportunities be exhausted:

- Transfer funds to other MAs to purchase FTHL habitat, especially habitat within or contiguous with MAs that are threatened with imminent impacts;
- construct and maintain fences and signs around MAs to prevent off-highway vehicles (OHV) from entering and degrading FTHL habitat. In addition, these fences could be designed to physically prevent FTHLs from leaving the MAs and encountering nearby roads; and

- restore degraded FTHL habitat within or contiguous with MAs.

Prior to ground-disturbing project activities, the project owner would provide compensation funds for impacts to FTHL habitat in the amount of no less than $5,717,028.34 to BLM. Proof of payment must be submitted to the CPM and BLM's Authorized Officer prior to commencement of project disturbance. These compensation amounts were calculated as follows (see **Biological Resources Table 5** for a calculation of costs):

- Land acquisition costs for compensation lands, calculated at no less than $500/acre for 6,619.9 acres: $3,309,950.00 minimum;
- Pre-acquisition Liability Survey (PALS) at no less than $2,500/parcel (approximately 40 acres/parcel): $413,743.75 minimum;
- Appraisal at no less than $3,000/parcel: $458,908.50 minimum;
- Costs of enhancing and restoring FTHL compensation lands and minor cleanups calculated at no less than $25/acre for 6,589 acres: $165,497.50 minimum;
- BLM direct costs for realty staff and operations, calculated at no less than 15%: $458,908.50 minimum; and
- BLM Denver Business Center, (standard BLM-wide charge to cover costs to implement project that cannot be directly tracked) calculated at no less than 17.1%: $834,852.14 minimum.

Verification: The project owner must provide proof of FTHL habitat compensation payment at least 30 days prior to ground disturbing project activities to BLM's Authorized Officer and the CPM.

Within 90 days after completion of project construction, the project owner shall provide to BLM's Authorized Officer and the CPM verification that disturbance to Sonoran creosote scrub habitat did not exceed 6,619.9 acres, and that construction activities at the plant site and along the transmission line and reclaimed water pipeline alignment did not result in impacts to Sonoran creosote scrub habitat adjacent to work areas. If habitat disturbance exceeded that described in this analysis, the CPM and BLM's Authorized Officer would notify the project owner of any additional funds required to compensate for any additional habitat disturbances at the adjusted market value at the time of construction to acquire and manage habitat. Payment for any additional funds must be made within 30 days of notification by the CMP and BLM's Authorized Officer.

FLAT-TAILED HORNED LIZARD COMPLIANCE VERIFICATION

BIO-11 The project owner shall provide Energy Commission staff, BLM, CDFG, USFWS, and USACE representatives 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 staff, CDFG, USFWS, USACE, 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 the Designated Biologist, the Energy Commission staff, CDFG, USFWS, USACE, and BLM harmless for any costs the project owner incurs in complying with the management measures, including stop work orders issued by the CPM, BLM's Authorized Officer, or the Designated Biologist. The Designated Biologist shall do all of the following:

- Notify BLM's Authorized Officer and the CPM at least 14 calendar days before initiating ground-disturbing activities.
- Immediately notify BLM's Authorized Officer and the CPM 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.
- Remain onsite daily while grubbing and grading are taking place to avoid or minimize take of special status species, to check for compliance with all impact avoidance and minimization measures, and to check all FTHL clearance areas to ensure that signs, stakes, and fencing are intact and that human activities are restricted in these protective zones.
- Conduct compliance inspections at a minimum of once per month after clearing, grubbing, and grading are completed and submit a monthly compliance report to BLM's Authorized Officer and the CPM.
- No later than January 31 of every year the SES Solar Two facility remains in operation, provide the CPM, BLM's Authorized Officer, USFWS, CDFG, and the FTHL ICC an annual FTHL Status Report, which shall include, at a minimum: 1) a general description of the status of the project site and construction 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) completed Horned Lizard Observation Data Sheet Sheets and a Project Reporting Form from the *Flat-tailed Horned Lizard Rangewide Management Strategy* (FTHL ICC 2003); 5) a summary of information regarding the numbers of captured, relocated, and dead FTHLs; and 6) other relevant information associated with SES Solar Two.
- Ensure that all observations of FTHL and their sign during construction project activities are reported to the Designated Biologist for inclusion in the next monthly compliance report submitted to BLM's Authorized Officer and the CPM.
- No later than 45 days after the initial production of energy in the project's equipment, provide BLM's Authorized Officer and the CPM a FTHL 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 FTHLs; 3) information about other project impacts on the FTHL; 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 FTHL; and 7) any other pertinent information, including the level of take of the FTHL associated with the project.

- In the event of a sighting in an active construction area (e.g., with equipment, vehicles, or workers), injury, kill, or relocation of any FTHL, notify BLM's Authorized Officer, the CPM, CDFG, USACE, and USFWS immediately by phone and in no event later than noon on the business day following the event if it occurs outside normal business hours so that the agencies can determine what further actions, if any, are required to protect the FTHL.
- Prepare written follow-up notification via FAX or electronic communication to these agencies within two calendar days of the incident and include the following information as relevant: 1) If a FTHL is killed by project-related activities during construction, or if a FTHL is otherwise found dead, submit a written report with the same information as an injury report. Written notification shall include, at a minimum, the date, time, location, circumstances of the incident; 2) The BLM's Authorized Officer and the CPM may issue the project owner a written stop work order to suspend any activity related to the construction or operation of the project for an appropriate period determined in consultation with BLM's Authorized Officer and the CPM in order 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, or relocation of a listed species, the project owner shall deliver to BLM's Authorized Officer, the CPM, CDFG, USACE, and USFWS via FAX or electronic communication the written report from the Designated Biologist describing all reported incidents of 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 BLM's Authorized Officer, the CPM, CDFG, USACE, and USFWS.

RAVEN MONITORING, MANAGEMENT, AND CONTROL PLAN

BIO-12 The project owner shall implement a Raven Monitoring, Management, and Control Plan that is consistent with the most current USFWS-approved raven management guidelines, and which meets the approval of the USFWS, CDFG, BLM, and Energy Commission staff. The draft Raven Monitoring, Management, and Control Plan submitted by the applicant (SES 2009f) shall provide the basis for the final plan, subject to review and revisions from USFWS, CDFG, BLM, and the Energy Commission staff.

Verification: At least 60 days prior to start of any project-related ground disturbance activities, the project owner shall provide the CPM, BLM's Authorized Officer, USFWS, and CDFG with the final version of the Raven Monitoring, Management, and Control

Plan that has been reviewed and approved by USFWS, CDFG, BLM's Authorized Officer, and Energy Commission staff. The CPM would determine the plan's acceptability within 15 days of receipt of the final plan. All modifications to the approved Raven Monitoring, Management, and Control Plan must be made only after consultation with the BLM, Energy Commission staff, USFWS, and CDFG. The project owner shall notify BLM's Authorized Officer and the CPM no less than five working days before implementing any BLM- and CPM-approved modifications to the Raven Monitoring, Management, and Control Plan.

Within 30 days after completion of project construction, the project owner shall provide to BLM's Authorized Officer and the CPM for review and approval, a written report identifying which items of the Raven Monitoring, Management, and Control 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.

EVAPORATION POND FENCING, NETTING, AND MONITORING

BIO-13 The project owner shall install exclusionary fencing around the evaporation ponds and cover the evaporation ponds prior to any discharge with 1.5-inch mesh netting designed to exclude birds and other wildlife from drinking or landing on the water of the ponds. The netted ponds shall be monitored regularly to verify that the netting remains intact, is fulfilling its function in excluding birds and other wildlife from the ponds, and does not pose an entanglement threat to birds and other wildlife. The ponds shall include a visual deterrent in addition to the netting, and the pond shall be designed such that the netting will never contact the water. Monitoring of the evaporation ponds shall include the following:

- The Designated Biologist or Biological Monitor shall regularly survey the ponds at least once per month starting with the first month of operation of the evaporation ponds. The purpose of the surveys shall be to determine if the netted ponds are effective in excluding birds, and to determine if the nets pose an entrapment hazard to birds and wildlife. Surveys shall be of sufficient duration and intensity to provide an accurate assessment of bird and wildlife use of the ponds during all seasons. Surveyors shall be experienced with bird identification and survey techniques. Operations staff at the SES Solar 2 site shall also report finding any dead birds or other wildlife at the evaporation ponds to the Designated Biologist within one day of the detection of the carcass. The Designated Biologist shall report any bird or other wildlife deaths or entanglements within two days of the discovery to the CPM, BLM's Authorized Officer, CDFG, and USFWS.
- If dead or entangled birds are detected, the Designated Biologist shall take immediate action to correct the source of mortality or entanglement. The Designated Biologist shall make immediate efforts to contact and consult the CPM, BLM's Authorized Officer, CDFG, and USFWS by phone and electronic communications prior to taking remedial action upon detection of the problem, but the inability to reach these parties shall not delay taking action that would, in the judgment of the Designated Biologist, prevent further mortality of birds or other wildlife at the evaporation ponds.

- If after 12 consecutive monthly site visits no bird or wildlife deaths or entanglements are detected by or reported to the Designated Biologist, monitoring can be reduced to quarterly visits.
- If after 12 consecutive quarterly site visits no bird or wildlife deaths or entanglements are detected by or reported to the Designated Biologist, the site visits can be reduced to two surveys per years, during spring and fall migration.

<u>Verification:</u> No less than 30 days prior to operation of the evaporation ponds the project owner shall provide to the CPM and BLM's Authorized Officer as-built drawings and photographs of the ponds indicating that the bird exclusion netting has been installed. The Designated Biologist shall submit annual monitoring reports to the CPM, BLM's Authorized Officer, CDFG, and USFWS describing the dates, durations and results of site visits conducted at the evaporation ponds. The annual reports shall fully describe any bird or wildlife death or entanglements detected during the site visits or at any other time, and shall describe actions taken to remedy these problems. The report shall be submitted to the CPM, BLM's Authorized Officer, CDFG, and USFWS no later than January 31st of every year for the life of the project.

PRE-CONSTRUCTION NEST SURVEYS AND IMPACT AVOIDANCE MEASURES

BIO-14 Where practicable, ground-disturbing activities would be conducted outside the bird nesting season (February 1 through July 31). Pre-construction nest surveys shall be conducted if construction activities would occur from February 1 through July 31. The Designated Biologist or Biological Monitor shall perform surveys in accordance with the following guidelines:

- 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;
- At least two pre-construction surveys shall be conducted, separated by a minimum 10-day interval. One of the surveys needs to be conducted within the 14-day period preceding initiation of construction activity. Additional follow-up surveys may be required if periods of construction inactivity exceed three weeks, an interval during which birds may establish a nesting territory and initiate egg laying and incubation;
- If active nests are detected during the survey, a no-disturbance buffer zone (protected area surrounding the nest, the size of which is to be determined by the Designated Biologist in consultation with CDFG, USFWS, and BLM) and monitoring plan shall be developed. Nest locations shall be mapped and submitted, along with a weekly report stating the survey results, to BLM's Authorized Officer and the CPM; and
- The Designated Biologist shall monitor the nest until he or she determines that nestlings have fledged and dispersed; activities that might, in the opinion of the Designated Biologist, disturb nesting activities, shall be prohibited within the buffer zone until such a determination is made.

<u>Verification:</u> At least 10 days prior to the start of any project-related ground disturbance activities or construction equipment staging, the project owner shall provide

BLM's Authorized Officer and the CPM a letter-report describing the findings of the pre-construction nest surveys, including the time, date, and duration of the survey; identity and qualifications of the surveyor (s); and a list of species observed. If active nests are detected during the survey, the report shall include a map or aerial photo identifying the location of the nest and shall depict the boundaries of the no-disturbance buffer zone around the nest. Additional copies shall be provided to CDFG and USFWS.

AMERICAN BADGER AND DESERT KIT FOX IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-15 To avoid direct impacts to American badgers and desert kit fox, pre-construction surveys shall be conducted for these species concurrent with the FTHL clearance surveys. Surveys shall be conducted as described below:

- Biological Monitors shall perform pre-construction surveys for badger and kit fox dens for any areas subject to disturbance from construction no less than 30 days prior to the start of initial ground disturbance activities, including areas within 250 feet of all project facilities, utility corridors, and access roads. If dens are detected each den would 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 and definitely active dens would 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 not tracks are observed in the tracking medium or no photos are taken of the target species after three nights, the den would be excavated and backfilled by hand. If tracks are observed, the den shall be progressively blocked with natural materials (rocks, dirt, sticks, and vegetation piled in front of the entrance) for the next three to five nights to discourage the badger or kit fox from continued use. After verification that the den is unoccupied, it shall then be excavated and backfilled by hand to ensure that no badgers or kit fox are trapped in the den.

Verification: The project owner shall submit a report to BLM's Authorized Officer, the CPM, and CDFG at least 30 days prior to the start of any project-related site disturbance activities that describes when badger and kit fox surveys were completed, field observations, implemented mitigation measures, and the results of the mitigation.

BURROWING OWL IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-16 The project owner shall implement the following measures to avoid and offset impacts to burrowing owls:

- Complete a pre-construction survey for burrowing owls for any areas subject to disturbance from construction no less than 30 days prior to the start of initial ground disturbance activities. If burrowing owls are present within 500 feet of the project site or linear facilities, then the CDFG burrowing owl guidelines (CDFG 1995) shall be implemented.

- Monitor burrowing owl pairs within 500 feet of any activities that exceed ambient noise and/or vibration levels.
- Establish a 500-foot set back from any active burrow and construct additional noise/visual barriers (e.g., haystacks or plywood fencing) to shield the active burrow from construction activities. Post signs (in both English and Spanish) designating presence of sensitive area.
- Passively relocate all owls occupying burrows that would be temporarily or permanently impacted by the project and implement the following CDFG take avoidance measures:
    - Occupied burrows shall not be disturbed during the nesting season (February 1–August 31) unless a qualified biologist can verify through non-invasive methods that egg laying/incubation has not begun or juveniles are foraging independently and able to fly;
    - A qualified biologist must relocate owls, confirm that owls have left burrows prior to ground-disturbing activities, and monitor the burrows. Once evacuation is confirmed, the biologist should hand excavate burrows and then fill burrows to prevent reoccupation; and
    - Relocation of owls shall be approved by and conducted in consultation with CDFG and BLM's Authorized Officer.
- Submit a Burrowing Owl Mitigation and Monitoring Plan to BLM's Authorized Officer, the CPM, and CDFG for review and approval prior to relocation of owls (and incorporate it into the project's BRMIMP) as well as a construction termination report with results to CDFG, BLM's Authorized Officer, and the CPM 30 days after completing owl relocation and monitoring and at least 30 days prior to the start of commercial operation.

<u>Verification:</u> The project owner shall submit a report to CDFG, USFWS, BLM's Authorized Officer, and the CMP at least 30 days prior to the start of any project-related site disturbance activities that describes when surveys were completed, observations, mitigation measures, and the results of the mitigation. If burrowing owls are to be protected on site or relocated, the project owner shall coordinate with and report to CDFG, USFWS, BLM, and Energy Commission staff on these proposed activities in a Burrowing Owl Monitoring and Mitigation Plan. Within 30 days after completion of owl relocation and monitoring, and the start of ground disturbance **or** at least 90 days prior to the sale of power, the project owner shall provide to the CDFG, BLM's Authorized Officer, and CPM a written construction termination report identifying how measures have been completed.

LAKE AND STREAMBED IMPACT MINIMIZATION AND COMPENSATION MEASURES

This proposed condition of certification will need to be altered as precise details of the required mitigation for impacts to Waters of the U.S. and jurisdictional state waters along the proposed reclaimed water line and to Waters of the U.S. on the proposed project site are not yet determined. When recommendations for a Lake and Streambed Alteration Permit and the federal Clean Water Act Section 404(b)(1) Alternatives Analysis are completed, Condition of Certification **BIO-17** will be updated to reflect the mitigation requirements by the USACE and CDFG.

BIO-17 The project owner would compensate for impacts to jurisdictional state waters and to Waters of the U.S.

Jurisdictional state waters:

- Acquire Off-Site Desert Ephemeral Wash: For the purposes of the CDFG Lake and Streambed Agreement requirements, compensation land purchased in Sonoran creosote scrub habitat would include ephemeral washes with at least 840 acres of jurisdictional state waters, mitigated at a 1:1 ratio. The terms and conditions of this acquisition or easement of the desert ephemeral wash mitigation lands shall meet the following criteria: 1) include at least 312 acres of jurisdictional state waters; 2) be characterized by similar soil permeability, hydrological and biological functions as the impacted drainages; and 3) located in the Colorado Desert. The compensation lands shall have equal or greater acreage than the jurisdictional state waters impacted by the SES Solar 2 project. The acquisition of jurisdictional state waters can be included with the FTHL mitigation lands for only one year under the FTHL mitigation requirements. After one year, the acquisition of any remaining ephemeral wash acreage up to a total of at least 312 acres, would be acquired independent of the FTHL mitigation. Acquired mitigation lands shall be approved by the CPM, in consultation with CDFG.
- Security for Implementation of Mitigation: A security in the form of an irrevocable letter of credit, pledged savings account, or certificate of deposit for the amount of all mitigation measures pursuant to this condition of certification shall be submitted to, and approved by the CPM, in consultation with CDFG, prior to commencing project activities within areas of CDFG jurisdiction. This amount shall be based on a cost estimate produced by a PAR or PAR-like process, which shall be submitted to CDFG for review and to the CPM for approval within 60 days of the Energy Commission Decision's publication and prior to commencing project activities within areas of CDFG jurisdiction. The security shall be approved by the CPM, in consultation with CDFG's legal advisors, prior to its execution, and shall allow the CPM at its discretion to recover funds immediately if the CPM, in consultation with CDFG, determines there has been a default.
- Preparation of a Management Plan: The project owner shall submit to the CMP 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. No later than 12 months after publication of the Energy Commission Decision the project owner shall submit a final Management Plan for review and approval to the CPM, in consultation with CDFG.

- Right of Access and Review for Compliance Monitoring: The CPM reserves the right to enter the project site or allow CDFG to enter the project site at any time to ensure compliance with these conditions. The project owner herein grants to the CPM and CDFG employees and/or their representatives the right to enter the project site at any time, to ensure compliance with the terms and conditions and/or to determine the impacts of storm events, maintenance activities, or other actions that might affect the restoration and revegetation efforts. The CPM and CDFG may, at the CPM's discretion, review relevant documents maintained by the operator, interview the operator's employees and agents, inspect the work site, and take other actions to assess compliance with or effectiveness of mitigation measures.
- Notification: The project owner shall notify the CPM and CDFG in writing, at least five days prior to initiation of project activities in jurisdictional areas as noted and at least five days prior to completion of project activities in jurisdictional areas. The project owner shall notify the CPM and CDFG of any change of conditions to the project, the jurisdictional impacts, or the mitigation efforts, if the conditions at the site of a 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 and CDFG no later than seven 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 defined below. A copy of the notifying change of conditions report shall be included in the annual reports.
    - 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.
    - 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.
    - 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: The project owner shall provide a copy of the Lake Streambed Impact Minimization and Compensation Measures from the Energy Commission Decision to all contractors, subcontractors, and the Applicant's project supervisors. Copies shall be readily available at work sites at all times during periods of active work and must be presented to any CDFG personnel or personnel from another agency upon demand. The CPM reserves the right to issue a stop work order or allow CDFG to issue a stop work order after giving notice to the project owner and the CPM, if the CPM in consultation with CDFG, determines that the project owner has breached any of the terms or conditions or for other reasons, including but not limited to the following:
    - The information provided by the applicant regarding streambed alteration is incomplete or inaccurate;
    - New information becomes available that was not known to it in preparing the terms and conditions;
    - The project or project activities as described in the Staff Assessment/ Draft Environmental Impact Statement have changed; or
    - The conditions affecting biological resources changed or the CPM or BLM's Authorized Officer, in consultation with CDFG or USACE, determines that project activities would result in a substantial adverse effect on the environment.
- Best Management Practices: The applicant shall also comply with the following conditions:
    - The owner shall minimize road building, construction activities, and vegetation clearing within ephemeral drainages to the extent feasible.
    - The project owner shall not allow water containing mud, silt or other pollutants from grading, aggregate washing, or other activities to enter a lake or flowing stream or be placed in locations that may be subjected to high storm flows.
    - 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 operator to ensure compliance.
    - Spoil sites shall not be located within a drainages or locations that may be subjected to high storm flows, where spoil shall be washed back into a drainage or lake.
    - Raw cement/concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products, or any other substances which 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 or lake, by project owner or any party working under contract or with the permission of the project owner shall be removed immediately.

- o 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.
- o 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.
- o No equipment maintenance shall be done within 150 feet of any ephemeral drainage where petroleum products or other pollutants from the equipment may enter these areas under any flow.
- o The project owner must have a Frac-Out Contingency Plan approved by CDFG and the CPM prior to commencement of construction of the reclaimed water pipeline for horizontal directional drilling under the waterways.

Any other requirements stated in the Lake and Streambed Agreement not listed above would be adhered to by the project owner. Should project conditions change and impacts to bed, bank, or channel occur on any of the water ways along the reclaimed water pipeline route, a revised Lake and Streambed Application must be submitted to CDFG prior to construction. At that time, impacts will be assessed and an appropriate mitigation shall be determined.

<u>Waters of the U.S.</u>: The project owner would follow mitigation requirements stated in the Clean Water Act 404 permit issued by the USACE.

<u>Verification:</u> No less than 90 days prior to acquisition of the parcel(s) containing no less than 312 acres of jurisdictional state waters, the project owner, or a third-party approved by the CPM, in consultation with CDFG, shall submit a formal acquisition proposal to the CPM and CDFG describing the parcel(s) intended for purchase.

Draft agreements to delegate land acquisition to CDFG or an approved third party and agreements to manage compensation lands shall be submitted to Energy Commission staff for review and approval (in consultation with CDFG) prior to land acquisition. Such agreements shall be mutually approved and executed at least 60 days prior to start of any project-related ground disturbance activities. The project owner shall provide written verification to the CPM that the compensation lands have been acquired and recorded in favor of the approved recipient(s). Alternatively, before beginning project ground-disturbing activities, the project owner shall provide Security in accordance with this condition. Within 90 days after the land 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, for the compensation lands and associated funds.

No fewer than 30 days prior to the start of work potentially affecting jurisdictional state waters, the project owner shall provide written verification (i.e., through incorporation into the BRMIMP) to the CPM that the above best management practices will be implemented and provide a discussion of work in jurisdictional state waters in Compliance Reports for the duration of the project.

NOXIOUS WEED MANAGEMENT PLAN

BIO-18 The project owner shall implement a Noxious Weed Management Plan that meets the approval of BLM and Energy Commission staff. The draft Noxious Weed Management Plan submitted by the applicant (SES 2009e) shall provide the basis for the final plan, subject to review and revisions from BLM, USFWS, CDFG, and the Energy Commission staff. In addition to describing weed eradication and control methods, and a reporting plan for weed management during and after construction, the final Noxious Weed Management Plan shall include at least the following Best Management Practices to prevent the spread and propagation of noxious weeds:

- Limit the size of any vegetation and/or ground disturbance to the absolute minimum, and limit ingress and egress to defined routes.
- Maintain vehicle wash and inspection stations and closely monitor the types of materials brought onto the site.
- Reestablish vegetation quickly on disturbed sites with native seed mixes.
- Monitoring and rapid implementation of control measures to ensure early detection and eradication for weed invasions.
- Use only weed-free straw or hay bales used for sediment barrier installations, and weed-free seed.
- Reclamation and revegetation shall occur on all temporarily disturbed areas, including pipelines, transmission lines, and staging areas.
- Control weeds in areas where irrigation and mirror washing take place.

Verification: At least 60 days prior to start of any project-related ground disturbance activities, the project owner shall provide the BLM's Authorized Officer and the CPM with the final version of the Noxious Weed Management Plan that has been reviewed and approved by BLM, USFWS, CDFG, and Energy Commission staff. BLM's Authorized Officer and the CPM would determine the plan's acceptability within 15 days of receipt of the final plan. All modifications to the approved Noxious Weed Management Plan shall be made only after consultation BLM, Energy Commission staff, USFWS, and CDFG. The project owner shall notify the BLM's Authorized Officer and the CPM no less than five working days before implementing any BLM- and CPM-approved modifications to the Noxious Weed Management Plan.

Within 30 days after completion of project construction, the project owner shall provide to the BLM's Authorized Officer and the CPM for review and approval, a written report identifying which items of the Noxious 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 noxious weed management on the project site shall be submitted in the Annual Compliance Report during plant operations.

SPECIAL STATUS PLANT SURVEYS AND PROTECTION PLAN

BIO-19 To avoid impacts to State and federally listed Threatened and Endangered, Proposed, Petitioned, and Candidate or California Native Plant Society List

1A, 1B, 2, 3, or 4 plants that might occur on the SES Solar Two site or along the proposed transmission line and proposed reclaimed water pipeline alignments, pre-construction surveys shall be conducted in these areas in spring and fall 2010. If special status plant species are detected within 100 feet of the project footprint, a qualified botanist shall prepare a Sensitive Plant Protection Plan to be implemented to avoid direct and indirect impacts. The project owner shall implement the following measures:

- Pre-Construction Floristic Surveys. A qualified botanist shall conduct floristic surveys on the SES Solar Two project site and along linear facilities in all areas subject to ground-disturbing activity, including, but not limited to, tower pad preparation and construction areas, pulling and tensioning sites, assembly yards, and areas subject to grading for new access roads. Surveys shall be conducted within 100 feet of all surface-disturbing activities at the appropriate time of year and according to guidelines from the BLM (2009), California Department of Fish and Game (CDFG 2009b) and the California Native Plant Society (CNPS 2001).
- Special Status Plant Protection Plan. If special status plant species are detected during pre-construction surveys, a qualified botanist shall prepare a Sensitive Plant Protection Plan (Plan). Populations of rare plants shall be flagged and mapped prior to any ground disturbance. Where possible the owner shall modify the placement of structures, access roads, laydown areas, and other ground-disturbing activities in order to avoid the plants. The Plan shall include measures for avoiding direct impacts and accidental impacts during construction by identifying the plant occurrence location and establishing an appropriately sized buffer. The Plan shall also include measures to avoid indirect impacts including: sedimentation from adjacent disturbed soils; alterations of the site hydrology from changes in the drainage patterns; dust deposition; and displacement or degradation of the habitat from the introduction and spread of noxious weeds. The Plan shall also include a discussion of monitoring and reporting requirements during and after construction.
- Prior to any ground disturbance, any populations of listed plant species identified during the surveys shall be protected by a buffer zone. The buffer zone shall be established around these areas and shall be of sufficient size to eliminate potential disturbance to the plants from human activity and any other potential sources of disturbance including human trampling, erosion, and dust. The size of the buffer would depend upon the proposed use of the immediately adjacent lands, and includes consideration of the plant's ecological requirements (e.g., sunlight, moisture, shade tolerance, edaphic physical and chemical characteristics) that are identified by the Designated Biologist. The buffer for herbaceous species shall be, at minimum, 50 feet from the perimeter of the population or the individual. A smaller buffer may be established, provided there are adequate measures in place to avoid the take of the species, with the approval of the USFWS, CDFG, BLM, and CPM.
- Impacts to non-listed plant species (i.e., CNPS List 1, 2, 3, and 4 species) shall first be avoided where feasible, and, where not feasible, impacts

shall be compensated through reseeding (with locally collected seed stock), or other CPM-approved methods. If project activities would result in loss of more than 10% of the known individuals within an existing population of non-listed special status plant species, the project owner shall preserve existing off-site occupied habitat that is not already part of the public lands in perpetuity at a 2:1 mitigation ratio. The CPM may reduce this ratio depending on the sensitivity of the plant. The preserved habitat shall be occupied by the plant species impacted, and be of superior or similar habitat quality to the impacted areas in terms of soil features, extent of disturbance, habitat structure, and dominant species composition, as determined by a qualified plant ecologist.

- State or Federally Listed Plant Species: If impacts to listed plants are determined to be unavoidable, the USFWS shall be consulted for authorization, through the context of a Biological Opinion, and/or the CDFG shall be consulted for authorization through an Incidental Take Permit. Additional mitigation measures to protect or restore listed plant species or their habitat may be required by the USFWS and/or CDFG before impacts are authorized.
- Agency Notification and Avoidance: If State or federally listed plant species are detected during the pre-construction floristic surveys, BLM's Authorized Officer, the CPM, USFWS, and CDFG shall be notified in writing no more than 15 days from detection of the plants.

Review and Submittal of Plan: The project owner shall submit to the CPM, USFWS, BLM's Authorized Officer, and CDFG a draft Sensitive Plant Protection Plan. Prior to any ground-disturbing activities within 100 feet of the sensitive plant occurrences detected during the pre-construction floristic surveys, the project owner shall submit to BLM's Authorized Officer and the CPM a final Plan that reflects review and approval by Energy Commission staff and BLM in consultation with CDFG and USFWS.

Verification: The project owner shall submit two reports:) no later than July 31, 2010 describing the results of the spring floristic surveys and, 2) October 31, 2010 describing the results of the fall floristic surveys conducted on the SES Solar Two power plant site and along the proposed transmission line and reclaimed water pipeline alignments. The report shall be submitted to BLM's Authorized Officer, the CPM, USFWS, and CDFG and shall describe qualifications of the surveyor, survey methods, dates and times, a discussion of visits to reference sites, figures depicting the area(s) surveyed, figures depicting the locations of any special status plants observed, and a list of all plant species detected.

If special status plant species were detected during the 2010 surveys the project owner shall submit to BLM's Authorized Officer, the CPM, USFWS, and CDFG a Sensitive Plant Protection Plan (Plan) at least 60 days prior to the start of any ground-disturbing activities. The BLM's Authorized Officer and the CPM would determine the Plan's acceptability in consultation with BLM, Energy Commission staff, CDFG, and USFWS within 15 days of receipt of the Plan. Any modifications to the approved Plan shall be made only after approval by Energy Commission staff and BLM in consultation with CDFG and USFWS. The project owner shall notify BLM's Authorized Officer and the

CPM no fewer than five working days before implementing any BLM- and CPM-approved modifications to the Plan.

Within 30 days after completion of construction, the project owner shall provide to BLM's Authorized Officer, the CPM, USFWS, and CDFG a construction termination report discussing how mitigation measures described in the Plan were implemented.

DECOMMISSIONING AND RECLAMATION PLAN

BIO-20 Upon project closure the project owner shall implement a final Decommissioning and Reclamation Plan to remove all structures from the project site and fill from Waters of the U.S. and restore the natural topography, hydrology and vegetation/wildlife habitat. The Decommissioning and Reclamation Plan shall include a cost estimate for implementing the proposed decommissioning and reclamation activities, and shall be consistent with the guidelines in BLM's 43 CFR 3809.550 et seq., subject to review and revisions from BLM's Authorized Officer and the CPM in consultation with USFWS, USACE, and CDFG.

Verification: No less than 30 days from publication of the Energy Commission Decision or the Record of Decision, whichever comes first, the project owner shall provide to BLM's Authorized Officer and the CPM a draft Decommissioning and Reclamation Plan. No more than 60 days prior to start of any project-related ground disturbance activities, the project owner shall provide BLM's Authorized Officer and the CPM with the final version of a Decommissioning and Reclamation Plan that has been reviewed and approved by BLM's Authorized Officer and the CPM, in consolation with USFWS, and CDFG. All modifications to the approved Channel Decommissioning Plan shall be made only after approval from BLM's Authorized Officer and the CPM, in consultation with USFWS, USACE, and CDFG.

No more that 60 days prior to initiating project-related ground disturbance activities the project owner shall provide financial assurances to BLM's Authorized Officer and the CPM to guarantee that an adequate level of funding will be available to implement measures described in the Decommissioning and Reclamation Plan.

C.2.13 CONCLUSIONS

Overview of Vegetation/Wildlife Impacts: Much of the 6,185-acre SES Solar Two project plant site consists of Sonoran creosote bush scrub habitat, which includes 1,038.7 acres of OHV and dirt roads, and supports a diversity of mammals, birds, and reptiles, including some special status wildlife species, such as FTHL and burrowing owl. Grading on the plant site would not directly or indirectly impact sensitive plant communities or wetlands, but would directly impact some wildlife, and possibly special status plants. The removal of vegetation would result in the loss of cover, foraging, and breeding habitat. Construction of linear facilities also has potential for impacts to wildlife; transmission line construction south of Interstate 8 would impact approximately 92.8 acres of Sonoran creosote bush scrub, which provides habitat for FTHL. Construction of the 12-mile reclaimed water pipeline would occur within the disturbed road shoulder, but nevertheless has potential to impact special status species such as burrowing owl and FTHL. Potential direct and indirect construction impacts to vegetation and wildlife can be reduced to less than significant levels under CEQA with avoidance and minimization measures described in staff's proposed Conditions of Certification **BIO-1** through **BIO-8**.

Take of Listed Species: It is unknown if potential take of FTHL, a candidate species for federal listing, and loss of habitat for these species would be fully mitigated with staff's proposed Conditions of Certification **BIO-9** through **BIO-11**. Staff's proposed Condition of Certification **BIO-10** requires compensatory mitigation for approximately 6,619.9 acres of habitat suitable for these listed species, as directed by the FTHL Rangewide Management Strategy (2003). The other two conditions require avoidance and minimization measures and compliance verification. Measures from the issuance of a Conference Opinion from USFWS would be incorporated into staff's proposed Conditions of Certification **BIO-9** through **BIO-11**. The measures described in staff's proposed Condition of Certification **BIO-10** are adapted from the Flat-Tailed Horned Lizard Rangewide Management Strategy, which includes agreed upon compensation funds to mitigate for impacts to FTHL habitat by federal and state agencies (FTHL ICC 2003). In order for staff to conclude that fee payment reduces impacts to less than significant levels under CEQA, staff is in the process of evaluating if the use of compensation funds is sufficient for CEQA mitigation or if funds can be earmarked for specific actions which would reduce impacts to FTHL.

Avian Predation on FTHL: Construction and operation of the project could provide attractants in the form of new nesting sites, trash, and water, which draw unnaturally high numbers of FTHL predators such as the common raven, American kestrel, and loggerhead shrike. Increased avian predation could contribute to the cumulative significant impacts to the FTHL. Staff's proposed Condition of Certification **BIO-12** specifies that the applicant finalize their draft Raven Management and Monitoring Plan in consultation with staff, BLM, CDFG, and USFWS. Staff anticipates that the applicant would be able to produce a final plan well before licensing, and that implementation of the condition would reduce this impact to less than significant levels under CEQA.

Migratory Birds/Burrowing Mammals: Vegetation at the plant site and along linear facilities provides foraging, cover, and/or breeding habitat for migratory birds, including a number of special status bird species confirmed to be present at the site (western burrowing owl, loggerhead shrike, LeConte's thrasher, and California horned lark). Migratory birds and their eggs and young are protected by the federal Migratory Bird Treaty Act and Fish and Game Code section 3503. Staff's proposed Conditions of Certification **BIO-8** (Impact Avoidance and Minimization Measures) and **BIO-14** (Pre-construction Nest Surveys and Impact Avoidance Measures) would avoid these potentially significant impacts to nesting birds. Potential impacts to burrowing owls would be further mitigated by implementation of staff's proposed Condition of Certification **BIO-16**.

American badgers were not detected during the surveys, but potential habitat is present for this species at the project site. Construction activities could also crush or entomb American badger, which are protected under Title 14, California Code of Regulations (sections 670.2 and 670.5). Staff's proposed Condition of Certification **BIO-15**, which requires pre-construction surveys and avoidance measures to protect badgers and kit fox, would avoid this potential impact. This condition also protects desert kit fox, which are known to occur on the site, and which are protected under the California Code of Regulations Chapter 5 Section 460.

Special Status Plants: Though no special status plants were observed during surveys, suitable habitat exists on the project site for twelve special status species. Five special status plant species were not included in targeted surveys. Staff and BLM are concerned that special status plant species may have been overlooked due to half the surveys conducted concurrently with FTHL surveys with biologists of varying levels of botanical expertise and the lack of fall surveys after late summer/early fall monsoonal rains. Thus, survey results were not considered adequate to assess presence or absence of a species within the project area. Staff's proposed Conditions of Certification **BIO-8** and **BIO-18** (Noxious Weed Management Plan) would minimize potentially significant impacts to special status plants. Potential impacts to special status plants would be further mitigated by staff's proposed Condition of Certification **BIO-19** (Special Status Plant Surveys and Protection Plan). This condition requires targeted surveys during the appropriate seasons in 2010 and a protection plan for special status species.

Threat to Migratory Birds from Evaporation Ponds: The SES Solar Two includes two evaporation ponds totaling two acres in area. Staff and CDFG are concerned that the proposed ponds could attract avian predators, which in turn prey on the FTHL, and could also harm waterfowl, shorebirds, and other resident or migratory birds due to hyper-saline conditions. The applicant has addressed these concerns by proposing several project design features for the evaporation ponds such as constructing exclusionary fencing and installing netting to minimize wildlife access. Staff concurs and has incorporated the applicant's proposal into staff's proposed Condition of Certification **BIO-13**. This condition would reduce potential impacts of the evaporation ponds to less than significant levels under CEQA.

Impacts to Jurisdictional State Waters and Waters of the U.S.: One of the significant biological impacts of the project is the placement of SunCatchers and associated electrical collection system, hydrogen gas pipelines, debris basins, and access roads in ephemeral washes on the plant site, resulting in the permanent impact of approximately 165 acres, the temporary impact of 5 acres, and the indirect impact of 13 acres of Waters of the U.S. and permanent impact to approximately 312 acres of jurisdictional state waters. These washes are characterized by natural processes of soil deposition, channel formation, and development of microtopography and soil crusts, all of which support recruitment of native desert wash vegetation and provide wildlife habitat and a corridor for movement. Placement of the SunCatchers, access roads, road culverts, and debris/ sediment basins within the beds of the ephemeral washes would disrupt the hydrological and biological functions and processes. The CDFG is agreeable to mitigation to impacts to the ephemeral washes at a 1:1 compensation ratio of ephemeral wash within acquired Sonoran creosote scrub habitat within acquired FTHL compensation land for one year under the FTHL mitigation requirement. After which, any remaining acreage needed to meet the 312-acre mitigation requirement will need to be acquired independent of the FTHL compensation land. Staff concurs with the CDFG requiring 1:1 compensation ratio for impacts to the ephemeral washes on the project site. With implementation of staff's proposed Condition of Certification **BIO-17**, staff anticipates that impacts to 312 acres of jurisdictional state waters and loss of the hydrological and biological functions of the project site desert washes would be mitigated to less than CEQA significant levels. However, the USACE would have different mitigation requirements. The mitigation requirements for the federal Clean Water Act (CWA) 404 permit under an Individual Permit subject to CWA Section 404(b)(1) guidelines are currently unresolved, but would typically include a minimum 2:1 ratio of mitigation to impacts, which can include credit for preservation of aquatic resources under the threat of development and restoration and enhancement of existing resources within the Salton Sea watershed for the remaining requirement. Staff is awaiting the requirements of the federal CWA 404(1)(b) Alternatives Analysis and the conditions that would be included in the CDFG Lake and Streambed Alteration Agreement. Once the conditions required by both agencies are known, the requirements will be incorporated into staff's proposed Condition of Certification **BIO-17**.

As there is currently no avoidance of Waters of the U.S. in the proposed project, the USACE has proposed two alternatives which avoid different aspects of the ephemeral washes on the project site. These alternatives are: 1) Drainage Avoidance #1, which prohibits permanent impacts within the ten primary ephemeral washes; or 2) Drainage Avoidance #2, which eliminates the eastern and westernmost portions of the project site where the largest ephemeral complexes are located.

For the proposed reclaimed water line along Evan Hewes Highway, an estimated 2.33 acres for Waters of the U.S. and 0.20 acres of jurisdictional state waters has been estimated. The proposed reclaimed water pipeline would either span or go under seven irrigation canals and the New River. The CDFG does not anticipate impacts to jurisdictional state waters and will require the implementation of Best Management Practices (BMPs) to avoid impacts during construction. A Frac-out Management Plan for horizontal directional drilling is required by CDFG prior to construction of the water pipeline. It is anticipated that the USACE would also require BMPs and a Frac-out Management Plan to avoid impacts to Waters of the U.S. for the proposed reclaimed water line.

Even with implementation of staff's proposed conditions of certification, staff is still uncertain if construction and operation of the proposed SES Solar Two project would comply with all federal, state, and local laws, ordinances, regulations, and standards relating to biological resources. Staff recommends adoption of the Conditions of Certification to mitigate potential impacts for most sensitive biological resources to less than CEQA significant levels with the exception of impacts to Waters of the U.S. Due to the lack of information regarding mitigation for Waters of the U.S., it is unknown if impacts from the proposed SES Solar Two project to biological resources would be mitigated to less than significant levels under CEQA. Also, staff is in the process of evaluating if the use of compensation funds for impacts to FTHL habitat is sufficient for CEQA mitigation or if funds can be earmarked for specific actions which would reduce impacts to FTHL. Similarly for purposes of NEPA compliance, it is unknown if the proposed SES Solar Two project would not result in adverse impacts to biological resources due to the lack of information regarding impacts to and mitigation for Waters of the U.S.

<u>Staff Preferred Project Alternative</u>: Due to impacts to FTHL habitat, Waters of the U.S., and jurisdictional state waters, the Drainage Avoidance #2 Alternative proposed by the USACE is preferable to the applicant's proposed project. The reduction of the project site to 3,153 acres would reduce impacts to FTHL habitat and FTHL populations by approximately 50%. In addition, impacts to Waters of the U.S. and jurisdictional state waters would be reduced to approximately 71 acres for Drainage Avoidance #2 Alternative.

C.2.14 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.

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

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

Audubon California, 2007 – Common Birds in Decline, a State of the Birds Report, Summer 2007, California's Vulnerable Common Birds. Accessed 07/02/09 at http://ca.audubon.org/bird/birds-in-decline.php.

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.

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.

Berry, K. H., F. G. Hoover, and M. Walker, 1996 – 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.

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 (Bureau of Land Management), 1994 – Environmental Assessment for 1994 Experimental Program to Shoot Ravens.

BLM, 1999 – California Desert Conservation Area Plan 1980 as amended. http://www.blm.gov/pgdata/etc/medialib//blm/ca/pdf/pdfs/cdd_pdfs.Par.aa6ec747.File.pdf/CA_Desert_.pdf

BLM, 2008 – Noxious Weeds Memorandum of Understanding. Accessed on 01/26/10 from http://www.blm.gov/ca/st/en/prog/weeds/weeds_mon.html.

BLM, 2009 – Survey Protocols for Special Status Plant Species.

BLM, 2009b – Bureau of Land Management. Oregon/Washington Bureau of Land Management Policy for 43 CFR 3809 Notice- and Plan-Level Operations, 43 CFR 3715 Use and Occupancy, and Reclamation Cost Estimates. EMS TRANSMISSION- 05/05/2009 - Instruction Memorandum No. OR-2009-032 (Expires: 09/30/2010).

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 p205-217.

Boarman, W. I. and K. H. Berry, 1995 – Common ravens in the southwestern U.S. *In* Our living resources: A report to the nation on the distribution, abundance, and health of U.S. plants, animals, and ecosystems, pp. 73-201. National Biological Service, Washington D.C.

CalPIF (California Partners in Flight), 2009 – V. 1.0. The Desert Bird Conservation Plan: a Strategy for Protecting and Managing Desert Habitats and Associated Birds in the Mojave and Sonoran Deserts. CalPIF. http://www.prbo.org/calpif/plans.html.

CBOC (California Burrowing Owl Consortium), 1993 – Burrowing Owl Survey Protocol and Mitigation Guidelines. April 1993.

CDFG (California Department of Fish and Game), 1995 – Staff Report on Burrowing Owl Mitigation. Memorandum dated October 17, 1995.

CDFG, 2003 – Biogeographic Data Branch, California Department of Fish and Game. List of Terrestrial Natural Communities Recognized by the California Natural Diversity Database. Memorandum dated September 2003.

CDFG, 2007 – Biogeographic Data Branch, California Department of Fish and Game. Vegetative Classification and Mapping Program List of California Vegetation Alliances. Memorandum dated October 22, 2007.

CDFG, 2009 – California Natural Diversity Database (CNDDB) Rarefind Search (V. 3.1.1., updated 06/02/09) of the Brawley NW, Carrizo Mountain, Carrizo Mountain NE, Coyote Wells, In-ko-pah Gorge, Mount Signal, Painted Gorge, Plaster City, Plaster City NW, Seeley, Superstition Mountain, and Yuha Basin 7.5 minute USGS quadrangles. Accessed 06/29/09.

CDFG, 2009b – Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities. Memorandum dated November 24, 2009.

CEC, 2008f (tn: 49011) – BLM and Energy Commission staff's Data Requests Set 1 Part 1 (1-52). Submitted to Energy Commission/Docket Unit on 11/14/08.

CNPS (California Native Plant Society), 2001 – Inventory of Rare and Endangered Plants of California (sixth edition). Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society. Sacramento, CA. x + 388p.

CNPS, 2009 – Inventory of Rare and Endangered Plants (online edition, v7-09b). California Native Plant Society. Sacramento, CA. Accessed 06/29/09 from http://www.cnps.org/inventory.

Conway, C. J. and W. R. Eddleman, 2000 – Yuma Clapper Rail. *In* Reading, R. P. and B. Miller, eds. Endangered Animals. A Reference Guide to Conflicting Issues. Greenwood Press.

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.

Foreman, L.D. (Ed.), 1997 – Flat-tailed horned lizard rangewide management strategy. Report of Interagency Working Group. 61 pp. plus appendices.

FTHL ICC (Flat-tailed Horned Lizard Interagency Coordinating Committee), 2003 – Flat-tailed horned lizard rangewide management strategy. 2003 revision. 80 pp. plus appendices.

Garrett, K., 2009 – Telephone conversation between Kimball Garrett, Los Angeles County of Natural History, Section of Ornithology, and Joy Nishida, California Energy Commission. July 1, 2009.

Garrett, K., and Dunn, J., 1981 – Birds of Southern California. Los Angeles Audubon Society, Los Angeles.

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.

Grant, T. J., 2005 – Flat-tailed Horned Lizards (*Phrynosoma mcallii*): Population Size Estimation, Effects of Off-Highway Vehicles, and Natural History, in partial fulfillment of the requirements for the Degree of Master of Science, Colorado State University, Fort Collins, Colorado.

Hanly, T. A., 1982 – The nutritional basis for food selection by ungulates. *Journal of Range Management*. 35:146-151.

Harris, J., 1988 – Life history account for pallid bat. *In* Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White, eds. 1988–1991. California's Wildlife. Volume I–III. California Department of Fish and Game, Sacramento, California.

Harris, J., 2008 – Life history account for western yellow bat. *In* Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White, eds. 1988–1991. California's Wildlife. Volume I–III. Updated 2008. California Department of Fish and Game, Sacramento, California.

Haug, E.A., B.A. Millsap, and M.S. Martell, 1993 – Burrowing Owl (*Speotyto cunicularia*). *In* The Birds of North America, No. 61 (A. Poole and F. Gill [eds.]). Philadelphia: The Academy of Natural Sciences; Washington D.C.: The American Ornithologist's Union.

Hoefler, G. and J. Harris, 1995 – Life history account for round-tailed ground squirrel. *In* Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White, eds. 1988-1990. California's Wildlife. Volume I–III (updated account). California Department of Fish and Game, Sacramento, California.

Humple, D., 2008 – Loggerhead Shrike (*Lanius ludovicianus*) (mainland populations). *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.

Imperial County, 1993 – County of Imperial Codified Ordinances.

Imperial County, 1993 – Imperial County General Plan.

Jennings, W. B., 1997 – Habitat use and food preferences of the desert tortoise, *Gopherus agassizii* in the western Mojave and impacts of off-road vehicles. Pages 42–45. *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.

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.

Kristan, W. B., III, and W. I. Boarman, 2003 – Spatial pattern of risk of common raven predation on desert tortoises. *Ecology* 84(9):2432-2443.

Kucera, T., 1997 – Life history account for black-tailed gnatcatcher. *In* Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White, eds. 1988-1990. California's Wildlife. Volume I–III (updated account). California Department of Fish and Game, Sacramento, California.

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. Accessed 07/01/09 at http://www.fs.fed.us/psw/publications/laudenslayer.psw_1992_laudenslayer_wildlife.pdf.

Long, C. A., 1973 – *Taxidea taxus*. Mammalian Species. No. 26:1–4. American Society of Mammalogists.

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.

Luz Solar Partners VIII & IX, Ltd. (Luz), 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.

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.

Marlow, R. W., 1988 – Life history account for barefoot banded gecko. *In* Zeiner, D. C., W. F. Laudenslayer, Jr., and K. E. Mayer, eds. 1988-1990. California’s Wildlife. Volume I–III. California Department of Fish and Game, Sacramento, California.

Marlow, R. W., 2000 – Life history account for flat-tail horned lizard. *In* Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White, eds. 1988-1990. California’s Wildlife. Volume I–III (updated account). California Department of Fish and Game, Sacramento, California.

Mattson, M., 2009 – E-mail communication between Michelle Matson, Project Manager, USACE, and Joy Nishida, California Energy Commission. December 21, 2009.

Mattson, M., 2010 – E-mail communication between Michelle Matson, Project Manager, USACE, and Joy Nishida, California Energy Commission. January 24, 2010.

McCaskie, G., 2010 – E-mail communication between Guy McCaskie, Author of *Birds of the Salton Sea: Status, biogeography, and ecology*, and Joy Nishida, California Energy Commission. January 22, 2010.

Muth, A. and M. Fisher, 1992 – Development of baseline data and procedures for monitoring populations of the flat-tailed horned lizard, *Phrynosoma mcallii*. Contr. Rept. No. FG9268 to California Department of Fish and Game, Sacramento, California.

Nafis, G., 2009 – California Herps website. Accessed 08/12/09 at http://www.californiaherps.com/lizards/pages/c.switaki.html.

NatureServe, 2009 – NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Accessed 06/24/09 at http://www.natureserve.org/explorer.

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.

Ostermann, S. D., J. R. Deforge, and W. D. Edge, 2001 – Captive breeding and reintroduction evaluation criteria: a case study of Peninsular bighorn sheep. *Conservation Biology* Vol. 15, No. 3: pp. 749–760.

Painter, M. L. and M. F. Ingraldi, 2007 – Use of Simulated Highway Underpass Crossing Structures by Flat-Tailed Horned Lizards (*Phrynosoma mcallii*), Final Report 594. Arizona Department of Transportation, Phoenix, Arizona.

Patten, M. A., G. McCaskie, and P. Unitt, 2003 – Birds of the Salton Sea: Status, biogeography, and ecology. University of California Press, Berkeley and Los Angeles, California.

Polite, C. and J. Pratt, 1988 – Life history account for golden eagle. *In* Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White, eds. 1988-1990. California’s

Wildlife. Volume I–III. California Department of Fish and Game, Sacramento, California.

Polite, C. and J. Pratt, 1988 – Life history account for bald eagle. *In* Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White, eds. 1988-1990. California's Wildlife. Volume I–III (updated 1999). California Department of Fish and Game, Sacramento, California.

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.

Rosenberg, K. V., R. D. Ohmart, W. C. Hunter, and B. W. Anderson, 1991 – Birds of the Lower Colorado River Valley. University of Arizona Press, Tucson, AZ.

Sauer, J. R., J. E. Hines, and J. Fallon, 2008 – The North American Breeding Bird Survey, Results, and Analysis 1966–2007. Version 5.15.2008. USGS Patuxent Wildlife Research Center, Laurel, MD. Accessed 06/30/09 at http://www.mbr-pwrc.usgs.gov/bbs/bbs.htm.

SCPBRG (Santa Cruz Predatory Bird Research Group), 1998-2007 – California Burrowing Owl Consortium. Accessed 06/26/09 at http://www2.ucsc.edu/scpbrg/burrowingowls.htm.

SES 2008a (tn: 46819) – Application for Certification SES Solar Two, LLC, dated 06/30/08. Submitted to Energy Commission/Docket Unit on 06/30/08.

SES 2008d (tn: 48223) – Supplement to Application for Certification SES Solar Two, LLC, dated 06/30/08. Submitted to Energy Commission/Docket Unit on 09/26/08.

SES 2008f (tn: 49332) – Applicant's Response to BLM and Energy Commission Data Request Set 1, Part 1 (1-52). Submitted to Energy Commission/Docket Unit on 12/08/08.

SES 2009e (tn: 50612) – Draft Noxious Weed Management Plan for the SES Solar Two Site, Imperial County, California, dated 01/29/09. Submitted to Energy Commission/Docket Unit on 03/19/09.

SES 2009f (tn: 50613) – Draft Raven Monitoring, and Control Plan, dated 03/20/09. Submitted to Energy Commission/Docket Unit on 03/19/09.

SES 2009g (tn: 50614) – Review of Federal and State Surface Waters for the Stirling Energy Systems Solar 2 Project, dated 02/23/09. Submitted to Energy Commission/Docket Unit on 03/19/09.

SES 2009h (tn: 50625) – In Response to CEC and BLM Data Requests 1–3, 5–10, 14, 24–26, 31–33, 36–38, 44, and 111–127 Application for Certification (08-AFC-5) SES Solar Two, LLC, dated 03/19/09. Submitted to Energy Commission/Docket Unit on 03/19/09.

SES 2009k (tn: 51367) – Applicant's Supplemental Cumulative Analysis to SES Solar Two Project, dated 04/30/09. Submitted to Energy Commission/Docket Unit on 04/30/09.

SES 2009m (tn: 51460) – In Response to CURE Data Requests 1–143, Application for Certification (08-AFC-5) SES Solar Two, LLC, dated 05/06/09. Submitted to Energy Commission/Docket Unit on 05/06/09.

SES 2009n (tn: 51828) – In Response to CURE Data Requests 128–141, Application for Certification (08-AFC-5) SES Solar Two, LLC, dated 06/05/09. Submitted to Energy Commission/Docket Unit on 06/05/09.

SES 2009q (tn: 51973) – Supplement to SES Solar Two Application for Certification (08-AFC-5) SES Solar Two, LLC, dated 06/12/09. Submitted to Energy Commission/Docket Unit on 06/12/09.

SES 2009s (tn: 52157) – Applicant's Current Conditions Report for SES Solar Two Project, dated 06/09. Submitted to Energy Commission/Docket Unit on 06/24/09.

SES 2009t (tn: 52272) – In Response to CURE Data Requests 143–178, Application for Certification (08-AFC-5) SES Solar Two, LLC, dated 07/02/09. Submitted to Energy Commission/Docket Unit on 07/02/09.

SES 2009u (tn: 53137) – SES Solar Two (08-AFC-5) Additional Supportive Materials to be Docketed—Biology and Water, dated 09/03/09. Submitted to Energy Commission/Docket Unit on 09/03/09.

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.

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.

Small, A., 1994 – California Birds: Their Status and Distribution. Ibis Publishing, Vista, CA.

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.

Stein, A., 2009 – E-mail communication between Alan Stein, Deputy District Manger, Resources, for the Bureau of Land Management, California Desert District, and Joy Nishida, California Energy Commission. December 24, 2009.

Steward, D., 2009 – Telephone conversation between Daniel Steward, Acting Field Manager for the Bureau of Land Management, El Centro, California office, and Joy Nishida, California Energy Commission. December 14, 2009.

Steward, D., 2010 – Telephone conversation between Daniel Steward, Acting Field Manager for the Bureau of Land Management, El Centro, California office, and Joy Nishida, California Energy Commission. January 6, 2010.

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). Available: http://www.fs.fed.us/database/feis/ [2008, June 27].

Tinant, J., 2006 – Black-tailed Gnatcatcher (*Polioptila melanura*). *In* The Draft Desert Bird Conservation Plan: a strategy for reversing the decline of desert-associated birds in California. California Partners in Flight. Accessed on 06/29/09 at http://www. prbo.org/calpis/htmldocs/species/desert.html.

Torres, S., 2009 – Telephone conversation between Steve Torres, Wildlife Biologist, CDFG, and Joy Nishida, California Energy Commission. July 30, 2009.

Trouette, A., 2010 – Telephone conversation between Andrew Trouette, Natural Resource Specialist for the Bureau of Land Management, El Centro, California office, and Joy Nishida, California Energy Commission. February 5, 2010.

USFWS (U.S. Fish and Wildlife Service), 2000 – Recovery Plan for Bighorn Sheep in the Peninsular Ranges, California. USFWS, Portland, OR.

USFWS, 2008 – Environmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise. Ventura, CA.

USFWS, 2009 – Yuma clapper rail (*Rallus longirostris yumanensis*) Nevada protected species account, updated October 19, 2009. Accessed 11/19/09 at www.fws.gov/nevada/protected_species/birds/species/yucr.html

WBWG (Western Bat Working Group), 2005 – Western yellow bat (*Lasiurus xanthinus*) species account prepared by B. C. Bolster, updated by J. A. Williams. www.wbwg.org/speciesinfo/species_accounts/species_accounts.html.

Wehasen, 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.

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, Jr., K. E. Mayer, and M. White, eds., 1988-1990 – California's Wildlife. Volume I–III (updated 2004). California Department of Fish and Game, Sacramento, California.

C.3 - CULTURAL RESOURCES AND NATIVE AMERICAN VALUES

C.3.1 SUMMARY OF CONCLUSIONS

On the basis of a 25% sample of the cultural resources inventory of the project area of analysis, staff concludes that the Stirling Energy Systems Solar Two Project would have significant impacts/effects on a presently unknown subset of approximately 330 known prehistoric and historical surface archaeological resources and may have significant impacts/effects on an unknown number of buried archaeological deposits, many of which may be determined historically significant (i.e., eligible for the National Register of Historic Places and the California Register of Historical Resources) under the programmatic agreement currently under development as part of the Bureau of Land Management's Section 106 consultation process. The adoption and implementation of Condition of Certification **CUL-1** would reduce the potential impacts of the proposed action on these resources to less than significant under CEQA, would resolve effects under Section 106 of the National Historic Preservation Act, and would further ensure that the proposed action would be in conformity with all applicable laws, ordinances, regulations, and standards.

C.3.2 INTRODUCTION

This cultural resources assessment identifies the potential impacts of the Stirling Energy Systems Solar Two (SES Solar Two) Project on cultural resources. Cultural resources are defined under federal and state law as including archaeological sites, buildings, structures, objects, and districts. Three kinds of cultural resources, classified by their origins, are considered in this assessment: prehistoric, ethnographic, and historic.

Prehistoric archaeological resources are associated with the human occupation and use of California prior to enforced European contact. These resources may include sites and deposits, structures, artifacts, rock art, trails, and other traces of Native American human behavior. In California, the prehistoric period began over 12,000 years ago and extended through the eighteenth century until 1769, when the first Europeans settled in California.

Ethnographic resources represent the heritage of a particular ethnic or cultural group, such as Native Americans or African, European, or Asian immigrants. They may include traditional resource collecting areas, ceremonial sites, topographic features, cemeteries, shrines, or ethnic neighborhoods and structures.

Historic-period resources, both archaeological and architectural, are associated with Euro-American exploration and settlement of an area and the beginning of a written historical record. They may include archaeological deposits, sites, structures, traveled ways, artifacts, or other evidence of human activity. Under federal and state historic preservation law, historic-period cultural resources must, under most circumstances, be at least 50 years old to have the potential to be of sufficient historical importance to merit eligibility for the National Register of Historic Places and the California Register of Historical Resources. A resource less than 50 years of age must be of exceptional historical importance to be considered for the National Register of Historic Places.

Groupings of historic-period resources are also recognized as historic districts and as historic vernacular landscapes. Under federal and state laws, historic cultural resources must be greater than 50 years old to be considered of potential historic importance. A resource less than 50 years of age may be historically important if the resource is of exceptional importance in history.

For the SES Solar Two project, staff provides an overview of the environmental setting and history of the project area, a representative sample of the inventory of the cultural resources identified in the project area for the proposed action and the nearby vicinity, and an analysis of the potential impacts to cultural resources from the proposed project using criteria from the National Environmental Policy Act (NEPA), Section 106 of the National Historic Preservation Act (Section 106), and the California Environmental Quality Act (CEQA).

C.3.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The purpose of the present cultural resources analysis is to provide evidence of the ongoing public process by which the Energy Commission and the Bureau of Land Management (BLM) are jointly complying with local, State, and Federal regulations to which each agency is variously subject. The Energy Commission, pursuant to section 25519, subsection (c) of the Warren-Alquist Act of 1974 (Act), is the lead agency for the purpose of complying with CEQA in relation to the certification of the proposed facility and the site on which the facility would operate, and is further responsible, pursuant to section 25525 of the Act, for ensuring that the facility would conform with applicable State, local, or regional standards, ordinances, or laws. The BLM is the lead agency for the purpose of complying with NEPA, as the Federal government considers the environmental implications of the proposed action, and has further obligations to comply with Section 106 of the National Historic Preservation Act of 1966, as amended (16 USC 470(f)) (NHPA), and other Federal historic preservation programs.

The structure of the cultural resources analysis for the proposed action accommodates both the primary need of the Energy Commission to demonstrate under CEQA a consideration of the potential for the project to affect cultural resources and the primary needs of the BLM to conduct similar analyses under NEPA and Section 106. (Each of these three regulatory programs uses slightly different terminology to refer to the proposed action. Clarifications on the use of “proposed action,” “proposed project,” and “undertaking” may be found in the “Cultural Resources Glossary” subsection, below.) The present analysis fulfills the largely parallel goals of the three regulatory programs through the execution of five basic analytic phases. The initial phase is the determination of the appropriate geographic extent of the analysis for the proposed action and for each alternative action under consideration. The second phase is to produce an inventory of the cultural resources in each such geographic area. The third phase is to determine whether particular cultural resources in an inventory are historically significant, unless resources can be avoided by construction. The fourth phase is to assess the character and the severity of the effects of the proposed or alternative actions on the historically significant cultural resources that cannot be avoided in each respective inventory. And the final phase is to propose measures that would resolve significant effects. The details of each of these phases follow below and provide the parameters of the present analysis.

C.3.3.1 THE PROJECT AREA OF ANALYSIS AND THE AREA OF POTENTIAL EFFECTS

A useful precursor to a cultural resources analysis under CEQA and NEPA and a requisite part of the Section 106 process (36 CFR Part 800) is to define the appropriate geographic limits for an analysis. The area that Energy Commission staff typically considers when identifying and assessing impacts to cultural resources under CEQA is referred to here as the “project area of analysis.” Energy Commission staff defines the project area of analysis as the area within and surrounding a project site and associated linear facility corridors. The area reflects the minimum standards set out in the Energy Commission Power Plant Site Certification Regulations (Cal. Code Regs., tit. 20, § 1701 et seq., appen. B, subd. (g)(2)) and is sufficiently large and comprehensive in geographic area to facilitate and encompass considerations of archaeological, ethnographic, and built-environment resources. The project area of analysis is a composite, though not necessarily contiguous geographic area that accommodates the analysis of each of these resource types:

- For archaeological resources, the project area of analysis is minimally defined as the project site footprint, plus a buffer of 200 feet, and the project linear facilities routes, plus a buffer of 50 feet to either side of the rights-of way for these routes.
- For ethnographic resources, the project area of analysis is expanded to take into account traditional use areas and traditional cultural properties which may be far-ranging, including views that contribute to the significance of the property. These resources are often identified in consultation with Native Americans and other ethnic groups, and issues that are raised by these groups may define the area of analysis.
- For built-environment resources, the project area of analysis is confined to one parcel deep from the project site footprint in urban areas, but in rural areas is expanded to include a half-mile buffer from the project site and above-ground linear facilities to encompass resources whose setting could be adversely affected by industrial development.
- For a historic district or a cultural landscape, staff defines the project area of analysis based on the particulars of each siting case (i.e., specific to that project).

The BLM concludes here that the project area of analysis concept provides an appropriate areal scope for the consideration of cultural resources under NEPA and is consistent with the definition of the area of potential effects (APE) in the Section 106 process (36 CFR § 800.16(d)). The project area of analysis will, therefore, be equivalent to the APE for the purpose of the present discussion and analysis.

C.3.3.2 INVENTORY OF CULTURAL RESOURCES IN PROJECT AREA OF ANALYSIS

A cultural resources inventory specific to each proposed or alternative action under consideration is a necessary step in the staff effort to determine whether each such action may cause, under CEQA, a substantial adverse change in the significance of any cultural resources that are on or would qualify for the California Register of Historical Resources (CRHR), may, under NEPA, significantly affect important historic and cultural aspects of our national heritage, or may, under Section 106, adversely affect any cultural resources that are on or would qualify for the National Register of Historic Places (NRHP).

The development of a cultural resources inventory entails working through a sequence of investigatory phases to establish the universe of cultural resources that will be the focus of the analyses of each proposed or alternative action. Generally the research process proceeds from the known to the unknown. These phases typically involve doing background research to identify known cultural resources, conducting fieldwork to collect requisite primary data on not-yet-identified cultural resources in the vicinity of an action, and assessing the results of any geotechnical studies or environmental assessments completed for a project site. The results of this research then support the development of determinations of historical significance for the cultural resources that are found.

C.3.3.3 DETERMINING THE HISTORICAL SIGNIFICANCE OF CULTURAL RESOURCES

A key part of a cultural resources analysis under CEQA, NEPA, or Section 106 is to determine which of the cultural resources that a proposed or alternative action may affect, are important or historically significant (each of these three regulatory programs uses slightly different terminology to refer to historically significant cultural resources; clarifications on the use of the terms "*historical resource*," "*important historic and cultural aspects of our national heritage*," and "*historic property*" may be found in the "Cultural Resources Glossary" subsection, of this report). Subsequent effects assessments are only made for those cultural resources that are determined to be historically significant. Cultural resources that can be avoided by construction may remain unevaluated. Unevaluated cultural resources that cannot be avoided are treated as eligible when determining effects. The criteria for evaluation and the requisite thresholds of resource integrity that are, taken together, the measures of historical significance, vary among the three regulatory programs.

Evaluation of Historical Significance under CEQA

CEQA requires the Energy Commission, as a lead agency, to evaluate the historical significance of cultural resources by determining whether or not they meet several sets of specified criteria. Under CEQA, the definition of a historically significant cultural resource is that it is eligible for listing in the CRHR, and such a cultural resource is referred to as a "historical resource," which is a "resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR", or "a resource listed in a local register of historical resources or identified as significant in a historical resource survey meeting the requirements of section 5024.1(g) of the Public Resources Code," or "any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the agency's determination is supported by substantial evidence in light of the whole record" (Cal. Code Regs., tit. 14,

§ 15064.5(a)). The term, “historical resource,” therefore, indicates a cultural resource that is historically significant and eligible for listing in the CRHR.

Consequently, under the CEQA Guidelines, to be historically significant, a cultural resource must meet the criteria for listing in the CRHR. These criteria are essentially the same as the eligibility criteria for the NRHP. In addition to being at least 50 years old,[1] a resource must meet at least one (and may meet more than one) of the following four criteria (Pub. Resources Code, § 5024.1):

- Criterion 1, is associated with events that have made a significant contribution to the broad patterns of our history;
- Criterion 2, is associated with the lives of persons significant in our past;
- Criterion 3, embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values; or
- Criterion 4, has yielded, or may be likely to yield, information important to history or prehistory.

In addition, historical resources must also possess integrity of location, design, setting, materials, workmanship, feeling, and association (Cal. Code Regs., tit. 14, § 4852(c)).

Additionally, cultural resources listed in or formally determined eligible for the National Register of Historical Places (NRHP) and California Registered Historical Landmarks numbered No. 770 and up are automatically listed in the CRHR and are therefore also historical resources (Pub. Resources Code, § 5024.1(d)). Even if a cultural resource is not listed or determined to be eligible for listing in the CRHR, CEQA allows a lead agency to make a determination as to whether it is a historical resource (Pub. Resources Code, § 21084.1).

Evaluation of Historical Significance under NEPA

NEPA establishes national policy for the protection and enhancement of the environment. Part of the function of the Federal Government in protecting the environment is to “preserve important historic, cultural, and natural aspects of our national heritage.” Cultural resources need not be determined eligible for the National Register of Historic Places as in the National Historic Preservation Act (NHPA) of 1966 (as amended) to receive consideration under NEPA. NEPA is implemented by regulations of the Council on Environmental Quality, 40 CFR 1500-1508. NEPA provides for public participation in the consideration of cultural resources issues, among others, during agency decision-making.

Evaluation of Historical Significance under Section 106 (Eligibility of Cultural Resources for Inclusion in the NRHP)

The federal government has developed laws and regulations designed to protect cultural resources that may be affected by actions undertaken, regulated, or funded by

[1] The Office of Historic Preservation’s Instructions for Recording Historical Resources (1995) endorses recording and evaluating resources over 45 years of age to accommodate a potential five-year lag in the planning process.

federal agencies. Cultural resources are considered during federal undertakings chiefly under Section 106 of NHPA of 1966 (as amended) through one of its implementing regulations, 36 Code of Federal Regulations (CFR) CFR 800 (Protection of Historic Properties). Properties of traditional religious and cultural importance to Native Americans are considered under Section 101(d)(6)(A) of NHPA.

Section 106 of NHPA (16 United States Code [USC] 470f) requires federal agencies to consider the effects of their undertakings on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places (NRHP) and to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings (36 CFR Part 800.1). Under Section 106, the significance of any adversely affected cultural resource is assessed and mitigation measures are proposed resolve effects. Significant cultural resources (historic properties) are those resources that are listed in or are eligible for listing on the NRHP per the criteria listed at 36 CFR 60.4 (Advisory Council on Historic Preservation 2000) and are presented in the next subsection below.

NHPA of 1966 established the ACHP and State Historic Preservation Officers (SHPO) to assist federal and State officials regarding matters related to historic preservation. As previously mentioned above, the administering agency, the ACHP, has authored regulations implementing Section 106 that are located in 36 CFR Part 800, *Protection of Historic Properties* (recently revised, effective January 11, 2001). 36 CFR Part 800 provides detailed procedures, called the Section 106 process, by which the assessment of impacts on archaeological and historical resources, as required by the Act, is implemented.

Given that the proposed Solar Two Project is located on lands managed by BLM and requires authorization by the BLM, the proposed action is considered an undertaking, and therefore must comply with the NHPA and implementing regulations. NEPA addresses compliance with the NHPA, and the required environmental documentation, whether it is an Environmental Assessment (EA) or an Environmental Impact Statement (EIS), must discuss cultural resources. It is important to recognize, however, that project compliance with NEPA does not mean the project is in compliance with the NHPA.

According to the NHPA (36 CFR Part 800), three steps are required for compliance: (1) identification of significant resources that may be affected by an undertaking; (2) assessment of project impacts on those resources; and (3) development and implementation of mitigation measures to offset or eliminate adverse impacts. All three steps require consultation with interested Native American tribes, local governments, and other interested parties.

Identification and National Register of Historic Places Evaluation

36 CFR Part 800.3 discusses the consultation process. Section 800.4 sets out the steps the ACHP must follow to identify historic properties. 36 CFR Part 800.4(c)(1) outlines the process for National Register of Historic Places (NRHP) eligibility determinations.

The Historic Sites, Buildings and Antiquities Act of 1935 required the survey, documentation, and maintenance of historic and archaeological sites in an effort to determine which resources commemorate and illustrate the history and prehistory of the United States.

The NHPA expanded on this legislation and assigned the responsibility for carrying out this policy to the United States Department of the Interior, National Park Service (NPS). Per NPS regulations, 36 CFR Part 60.4, and guidance published by the NPS, *National Register Bulletin, Number 15, How to Apply the National Register Criteria for Evaluation*, different types of values embodied in districts, sites, buildings, structures, and objects are recognized. These values fall into the following categories:

1. Associate Value (Criteria A and B): Properties significant for their association with or linkage to events (Criterion A) or persons (Criterion B) important in the past.

2. Design or Construction Value (Criterion C): Properties significant as representatives of the man-made expression of culture or technology.

3. Information Value (Criterion D): Properties significant for their ability to yield important information about prehistory or history.

The quality of *significance* in American history, architecture, archaeology, engineering and culture is present in districts, sites, buildings, structures, and objects that possess *integrity* of location, design, setting, materials, workmanship, feeling and association. Cultural resources that are determined eligible for listing in the NRHP, along with SHPO concurrence, are termed “historic properties” under Section 106, and are afforded the same protection as sites listed in the NRHP.

C.3.3.4 ASSESSING ACTION EFFECTS

The core of a cultural resources analysis under CEQA, NEPA, or Section 106 is to assess the character of the effects that a proposed or alternative action may have on historically significant cultural resources. The analysis takes into account 3 primary types of potential effects which each of the three above regulatory programs defines and handles in slightly different ways. The three types of potential effects include direct, indirect, and cumulative effects. Once the character of each potential effect of a proposed or alternative action has been assessed, a further assessment is made as to whether each such effect is significant, relative to specific regulatory criteria under CEQA, NEPA, and Section 106.

Direct and Indirect Effects

Direct and indirect effects are those that are more clearly and immediately attributable to the implementation of proposed or alternative actions. Direct and indirect effects are conceptually similar under CEQA and NEPA. The uses of the concepts vary under Section 106 relative to their uses under CEQA and NEPA as discussed below.

Direct and Indirect Impacts under CEQA

In the abstract, direct impacts to cultural resources are those associated with project development, construction, and co-existence. Construction usually entails surface and subsurface disturbance of the ground, and direct impacts to archaeological resources may result from the immediate disturbance of the deposits, whether from vegetation removal, vehicle travel over the surface, earth-moving activities, excavation, or demolition of overlying structures. Construction can have direct impacts on historic built-environment resources when those structures must be removed to make way for new structures or when the vibrations of construction impair the stability of historic structures nearby. New structures can have direct impacts on historic structures when the new structures are stylistically incompatible with their neighbors and the setting, and when the new structures produce something harmful to the materials or structural integrity of the historic structures, such as emissions or vibrations.

Generally speaking, indirect impacts to archaeological resources are those which may result from increased erosion due to site clearance and preparation, or from inadvertent damage or outright vandalism to exposed resource components due to improved accessibility. Similarly, historic structures can suffer indirect impacts when project construction creates improved accessibility and vandalism or greater weather exposure becomes possible.

Ground disturbance accompanying construction at a proposed plant site, along proposed linear facilities, and at a proposed laydown area has the potential to directly impact archaeological resources, unidentified at this time. The potential direct, physical impacts of the proposed construction on unknown archaeological resources are commensurate with the extent of ground disturbance entailed in the particular mode of construction. This varies with each component of the proposed project. Placing the proposed plant into this particular setting could have a direct impact on the integrity of association, setting, and feeling of nearby standing historic structures.

Direct and Indirect Effects under NEPA

The concepts of direct and indirect effects under NEPA are almost equivalent to those under CEQA. Direct effects under NEPA are those "which are caused by the [proposed or alternative] action and [which] occur at the same time and place" (40 CFR § 1508.8(a)). Indirect effects are those "which are caused by the [proposed or alternative] action and are later in time or farther removed in distance, but are still reasonably foreseeable" (40 CFR § 1508.8(b)).

Direct and Indirect Effects under Section 106

The Section 106 regulation narrows the range of direct effects and broadens the range of indirect effects relative to the definitions of the same terms under CEQA and NEPA. The regulatory definition of "effect," pursuant to 36 CFR § 800.16(i), is that the term "means alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register." In practice, a "direct effect" under Section 106 is limited to the direct physical disturbance of a historic property. Effects that are immediate but not physical in character, such as visual intrusion, and reasonably foreseeable effects that may occur at some point subsequent to the implementation of the proposed undertaking are referred to in the Section 106 process as "indirect effects."

Cumulative Impacts

Cumulative Impacts are slightly different concepts under CEQA and NEPA, and are, under Section 106, undifferentiated as an aspect of the potential effects of an undertaking, of a proposed or alternative action. The consideration of cumulative impacts reaches beyond the project area of analysis or the area of potential effects. It is a consideration of how the effects of a proposed or alternative action in those areas contributes or does not contribute to the degradation of a resource group or groups that is or are common to the project area of analysis and the surrounding area or vicinity.

Cumulative Impacts under CEQA

A cumulative impact under CEQA refers to a proposed project's incremental effects considered over time and taken together with those of other, nearby, past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Pub. Resources Code sec. 21083; Cal. Code Regs., tit. 14, secs. 15064(h), 15065(a)(3), 15130, and 15355). Cumulative impacts to cultural resources in a project vicinity could occur if any other existing or proposed projects, in conjunction with the proposed project, had or would have impacts on cultural resources that, considered together, would be significant. The previous ground disturbance from prior projects and the ground disturbance related to the future construction of a proposed project and other proposed projects in the vicinity could have a cumulatively considerable effect on archaeological deposits, both prehistoric and historic. The alteration of the natural or cultural setting which could be caused by the construction and operation of a proposed project and other proposed projects in the vicinity could be cumulatively considerable, but may or may not be a significant impact to cultural resources.

Cumulative Impacts under NEPA

Under NEPA, a cumulative is the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR § 1508.7). Cumulatively significant impacts are taken into consideration as an aspect of the intensity of a significant effect (40 CFR § 1508.27(b)(7).

Cumulative Effects under Section 106

The Section 106 regulation makes explicit reference to cumulative effects only in the context of a discussion of the criteria of adverse effect (36 CFR § 800.5(a)(1)). Cumulative effects are largely undifferentiated as an aspect of the potential effects of an undertaking. Such effects are enumerated and resolved in conjunction with the consideration of direct and indirect effects.

Assessing the Significance of Action Effects

Once the character of the effects that proposed or alternative actions may have on historically significant cultural resources has been determined, the severity of those effects needs to be assessed. CEQA, NEPA, and Section 106 each have different definitions and tests that factor into decisions about how severe, how significant the effects of particular actions may be.

Significant Impacts under CEQA

Under CEQA, "a project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment" (Pub. Resourced Code, § 21084.1). Thus, staff analyzes whether a proposed project would cause a substantial adverse change in the significance, that is, the CRHR eligibility, of the subset of the historical resources in the cultural resources inventory for a project area that the proposed project demonstrably has the potential to effect. The degree of significance of an impact depends on:

- The cultural resource impacted;
- The nature of the resource's historical significance;
- How the resource's historical significance is manifested physically and perceptually;
- Appraisals of those aspects of the resource's integrity that figure importantly in the manifestation of the resource's historical significance; and how much the impact will change those integrity appraisals.

Significant Effects under NEPA

Significant effects under NEPA require considerations of both context and intensity (40 CFR § 1508.27), and the considerations are presented below:

(a) *Context.* This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

(b) *Intensity.* This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:

(1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

(2) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

(3) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

(4) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

(5) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

(6) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

Adverse Effects under Section 106

In accordance with 36 CFR Part 800.5 of the ACHP's implementing regulations, which describes criteria for adverse effects, impacts on cultural resources are considered significant if one or more of the following conditions would result from implementation of the proposed action:

An undertaking has an effect on a historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the NRHP. For the purpose of determining the type of effect, alteration to features of a property's location, setting, or use may be relevant, depending on the property's significant characteristics, and should be considered.

An undertaking is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic properties include, but are not limited to:

1. Physical destruction, damage, or alteration of all or part of the property
2. Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for the NRHP
3. Introduction of visual, audible, or atmospheric elements that are out of character with the property or that alter its setting
4. Neglect of the property, resulting in its deterioration or destruction
5. Transfer, lease, or sale of the property

Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative. A formal effect finding under Section 106 relates to the proposed or alternative action as a whole rather than relating to individual resources.

C.3.3.5 RESOLVING SIGNIFICANT EFFECTS

The concluding phase in a cultural resources analysis, whether under CEQA, NEPA, or Section 106, is to resolve those effects of a proposed or alternative action that have been found to be significant or adverse. The terminology used to describe the process of effects resolution differs among the three regulatory programs. The resolution of significant effects under CEQA involves the development of mitigation measures the implementation of which would minimize any such effects (14 CCR § 15126.4). Mitigation under NEPA includes proposals that avoid or minimize any potential significant effects of a proposed or alternative action on the quality of the human environment (40 CFR § 1502.4). The definition of mitigation in the NEPA regulation includes the development of measures that would avoid, minimize, or rectify significant effects, progressively reduce or eliminate such effects over time, or provide compensation for such effects (40 CFR § 1508.20). The Section 106 process directs the resolution of adverse effects through the development of proposals to avoid, minimize, or otherwise mitigate such effects (36 CFR § 800.6(a)).

The present analysis seeks to resolve the potentially significant effects of proposed and alternative actions on significant cultural resources (i.e., historical resources/historic properties) through the development of measures that satisfy the common conceptual threads of effects resolution in CEQA, NEPA, and Section 106. Energy Commission staff here proposes that the Energy Commission fulfill the bulk of its obligation under CEQA to resolve any potentially significant effects that the proposed or alternative actions may have on cultural resources by making the applicant's compliance with the terms of the BLM's programmatic agreement (PA) under Section 106 a condition of certification (**CUL-1**). The BLM here proposes to use the present cultural resources analysis and its consultation efforts under Section 106, which includes the negotiation and drafting of the PA, to evidence its compliance with NEPA. The applicant's implementation of the terms of the PA would ensure compliance with applicable laws, ordinances, regulations, and standards (LORS), in addition to compliance with CEQA, NEPA, and Section 106.

<u>Programmatic Agreement (PA)</u>

In accordance with 36 CFR Part 800.14(b), PAs are used for the resolution of adverse effects for complex project situations and when effects on historic properties (resources eligible for or listed in the NRHP) cannot be fully determined prior to approval of an undertaking. The BLM will prepare a PA in consultation with the ACHP, the SHPO, the Energy Commission, and interested tribes (including tribal governments as part of government to government consultation. The PA will govern the continued identification and evaluation of historic properties (eligible for the NRHP) and historical resources (eligible for the California Register), as well as the resolution of any effects that may result from this proposed undertaking. Historic properties and historical resources are significant prehistoric and historic cultural resources as determined by the BLM.

As a result of the anticipated impacts of the project on cultural resources and the large geographic area in the APE, a PA with the Energy Commission, the SHPO, and interested Native American tribes **(**government to government consultation) is necessary. Treatment plans regarding historic properties and historical resources that cannot be avoided by project construction will be developed in consultation with the Energy Commission, the SHPO, and interested Native American tribes (government to government consultation) as stipulated in the PA. When the PA is fully executed, the project will have fulfilled the requirements of the NHPA.

The BLM initiated formal consultation with the Advisory Council on Historic Preservation (ACHP), and the SHPO on the development of a PA for the Solar Two Project on August 25, 2009. The ACHP replied on September 22, 2009 that they would participate in consultation on the project. Due to the presence in the APE of the Juan Bautista de Anza National Historic Trail and jurisdictional waters as defined by Section 404 of the Clean Water Act, the National Parks Service (NPS) and the U.S. Army Corps of Engineers were also invited into consultation on the development of the PA in that they may use it to comply with Section 106 of the NHPA. They have agreed to participate and will be Invited Signatories. Other formal Consulting Parties to the PA at this time include the National Trust for Historic Preservation and Edie Harmon however the BLM has been informally consulting with many individuals and organizations on this project. The following Tribes or tribal organizations have also been invited to be Consulting Parties to the PA:

- Campo Kumeyaay Nation
- Cocopah Indian Tribe
- Quechan Indian Tribe
- Ewiiaapaayp Band of Kumeyaay Indians
- Jamul Indian Village
- Kwaaymii Laguna Band of Indians
- La Posta Band of Kumeyaay Indians
- Manzanita Band of Kumeyaay Indians
- San Pasqual Band of Diegueño Indians
- Santa Ysabel Band of Diegueño Indians
- Ah-Mut Pipa Foundation
- Kumeyaay Cultural Repatriation Committee

A draft PA is currently in development and will be sent out to the Consulting Parties for their review and comment. The PA will be included in the Final EIS and the Record of Decision will include the signed PA.

C.3.3.6 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Projects licensed by the Energy Commission are reviewed to ensure compliance with all applicable laws. Although the Energy Commission has pre-emptive authority over local laws, it typically ensures compliance with local laws, ordinances, regulations, standards, plans, and policies. The BLM is responsible for compliance with NEPA and Section 106 of the NHPA.

LORS applicable to the SES Solar Two project are in Cultural Resources Table 1 below.

Cultural Resources Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
National Historic Preservation Act of 1966, as amended, 16 USC 470(f)	Section 106 of the Act requires Federal agencies to take into account the effects of a proposed action on cultural resources (historic properties) and afford the Advisory Council on Historic Preservation the opportunity to comment.
36 CFR Part 800 (as amended August 5, 2004),	Implementing regulations of Section 106 of the National Historic Preservation Act
National Environmental Policy Act (NEPA): Title 42, USC, section 4321-et seq.	This statute requires Federal agencies to consider potential environmental impacts of projects with Federal involvement and to consider appropriate mitigation measures.

Applicable Law	Description
Federal Land Policy and Management Act (FLPMA): Title 43, USC, section 1701 et seq.	This statute requires the Secretary of the Interior to retain and maintain public lands in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric water resource, and archaeological values [Section 1701(a)(8)]; the Secretary, with respect to the public lands, shall promulgate rules and regulations to carry out the purposes of this Act and of other laws applicable to public lands [Section 1740].
Federal Guidelines for Historic Preservation Projects, Federal Register 44739-44738, 190 (September 30, 1983)	The Secretary of the Interior has published a set of Standards and Guidelines for Archaeology and Historic Preservation. These are considered to be the appropriate professional methods and techniques for the preservation of archaeological and historic properties. The Secretary's standards and guidelines are used by Federal agencies, such as the Forest Service, the Bureau of Land Management, and the National Park Service. The California Office of Historic Preservation refers to these standards in its requirements for selection of qualified personnel and in the mitigation of potential impacts to cultural resources on public lands in California.
Executive Order 11593 May 13, 1971 (36 Federal Register 8921)	This order mandates the protection and enhancement of the cultural environment through providing leadership, establishing state offices of historic preservation, and developing criteria for assessing resource values.
American Indian Religious Freedom Act; Title 42, USC, Section 1996	Protects Native American religious practices, ethnic heritage sites, and land uses.
Native American Graves Protection and Repatriation Act (1990); Title 25, USC Section 3001, et seq.,	The stature defines "cultural items," "sacred objects," and "objects of cultural patrimony;" establishes an ownership hierarchy; provides for review; allows excavation of human remains, but stipulates return of the remains according to ownership; sets penalties; calls for inventories; and provides for the return of specified cultural items.
U.S. Dept. of the Interior, Bureau of Land Management (BLM), the California Desert Conservation Area (CDCA) Plan 1980 as amended – Cultural Resources Element Goals	1. Broaden the archaeological and historical knowledge of the CDCA through continuing efforts and the use of existing data. Continue the effort to identify the full array of the CDCA's cultural resources.
	2. Preserve and protect representative sample of the full array of the CDCA's cultural resources.
	3. Ensure that cultural resources are given full consideration in land use planning and management decisions, and ensure that BLM-authorized actions avoid inadvertent impacts.
	4. Ensure proper data recovery of significant (National Register of Historic Places-quality) cultural resources where adverse impacts can be avoided.

Applicable Law	Description
State	
California Environmental Quality Act (CEQA), Sections 21000 et seq. of the Public Resources Code (PRC) with Guidelines for implementation codified in the California Code of Regulations (CCR), Title 14, Chapter 3, Sections 15000 et seq.	CEQA requires that state and local public agencies to identify the environmental impacts of the proposed discretionary activities or projects, determine if the impacts will be significant, and identify alternatives and mitigation measures that will substantially reduce or eliminate significant impacts to the environment. Historical resources are considered a part of the environment and a project that may cause a substantial adverse effect on the significance of a historical resource is a project that may have a significant effect on the environment. The definition of "historical resources" is contained in Section 15064.5 of the CEQA Guidelines.
AB 4239, 1976	Established the Native American Heritage Commission (NAHC) as the primary government agency responsible for identifying and cataloging Native American cultural resources. The bill authorized the Commission to act in order to prevent damage to and insure Native American access to sacred sites and authorized the commission to prepare an inventory of Native American sacred sites located on public lands.
Public Resources Code 5097.97	No public agency, and no private party using or occupying public property, or operating on public property, under a public license, permit, grant, lease, or contract made on or after July 1, 1977, shall in any manner whatsoever interfere with the free expression or exercise of Native American religion as provided in the United States Constitution and the California Constitution; nor shall any such agency or party cause severe or irreparable damage to any Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine located on public property, except on a clear and convincing showing that the public interest and necessity so require.
Public Resources Code 5097.98 (b) and (e)	Requires a landowner on whose property Native American human remains are found to limit further development activity in the vicinity until he/she confers with the Native American Heritage Commission-identified Most Likely Descendents (MLDs) to consider treatment options. In the absence of MLDs or of a treatment acceptable to all parties, the landowner is required to reinter the remains elsewhere on the property in a location not subject to further disturbance.
California Health and Safety Code, Section 7050.5	This code makes it a misdemeanor to disturb or remove human remains found outside a cemetery. This code also requires a project owner to halt construction if human remains are discovered and to contact the county coroner.
Local	
Imperial County General Plan, Land Use Element, 2008, Protection of Environmental Resources, Goal 9, Objective 9.1, Page 42	Goal: Identify and Preserve the significant natural, cultural, and community character resources and the County's air and water quality. Objective: Preserve as open space those lands containing watersheds, aquifer recharge areas, floodplains, important natural resources, sensitive vegetation, wildlife habitats, historic and prehistoric sites, or lands which are subject to seismic hazards and establish compatible minimum lot sizes.

Applicable Law	Description
Imperial County General Plan, Conservation and Open Space Element, Goals and Objectives, Preservation of Cultural Resources, Page 48	Goal 3: Important prehistoric and historic resources shall be preserved to advance scientific knowledge and maintain the traditional historic element of the Imperial Valley landscape. Objective 3.1: Protect and preserve sites of archaeological, ecological, historical, and scientific value, and/or cultural significance.
Imperial County General Plan, Conservation and Open Space Element, Implementation Programs and Policies, Cultural Resources Conservation, Pages 57–58	Programs: The County will use the environmental impact report process to conserve cultural resources. Public awareness of cultural heritage will be stressed. All information and artifactual resources recovered in this process will be stored in an appropriate institution and made available for public exhibit and scientific review. Encourage the use of open space easements in the conservation of high value cultural resources. Consider measures which would provide incentives to report archaeological discoveries immediately to the Imperial Valley College – Baker Museum. Coordinate with appropriate federal, state, and local agencies to provide adequate maps identifying cultural resource locations for use during development review. Newly discovered archaeological resources shall be added to the "Sensitivity Map for Cultural Resources." Discourage vandalism of cultural resources and excavation by persons other than qualified archaeologists. The County shall study the feasibility of implementing policies and enacting ordinances toward the protection of cultural resources such as can be found in California Penal Code, Title 14, Point 1, Section 622-1/2.

C.3.4 PROPOSED PROJECT

C.3.4.1 SETTING AND EXISTING CONDITIONS

Information provided regarding the setting of the proposed project places it in its geographical and geological context and specifies the technical description of the project. Additionally, the prehistoric, ethnographic, and historical background provides the context for the evaluation of the historical significance of any identified cultural resources within staff's area of analysis for this project.

Regional Setting

With minimal updates and editorial contributions, the following subsections entitled "Regional Setting," "Flora and Fauna," "Climate," and "Hydrology" were adapted from URS (2008: Section 2.1) and emphasize the non-archaeological aspects of these themes.

The project area is within the western portion of the Salton Trough, a topographic and structural depression within the Colorado Desert physiographic province. Technically, the Colorado Desert is a biotic designation, a subregion of the Sonoran Desert. It is bounded by the Coachella Valley to the north, the Gulf of California to the south, and mountain ranges to the east and west. The Salton Trough is filled with marine and poorly clastic fluvial sediments up to 15,000 feet thick (Dibblee 1954) and overlaying the basement rock. The Salton Trough has filled with eroded sediments from the surrounding mountains and with Colorado River deposits. During the Pleistocene glacial age, the Salton Trough was occasionally inundated by floodwaters of the Colorado River as it meandered across the desert toward the Gulf of California. This would occur as the river would alter its channel, causing it to disperse the water across the local topography. The large lakes that were created as a result were random and intermittent in nature. There is evidence that there were several separate lake episodes during this period (Singer 2008).

During the Early and Middle Holocene, the area was arid, with little to no evidence of lake episodes until the most recent natural lake episode occurred circa (ca.) AD 1200–1600, when the Colorado River again began emptying into the Salton Trough, and created a massive lake as much as 95 meters (m) deep called Lake Cahuilla (Waters 1983). The project area is near the western shoreline of the former Lake Cahuilla within the Yuha Desert. The lowest portion of the Salton Trough is currently occupied by the Salton Sea, a human-made inland lake with no natural outlet.

The ground surface in the project area slopes gradually to the northeast, ranging from about sea level (elevation 0 feet) near the southwestern corner to an elevation of 345 feet near the northeastern corner.

Climate

The project area, and lower elevations within the Colorado Desert in general, appear to have experienced climatic and vegetation regimes similar to today, for most of the Holocene (ca. 11,000 years ago; Schaefer 1994:60–63). The creosote-scrub habitat that typifies the project area was established at lower elevations by the Late Pleistocene, indicating that people inhabiting the area would have had access to similar natural resources throughout much of prehistory. Numerous studies throughout the region, particularly the Mojave, have demonstrated relatively significant climatic, precipitation, and vegetation fluctuations throughout the Holocene (Kaijnkoski 2008). However, these studies have generally been in much higher elevations than the Yuha Desert. Those that have focused on lower areas have shown much less environmental change, likely due to the preponderance of precipitation in these low-lying areas within the rain shadow of large mountain ranges (Weide 1976). The major fluctuation in available resources within the project area through time then, and the concomitant placement of various site types on the landscape, is directly related to the episodic filling and desiccation of Lake Cahuilla (discussed below).

The climate of the project area can be characterized as hot and dry. According to climate data gathered at El Centro, California, between 1948 and 2007, the area experiences average annual maximum temperatures of 88.6 degrees Fahrenheit (°F) and average annual minimum temperatures of 56.6°F (WRCC 2008). The highest average maximum monthly temperature occurs in July (107.6°F), and the lowest minimum average monthly temperature occurs in December (39.9°F). Precipitation has been recorded in all months except June and averages 2.58 inches per year. Most of the precipitation falls from August to March (2.41 inches) in the form of rain. Snowfall has never been recorded during the reporting period.

Hydrology

The project area is crossed by a series of intermittent alluvial washes that begin in the project area or just south in the dissected hills along the boundary of the Yuha Basin. Extensive gullies and channels are present across the project area and throughout the greater Yuha Basin area. Surface water flows across the project area are likely to occur during seasonal periods of intense rainfall. None of the drainages passing through the project area is formally named. The numerous small arroyos, ephemeral drainages, and seasonal washes within the project area all drain into 5 larger intermittent drainages. The smaller tributary drainages descend from the higher, flat ridge tops channeling rainfall off the ridges into the larger main drainages. Higher areas of the drainages are often cobble- or bedrock-bottomed. The larger drainages are deeply incised, dissecting the ridges in the western and southern portions of the project area, and exhibit sand and other alluvial sedimentation along their bottoms.

Drainages in the western portion of the project area feed two larger drainages; both flow toward Coyote Wash, located north of the project area. The drainages do not directly connect to Coyote Wash. Instead, water flow from these identified channels spreads quickly into dispersed fans as it encounters the more sandy deposits found in the northern portions of the project area and along the broad floodplain of Coyote Wash.

The eastern half of the project area is drained by 3 deeply incised, intermittent, main drainages that flow generally north and east. These main drainages converge approximately 3 miles east of Plaster City. Topographic maps show this combined drainage ending less than a mile east of this convergence. The natural path of this drainage has been altered and stopped by the agricultural development of the area and the construction of the Foxglove Canal.

Analysis of aerial photographs east of the project area show evidence of the original water channels continuing east and eventually north toward the New River. However, the path of these drainages has been diverted and blocked by numerous canal systems including the Foxglove, Westside Main, Dixie, Fern, and Fig Canals. Historically, these drainages would have flowed directly into larger tributaries, including Coyote Wash, all feeding into the New River. The New River travels through the center of the Imperial Valley and drains into the Salton Sea, approximately 35 miles north of the project area.

The northern and western portions of the project area are dominated by alluvial and aeolian sand deposits. These sandy deposits correspond with the paleo-shoreline of the prehistoric Lake Cahuilla. The Salton Sea is the modern remnant of this once large freshwater lake, which inundated much the southern Imperial Valley through the Pleistocene and into the middle Holocene epochs (Schaefer and Laylander 2007). The modern hydrology of the project area, e.g., deeply incised drainages, extensive arroyo cutting, and dispersed alluvial fans, is evidence of the drastically decreasing lake level during the recession of Lake Cahuilla.

Flora and Fauna

Vegetation in the project area consists of a single vegetation community: Sonoran creosote bush scrub dominated by creosote bush (*Larrea tridentata*). Other vegetation observed include screwbean mesquite (*Prosopis pubescens*), desert sunflower (*Geraea canescens*), sand verbena (*Abronia ameliae*), burroweed (*Ambrosia dumosa*), desert needlegrass (*Achnatherum speciosum*), scale bud (*Anisocoma acaulis*), prickly poppy (*Argemone munita*), Borrego milk vetch (*Astragalus lentiginosus* var. *borreganus*), desert holly (*Atriplex hymenelytra*), yellow cups (*Camissonia brevipes*), white mallow (*Eremalche exilis*), pygmy poppy (*Eschscholzia minutiflora*), ocotillo (*Fouquieria splendens* ssp. *splendens*), annual psathyrotes (*Psathyrotes annua*), desert hollyhock (*Sphaeralcea ambigua*), Emory's desert mallow (*Sphaeralcea emoryi* var. *emoryi*), tamarisk (*Tamarix chinensis*), desert lily (*Hesperocallis undulata*), Indian ricegrass (*Achnatherum hymenoides*), and smoketree (*Psorothamnus spinosus*).

Disturbed areas are mostly limited to dirt roads and off-road vehicle trails that traverse the project area. The project area also supports a diversity of common desert wildlife. The project area also has the potential to have several special-status species present, including plants such as brown turbans (*Malperia tenuis*), Harwood's milk-vetch (*Astragalus insularis* var. *harwoodii*), and flat-seeded spurge (*Chamaesyce platysperma*) and wildlife such as flat-tailed horned lizard (*Phrynosoma mcalli*), burrowing owl (*Athene cunicularia*), Le Conte's thrasher (*Toxostoma lecontei*), and American badger (*Taxidea taxus*).

Project, Site, and Vicinity Description

As noted above, the project area is within the western portion of the Salton Trough, a topographic and structural depression within the Colorado Desert physiographic province. Technically, the Colorado Desert is a biotic designation, a sub-region of the Sonoran Desert. It is bounded by the Coachella Valley to the north, the Gulf of California to the south, and mountain ranges to the east and west.

The project area and the project area of analysis are contributors to the Ancient Lake Cahuilla Interaction Sphere (ALCIS). The ALCIS reaches from the central feature of the ancient lake to the Pacific coast on the west, the San Jacinto Valley to the north, the Colorado River to the east, and into an as yet undefined terminus in Mexico to the south. While the primary emphasis is on the interaction sphere as an archaeological concept and focuses on cultural features of the landscape, the ALCIS also incorporates the natural history of the landscape and historical dimensions of the interaction sphere. With the lake as a focal point, the spatial proximity of the different elements of a highly diverse topography form numerous life zones and climates. The project area lands are currently administered by the Bureau of Land Management (BLM) on behalf of the public and are used for off-road vehicle and other outdoor activities.

Project Description

Project Construction

Project Construction Schedule

The Solar Two project would be developed in two phases. The schedule would be approximately 58 months in duration. Construction would require approximately 40 months.

Site Mobilization

Project facilities and amenities would be established during the first month of the build-out. The majority of these facilities would be located in the 11-acre construction laydown area adjacent to the Main Services Complex, which would be located within the project site approximately 1.5 miles south of the construction exit gate at Evan Hewes Highway. Project amenities would consist of site offices, restroom facilities, meal rooms, limited parking areas, vehicle marshalling areas/traffic staging, and construction material/ equipment storage areas. Construction power to the project site facilities would be provided by mobile diesel-driven generator sets and/or temporary service(s) from IID. Additional construction employee parking would be provided on the 100-acre laydown and staging area east of Dunaway Road. Employees would be moved to and from the project site from surrounding areas and/or the Dunaway Road parking area in up to 10 buses and other mass conveyance vehicles.

Project Site Preparation

The ground surface at the Solar Two project site slopes northeast. The western portion of the site west of the SDG&E transmission line is characterized by rolling terrain with well-defined washes. East of the SDG&E transmission line, the site terrain has uniform and gentle slopes.

Site preparation would be based on avoiding major washes and minimizing surface-disturbing activities. Also, areas of sensitive habitat and cultural resources would be avoided wherever possible.

Brush trimming would be conducted between alternating rows of SunCatchers™. Brush trimming consists of cutting the top of the existing brush while leaving the existing native plant root system in place to minimize soil erosion. After brush has been trimmed, blading for roadways and foundations will be conducted between alternating rows of SunCatchers™ to provide access to individual SunCatchers™. Blading would consist of removing terrain undulations and would be limited to 3 feet in cut and 3 feet in fill. The blading operations would keep native soils within 100 feet of the pre-development location, with no hauling of soils across the site. Paved roadways would be constructed as close to the existing topography as possible, with limited cut-and-fill operations to maintain roadway design slope to within a maximum of 10%. Minor grading would also be required for building foundations and pads and parking areas in the Main Services Complex and substation areas.

The clearing, blading, and grading operations would be undertaken using standard contractor heavy equipment. This equipment would consist of, but not be limited to, motorgraders, bulldozers, elevating scrapers, hydraulic excavators, tired loaders, compacting rollers, and dump trucks.

Foundations

From the preliminary geotechnical investigations, it is expected that lightly loaded equipment and structures, including some of the equipment foundations in the substation yard, small equipment such as the fire water pump and standby generator, the support structures for the water treatment plant and the hydrogen storage area, and the transmission line lattice steel towers would be supported on shallow footings. Shallow footings would be continuous strip and isolated spread footings.

The majority of each SunCatcher™ would be supported by a single metal fin-pipe foundation that is hydraulically driven into the ground. These foundations are expected to be approximately 20 feet long and 24 inches in diameter, with 12-inch-wide fins extending from each side of the pipe pile. Shallow drilled pier concrete foundations of approximately 36 inches in diameter and an embedment depth with a minimum socketed depth into rock of 6 feet would be used for hard and rock-like ground conditions.

The buildings and major structures such as yard tanks would be supported on shallow spread and continuous footings or mat-type foundations.

Deep foundations would be required for heavy items, such as the power transformers at the electrical substation.

Materials and Equipment Staging Area

Two construction staging and laydown areas would be used for the project. A 100-acre construction laydown area that includes a 25-acre construction staging area would be provided east of Dunaway Road. An 11-acre construction laydown area would be provided adjacent to the Main Services Complex.

Both the 25-acre construction staging area to the east of Dunaway Road and the 11-acre construction laydown area adjacent to the Main Services Complex would contain temporary construction facilities, including site offices, restrooms, meal rooms, conference rooms, storage facilities, and parking and vehicle maintenance and storage areas.

The 11-acre construction laydown area adjacent to the Main Services Complex would also contain a temporary fueling station. An 8-foot-diameter by 13⅓-foot-long diesel fuel storage tank with secondary containment would be temporarily located on a paved surface in this laydown area.

The 100-acre laydown area east of Dunaway Road is nearly level and thus requires little grading. The 11-acre laydown area adjacent to the Main Services Complex is on a gently sloping, rocky area that would require minimum grading and fill operations to create a level area. Pads would be prepared for setting the trailers housing the temporary construction facilities.

Operation Impacts

It is expected that the Solar Two project would be operated with a staff of approximately 164 full-time employees. The project would operate 7 days per week, generating electricity during normal daylight hours when the solar energy is available. Maintenance activities would occur 7 days a week, 24 hours a day to ensure SunCatcher™ availability when solar energy is available.

Project Operations

Operation of the Project would generate wastes resulting from processes, routine maintenance, and office activities typical of solar electric generation operations. Non-hazardous wastes generated during operation of the project would be recycled to the greatest extent practical and the remainder of the wastes would be removed on a regular basis by a certified waste-handling contractor.

Inert solid wastes generated at the project site during operation would be predominantly office wastes and routine maintenance wastes, such as scrap metal, wood and plastic from surplus and deactivated equipment and parts. Scrap materials such as paper, packing materials, glass, metals, and plastics would be segregated and managed for recycling. Non-recyclable inert wastes would be stored in covered trash bins in accordance with local ordinances and picked up by an authorized local trash hauler on a regular basis for transport to and disposal in a suitable landfill.

Project operations would consist of few inputs, most of which would be associated with the day-to-day operations and maintenance of the facilities, and the resulting energy production would decrease the area's reliance on imported non-renewable electricity. The existing transmission lines which run through the project site are convenient to this project, and adhere to the goals and policies of the Geothermal/Alternative Energy and Transmission Element. There are no recently proposed zone changes that affect this Project Site, and no changes to the general provisions for development of solar energy are in the Ocotillo/Nomirage planning area.

In general, the operation and maintenance of the Solar Two project is compatible with adjacent and surrounding land uses. Operations and maintenance would not disturb the recreational use of surrounding land (e.g., OHV use at the Plaster City Open Area) and open space conservation. There would, however, be a loss of recreational use at the project site which is moderately used for dispersed camping and associated OHV use. Developed camping areas located in the Yuha Basin ACEC would not be disturbed. Nearby residences are well screened and Project operations would not divide any established communities. The project would not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect; nor would the plan conflict with any applicable habitat conservation plan or natural community conservation plan

Liquid Wastes

Non-hazardous liquid wastes produced by the project would consist of wastes from the wastewater system.

The layout of the Solar Two project site would be based on avoiding major washes and minimizing surface-disturbing activities. The site layout would maintain local pre-development drainage patterns where feasible and discharge from the site would remain at the northeastern boundary. The paved roadways would have a low-flow unpaved swale or roadway dip, as needed, to convey nuisance runoff to existing drainage channels or swales and use low-flow culverts. It is expected that storm water runoff would flow over the crown of the paved roadways, which are typically less than 6 inches from swale flow line to crown at centerline of roadway, thus maintaining existing local drainage patterns during storms. Unpaved roads would utilize low-flow culverts.

Localized channel grading would take place on a limited basis to improve channel hydraulics, and to control flow direction where buildings and roadways are proposed. Also, a channel would be constructed along the northeastern portion of the site. The Main Services Complex would be protected from a 100-year flooding by berms or channels that would direct the flow around the perimeter of the building site, if required.

A proposed channel, located within portions of Sections 9, 10 and 11 of Township 16 South, Range 11 East, would be constructed adjacent to the railroad and would discharge to the existing Dunaway Road dip section. This action would maintain existing pre-development flow patterns. Spoils from the channel would be placed along the southern floodplain, thereby minimizing flooding effects to the SunCatchers^{TM} placed along the southern bank. The proposed channel would improve acceptance of off-site waters at the railroad trestle.

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

The proposed East-West on-site paved arterial roadway section between the Main Services Complex and the 100-acre laydown area at Dunaway Road would be designed as a designated evacuation route. As such, culverts would be designed such that the roadway section shall have its driving surface constructed above the projected profile of a 100-year flood event.

Building sites would be developed per county drainage criteria, with provision for a soft-bottom storm water retention basin. Rainfall from paved areas and building roofs would be collected and directed to the storm water retention basins. The volume of the retention or detention basins should have a total volume capacity for a 3-inch minimum precipitation event covering the entire site with no C reduction (coefficient of runoff) factors. Volume can be considered by a combination of basin size and additional volume provided within paving and/or landscaping areas.

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

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

All runoff crossing the site would flow north and east and would eventually reach the railroad tracks or Dunaway Road. Flow that reaches Dunaway Road would follow existing drainage north toward the railroad tracks. Flows reaching the railroad tracks would flow through the existing trestles or would follow existing drainage east. Flow would follow the railroad embankment and would then flow through the nearest trestle. Flow in excess of the capacity of the trestle would pond until it can flow through. As is the case with the interstate highway, sediment is deposited near the upstream side of the railroad embankment and under each of the trestles. Additional flows affect the northeast side of the project site, flowing south through the railroad embankment. The majority of the flow along the east side of the project crosses Dunaway Road just south of the railroad tracks. Ponding and sediment deposition in this area may be expected to create localized flooding during rainfall events.

A local, site-specific, small wastewater treatment plant at the Main Services Complex is proposed to process sanitary wastewater. A facility of this type would require permitting by the local Regional Water Quality Control Board (RWQCB), and would be designed to meet the operation and maintenance guidelines required by the State of California Department of Health Services.

Wastewater at the Main Services Complex would be discharged into a septic system with sanitary leach field, and would be designed to meet guidelines required by the RWQCB and the Department of Health Services.

Project Closure and Decommissioning

Project Closure

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

Temporary Closure

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

Permanent Closure

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

The removal of the project from service, or decommissioning, may range from "mothballing" to the removal of equipment and appurtenant facilities, depending on conditions at the time. Because the conditions that would affect the decommissioning decision are largely unknown at this time, these conditions would be presented to the Energy Commission, the BLM, and other applicable agencies.

To ensure that public health, safety, and the environment are protected during decommissioning, a decommissioning plan would be submitted to the Energy Commission for approval before decommissioning. The plan would discuss the following:

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

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

Premature closure or unexpected cessation of project operations would be outlined in the Project Closure Plan. The plan would outline steps to secure hazardous and non-hazardous materials and wastes. Such steps would be consistent with Best Management Practices, the HMBP, the RMP, and according to applicable LORS. The plan would include monitoring of vessels and receptacles of hazardous material and wastes, safe cessation of processes using hazardous materials or hazardous wastes, and inspection of secondary containment structures.

Planned permanent closure effects would be incorporated into the Project Closure Plan and evaluated at the end of the project's economic operation. The Project Closure Plan would document non-hazardous and hazardous waste management practices including the inventory, management, and disposal of hazardous materials and wastes and the permanent closure of permitted hazardous materials and waste storage units.

Environmental Setting

A Cultural and Natural Interaction Sphere Model for Ancient Lake Cahuilla and the Project Area of Analysis

The concept of the "interaction sphere" was introduced by J. Caldwell (1964) in an analysis and interpretation of sites and artifacts of the Hopewell culture in the Midwestern United States. While the original definition of the interaction sphere was focused on cultural characteristics of a particular region, here the concept is expanded to include natural aspects of the prehistoric and historic landscape; for example, the interaction between altitude and temperature, soils and vegetation, habitat and animal species, the filling and emptying of Lake Cahuilla and the cyclical presence and absence of fish and migratory water-fowl, and many other interrelated aspects of the Holocene environment. The following sections establish the integration of cultural and natural interaction spheres in more detail.

The present Salton Sea is at the center of Ancient Lake Cahuilla, and as the introduction to the ESRI-Redlands Institute Atlas of the Salton Area states, "Every land has a story." The introduction proceeds to document that the history of the Salton Sea began millions of years ago at the convergence of three tectonic plates: the Pacific Plate, the Farallon Plate, and North American Plate. The intersection of these plates has created one of the most topographically diverse regions on the surface of the earth, a region that has provided, and continues to provide an unusually wide range of climates, animals, and plants. Thousands of years after the establishment of the current natural environment, the cultural dimensions of the ALCIS developed within this land of complex topography and diversity of subsistence and technological resources. While in the midst of an extremely arid desert environment, the setting of the ALCIS provided a wide range of materials for settlement, subsistence, and technology.

Lake Cahuilla and the Salton Sea

With only minor editorial changes and updating, the following text was adapted from the URS text prepared in response to Data Request 112 from the Energy Commission:

An early survey and compilation of site locations within the Salton Sea basin found that sites were differentially distributed along the Lake Cahuilla shoreline, due to local geomorphology and a diverse range of shoreline types (Gallegos 1980). The study indicated that sites tend to concentrate near small bays and sandy pits where marsh habitats were more likely to develop, as well as steeper rocky shorelines, where proximal alluvial cones met the shoreline and fish traps could be more easily constructed. Additionally, a few archaeological sites have been identified on recessional beach deposits that postdate the final lake high stand. One of these is the Dunaway Road site, located very near the project area (Schaefer 1986). The site is situated on a raised, remnant beach berm at sea level (i.e., approximately 12 m below the maximal shoreline). No raised remnant shoreline deposits were identified in the project area below approximately 7.5 m (25 feet) elevation.

Schaefer (1994:72) has stated that “recessional beachlines in many areas have been destroyed by natural erosion or agricultural development” and this appears to be the case within the project area. As such, it is not anticipated that significant buried archaeological deposits associated with recessional shorelines are preserved within the western lake basin portion of the project.

Although remnant recessional shoreline features may not be preserved, Waters’ (1983) dating of archaeological hearth features in stratified lake and alluvial sediments north of the project area, at or below sea level, indicates that there is a possibility of subsurface archaeological preservation within the lower-lying lake basin portion of the project area. However, the same processes that affect and destroy recessional beach formations have also likely disturbed archaeological sites deposited within the lake basin. Significant effort and thought has been put into this archaeological question over the last century. A recent summary of various findings and hypotheses related to the impact of Lake Cahuilla’s fluctuations on prehistoric peoples and archaeology is presented by Laylander (2006).

Unfortunately, the majority of these studies is purely theoretical, limited by the time depth of documented 12 m lake highstands (approximately 1,000 years) and other evidence of prehistoric lake desiccation buried deeply within the lake basin (Waters 1983). However, very recent isotopic studies have begun to greatly expand our understanding of the nature and extent of Lake Cahuilla during the Late Quaternary.

A study by Li et al. (2008a) of carbonate tufas from 24 m below mean sea level (BMSL) in the Salton Sea basin provides intriguing evidence that a lake existed more or less continuously in the basin between 20,500 and 1,300 years ago. No hiatuses in tufa formation were observed over this period, and given that under current climatic conditions it would take only 30 years for a completely filled Lake Cahuilla to desiccate to 24 m BMSL (Wilke 1978), it suggests that at least a portion of the Colorado River flowed into the Salton Sea basin during that entire time span. While there is evidence for brief shifts of the Colorado River away from the basin between 8000–7000, and at 3050, 2180, and 1660 cal BP, this investigation failed to identify any complete desiccation episodes during almost the entire span of human history in the Salton Sea basin (Li et al. 2008b).

In light of this new evidence, an important research agenda for future geoarchaeological analysis of the region would be to identify the locations of prehistoric lake shorelines and the potential for preservation of associated archaeological sites. However, in relation to our current project area, some basic inferences may be made about prehistoric lake levels.

Regionally, prehistoric surface site density and complexity is notably higher within the region adjacent to the Lake Cahuilla shoreline (URS 2008). Given the resource potential of Lake Cahuilla in the otherwise sparse Yuha Desert, this pattern is not unexpected. A similar pattern should also be seen at all periods and locations of Lake Cahuilla shorelines since the Late Pleistocene. However, in order to more accurately assess the potential for prehistoric shoreline sites within the project area, one must know when and at what height Lake Cahuilla existed throughout prehistory.

As with other major delta systems in California (e.g., the San Joaquin and Sacramento River deltas in the San Francisco Bay Area), delta formation is largely dictated by sea level (Shlemon and Begg 1975). During the last glacial maximum 15,000 years ago, global sea level was over 90 m lower than today. As the ice sheets began to melt, sea levels began to rise substantially between 15,000 and 11,000 BP, at a rate of 13 m every 1,000 years. This rate decreased to about 8 m every 1,000 years between 11,000 and 8,000 BP, at which point sea level rise slowed considerably. Between 6,000 BP and the present, sea level has risen at an average rate of a little over 1 m every 1,000 years. As the base level rises, river systems deposit material at higher elevations, essentially retreating or prograding.

Prior to 6,000 BP maximum lake levels may have been controlled by other geological factors (e.g., bedrock). Deltaic levee control of maximum lake stands may not have played a major role until the Middle or Late Holocene when sea levels began to stabilize and approach modern levels. Lake high stand shorelines were likely much lower for the majority of the Late Pleistocene and Early Holocene and probably well outside of the current project area. This hypothesis is supported by the Li et al. (2008b) analysis of tufas collected from 8 m AMSL, which did not begin accretion until approximately 5,000 BP, suggesting that deltaic controls may have started to play a role at this time. Interestingly, this is precisely when the modern Sacramento-San Joaquin Delta began to form (Shlemon and Begg 1975). Based on this evidence, and an apparently much lower height of Lake Cahuilla prior to 5,000 BP, it can be expected that pre-Middle Archaic sites related to the Lake Cahuilla shoreline will be absent from the project area.

Nonetheless, several potential problems exist with the Li et al. (2008a, 2008b) reporting, including only cursory treatment of the reservoir effect on alteration of 14C dates derived from the tufa, and no discussion of evidence for depositional hiatuses (i.e., lake recession) which should be readily evident in the higher elevation (8 m AMSL) tufa. Nonetheless, their initial findings are significant and have dramatic implications for understanding the nature and extent of the Late Pleistocene and Holocene Lake Cahuilla.

Regional climatic trends through the Late Pleistocene and Holocene are important to the current study because of effects at higher elevations and the production of material for alluvial fan deposition. Unlike many regions in the arid basin and range, we cannot use the record of Lake Cahuilla high and low stands as indicators of local environmental change. Lake fluctuations within the Salton Sea basin are primarily related to structural changes in the Lower Colorado delta, and the construction or breaching of a natural dike. These changes may or may not be environmentally dependent, and thus have little bearing on the timing of deposition-erosion cycles in the Yuha Desert. Instead, reliance must be on environmental fluctuation data from nearby regions, such as the Mojave, for the timing of these events (this completes the edited material from Data Request 112).

Paleoclimate

From the often snowy peak of Mt. San Gorgonio (11, 502 feet AMSL) to the below sea level depths of the Salton Sea basin (227 feet BMSL) less than 50 miles away, the physical extremes of the Salton Sea basin significantly influence the climate in the ALCIS. The mountain ranges surrounding the Salton Sea basin contribute to the creation of a variety of microclimates with the ALCIS, as they channel the winds from the Pacific Ocean and the Gulf of Baja California from the south and west, as well as the winds that enter the Coachella Valley from the north via Banning Pass.

The winds control the flow of moisture, and some of the areas of the Salton Sea basin receive less than 2 inches of rain per year, making them some of the driest locations in the Western Hemisphere. In the summer months, moist, warm tropical air moves from the Gulf of California and northern Mexico into the Colorado Desert with the Sonoran monsoon. From time to time, tropical cyclones develop over the northern Gulf of California, creating hurricane-strength winds and torrential rains. Although these force storms only reach the Salton Sea basin once every 5 to 10 years, they can drench the project area of analysis with 3 to 4 years' worth of average precipitation in just a few hours.

The Salton Sea basin is located at the intersection of the Mojave Desert to the north and the Sonoran Desert to the south and west. Both deserts are sparsely vegetated and both have experienced profound changes over the past 2 to 3 million years. During the Pleistocene geologic era, the world's climate oscillated between Ice Age conditions and warmer temperatures similar to the modern era; average temperatures were as much as 14.4°F cooler than today. Glaciers covered much of North America, and temperate forests extended far south of the present range. Warmer temperatures have been predominant for the past 10,000 years (the Holocene era), which encompassed all of the confirmed human occupation of the project area of analysis, and provided the initial natural and cultural setting that ultimately became the ALCIS.

The Sonoran Desert is a sub-tropical desert in the southern part of the ALCIS, and much of its moisture falls during the summer monsoon season (July to September). Rainfall varies from 4.7 to 11.8 inches each year, and average monthly temperatures range from 61° to 92°F. Nighttime and daytime temperatures vary during the summer with temperatures exceeding 100° F during the day and dropping to 65°F. During the winter, the variation from nighttime to daytime averages from 45°F to 70°F.

The Mojave Desert is less arid than the Sonoran Desert, but still receives very little rain. The Mojave is in the northern part of the ALCIS and has mountains of sufficient altitude that some of its annual moisture falls in the form of snow. Most locations in the Mojave receive less than 6 inches of rain per year, and in the heart of the desert the average falls from only 2 to 4 inches per year. Mojave Desert temperatures vary more than in the Sonoran Desert and winter temperatures often dip below freezing. Analysis of southeastern California packrat middens demonstrate that the Sonoran Desert was more humid 13,000 to 10,00 years ago (about the time of the beginning of human habitation) and average rainfall was almost 50% higher than it is today. Joshua trees, which no longer grow in the Sonoran Desert, are now found farther north in the Mojave Desert; by contrast, the habitat of the desert tortoise is shrinking toward the south. Currently, Joshua trees do not grow any closer than 60 to 90 miles northwest of the Salton Sea, but are still on the northern periphery of the ALCIS. Vegetation species that are typical of the eastern Sonora (such as creosote bush, brittlebush, and catclaw acacia) replaced other species some 9,000 to 10,000 years ago (Redland Institute 2008: 12–13).

Geology

With minimal updates and editorial contributions, the following subsection was adapted from URS (2008: Section 2.1) and emphasize the archaeological aspects of the geology of the project area.

The basement of the Salton Trough is composed of Late Cenozoic and older crystalline igneous and metamorphic rocks. Extensive studies by the USGS in Imperial County indicate that the sub-basement, or lower crust, beneath the axis of the Salton Trough, is composed of a mafic intrusive complex similar to oceanic middle crust (Fuis and Kohler 1984). Metavolcanics, quartz, and jasper were the principal stone types utilized by prehistoric residents, and many sources of raw material were found on the surface of desert pavement. Appropriate stone for manos and metates was found in the washes and streambeds, or carried in from the nearby mountains. Obsidian was traded in from nearby sources, as part of the project area of analysis and ALCIS network, but was always a minor element in any lithic assemblages. Overall, the lithic artifact needs of the prehistoric inhabitants of the ALCIS were met by materials from locally available sources.

Geomorphology

With minimal updates and editorial contributions, the following sections entitled Regional Setting, Geology of the Project Area, Geomorphology of the Project Area, Dating Alluvial Desert Deposits in the Project Area, Methods and Results, Sediments and Soils in the Project Area, Flora and Fauna, Climate, and Hydrology were adapted from URS (2008: Section 2.1) and emphasize the non-archaeological aspects of these themes.

It has been widely demonstrated that a significant period of alluvial fan deposition occurred in the Salton Sea basin and range during the Pleistocene-Holocene transition (McDonald et al. 2003:198). Within the Soda Mountains of the Mojave Desert, alluvial fan deposition resumed around 6,000 years ago, corresponding with a resurgence of Lake Mojave (Harvey and Wells 2003). Two later episodes of fan deposition occurred around 3,000 years ago, likely associated with changes in the North American Monsoon and an increase in effective moisture at the onset of the Late Holocene, and again during the past 1,000 years, possibly due to climate changes associated with the Medieval Climatic Anomaly. These periods of punctuated fan deposition correspond with those observed elsewhere in the region, and are assumed to have affected the Solar Two project area as well.

The Solar Two project area represents a microcosm of the geomorphic conditions that exist in the Yuha Desert. Pliocene and Pleistocene non-marine sedimentary rock outcrops are located along the southern boundary of the project area. These formations mantle the uplifted Pliocene marine outcrops, which form the Yuha Buttes, just south of the project area. The non-marine rock outcrops within the project area are heavily dissected (eroded) and mantled by Quaternary fan piedmonts. More recent fan aprons issue from the leading edge of these piedmonts and reach to the paleo-shoreline of

Lake Cahuilla, where various beach deposits are also located. As with most large alluvial fans, these Quaternary landforms are composed of numerous remnants and more recent deposits of varying ages. By examining the relationship between these landform components, relative age estimates can be developed, conclusions may be drawn as to the depositional history of that landform, and the potential of each landform to harbor buried paleosols of appropriate age can be determined.

Present Process Geomorphology

Note: With minimal updates and editorial contributions, the following subsection was adapted from URS (2008: Section 2.1).

The eastern half of the project area is drained by 3 deeply incised, intermittent, main drainages that flow generally north and east. These main drainages converge approximately 3 miles east of Plaster City. Topographic maps show this combined drainage ending less than a mile east of this convergence. The natural path of this drainage has been altered and stopped by the agricultural development of the area and the construction of the Foxglove Canal.

Analysis of aerial photographs east of the project area show evidence of the original water channels continuing east and eventually north toward the New River. However, the path of these drainages has been diverted and blocked by numerous canal systems including the Foxglove, Westside Main, Dixie, Fern, and Fig Canals. Historically, these drainages would have flowed directly into larger tributaries, including Coyote Wash, and all feed into the New River. The New River travels through the center of the Imperial Valley and drains into the Salton Sea, approximately 35 miles north of the project area.

In addition, berms that block natural drainages in the project area of analysis have been built to protect the Clean Harbor toxic waste disposal plant. The project area is also subject to short duration, intensive impact sheet wash during monsoon rains. Visual inspection of vertical profiles in numerous washes has not revealed any fault lines from the seismic activity in the Salton Sea basin.

Surface and Subsurface Hydrology

With minimal updates and editorial contributions, the following sections were adapted from URS (2008: Section 2.1).

Analysis of aerial photographs east of the project area show evidence of the original water channels continuing east and eventually north toward the New River. However, the path of these drainages has been diverted and blocked by numerous canal systems including the Foxglove, Westside Main, Dixie, Fern, and Fig Canals. Historically, these drainages would have flowed directly into larger tributaries, including Coyote Wash, and feed into the New River. The New River travels through the center of the Imperial Valley and drains into the Salton Sea, approximately 35 miles north of the project area.

Paleoecology

The project area of analysis is composed of multiple Life Zones whose animal and plant communities attracted and tempered the settlement and adaptations of a long sequence of prehistoric and historic populations. The Life Zones are (from the highest altitude to the lowest): Arctic/Alpine (10,000 feet and above), Canadian/Hudsonian (7,000 to 10,000 feet), Transition (5,000 to 7,000 feet), Upper Sonoran (3,300 to 5,000 feet), and Lower Sonoran (3,300 feet and below). Although some prehistoric and historic inhabitants of the ALCIS visited all of these Life Zones at one time or another, most settlement and subsistence activities were concentrated in the Transition, Upper Sonoran, and Lower Sonoran Zones, that is, between 5,000 feet and -227 feet in altitude (approximately a mile vertical distance).

The inhabitants of the project area of analysis lived primarily in the Lower Sonoran Life Zone, where fish, mesquite beans, and cactus fruit were available when the lake held water. During times when the lake was dry, settlement and subsistence were focused on the Upper Sonoran Life Zone. Edible varieties of agave cactus grow naturally on the rocky slopes of the Coachella Valley in the northern end of the ALCIS. Acorns and pinyon nuts were traded from Cahuilla bands of the mountains and passes of the Upper Sonoran Life Zone and Transition Life Zone, and mesquite beans were often received in return. Also, the *Diegueños* from the Pacific walked through and over the peninsular range to the desert to trade acorns for mesquite seeds and pods. There is no archaeological evidence that dried fish were traded beyond the immediate area (Redlands Institute 2008: 18-19).

Since Caldwell's initial application of the interaction sphere concept, it has been applied to a wide range of archaeological cultures. In a slight modification of Caldwell's original concept, Hayden and Schulting (1997:51) stated that "…the main factor responsible for the emergence of interaction spheres in transegalitarian societies is the development of an elite class. Elites who seek to maximize their power and wealth at the tribal level do so in part by establishing trading, marriage, ideological, military, and other ties to elites in other communities and regions. They use these ties to monopolize access to desirable regional prestige goods and to enhance their own socioeconomic positions."

Conforming with the expectations derived from this model, the data from Ancient Lake Cahuilla demonstrate that interaction sphere goods are predominantly subsistence prestige items (defined as foods that are not locally grown [seeds and beans] or produced [fish] and that had to be traded for) and that these subsistence goods were concentrated in the communities that had the greatest potential to produce surplus and to develop socioeconomic inequalities. While our traditional view of "elite" members of society tends to be more of chiefs sitting on thrones and those members of society with particularly well-developed artistic or religious abilities, elites can also obviously consist of those who control the subsistence network. These same features also seem to characterize well-known interaction spheres elsewhere in the world. In conceptualizing an elite for the subsistence-challenged ALCIS project area of analysis it is important to remember that the subsistence quest was paramount and that the leaders who built and controlled the fish traps would have to a certain extent controlled access to that resource, just as the owners of privately held groves of mesquite and oak would have controlled access to those resources; only the pinyon stands, somewhat more haphazard in their production, do not seem to have been controlled either by individuals or tribelets. Here we note that the pattern of distribution of natural subsistence resources on the landscape influenced human settlement patterns, subsistence practices, and patterns of trade and economic exchange.

The Ancient Lake Cahuilla culture area of desert North America fits the criteria of an interaction sphere, although as Hayden and Schulting noted (1997:51), understanding the general cultural dynamics responsible for the creation of interaction spheres has been poorly developed in archaeological and ethnological theory. In the case of Ancient Lake Cahuilla, the principal elements of the interaction sphere include fish traps, mesquite groves, pinyon groves, oak groves, agricultural products from the Colorado River, salt from the Gulf of California, the trail systems that connected the different resources areas, stone slab storage features, obsidian, traded ceramics, and marine shell. Ethnographically, it is well documented that the different bands of Cahuilla traded extensively across a multitude of life zones.

While the vast majority of archaeological sites in the project area of analysis have revealed neither non-local materials nor chronologically sensitive artifacts during previous and recent surveys, those that have, or have the potential to produce chronologically sensitive and non-local materials, may have participated in the interaction sphere in the past. Based on the ethnographic literature, the interaction sphere continued into at least the protohistoric period; and the ethnographic data also confirm that many of the materials that moved within the interaction sphere were perishable (such as animal and vegetal food stuffs, clothing, tools, and weapons), and this aspect of the cultural assemblage must be kept in mind when evaluating sites that although they have indications of having been semi-permanent settlements, are still devoid of non-local remains.

The project area and the project area of analysis are contributors to the ALCIS. While the primary emphasis is on the ALCIS as an archaeological concept and focuses on cultural features of the landscape, it also incorporates the natural history of the landscape and the historical dimensions of the interaction sphere. With the lake as a focal point, the spatial proximity of the different elements of a highly diverse topography and numerous life zones and climates that produced the mesquite beans, pinyon, nuts, acorns, fish, and riverine agricultural products integrates the cultural and natural interaction that existed. Although beyond the scope of this DEIS, a similar interaction sphere model might also be applicable to the Lake Elsinore region of Southern California.

Cultural Setting

Prehistoric Background

Contribution to the Ancient Lake Cahuilla Interaction Sphere

The Solar Two project area ranges from inside the high water mark (approximately 40 feet AMSL) of Ancient Lake Cahuilla on the east to the sandy desert on the west. For millennia, the alternating episodes of the filling and emptying of the lake have interacted with human settlement in the region. For thousands of years, the ancestors of the modern Native American inhabitants of the Colorado Desert and the Colorado River were drawn to the lake and its rich resources as it filled, and then driven from it to the surrounding area when it again emptied and became barren. Lake Cahuilla was created when the lower Colorado River shifted its course within its delta and instead of flowing directly south to the head of the Gulf of California, the river's waters were diverted northwest into the Salton Basin, the base of which lay about 80 m BMSL. With climatic conditions similar to those of today, two decades of uninterrupted river flow would have been required to fill the basin to 12 m amsl (Wilke 1978; Waters 1983; Schaefer and Laylander 2007). When the river once again shifted its course to the south, the isolated basin would have taken more than 5 decades to completely dry out. The former presence of a large lake in the Salton Basin was remembered in the oral traditions of the region's historic-period native inhabitants, the Cahuilla and the Kumeyaay (Wilke 1978). Research has established that there were not one but several different high stands of the lake, both prior to AD 1000 and after AD 1500, including a stand as late as the 17th century, when Spanish explorers had already reached the lower Colorado River although not entering the Salton Basin (Wilke 1978; Waters 1983; Laylander 1997). One of the more exciting tales from the early historic period deals with the "Lost Pearl Ship," which supposedly sailed, unawares, into the Salton Basin during a high flood period, but was unable to leave when the river shifted course once again.

A recent overview of the general project area by Schaefer and Laylander (2007) and a Class III Intensive Field Survey for Solar Two have both contributed to our knowledge of sectors of the Salton Sea/Ancient Lake Cahuilla region, in particular the lesser known southern and southwestern areas (Wilke 1978). As Schaefer and Laylander (2007:250–251) stated, the picture of settlement and subsistence patterns that is emerging for Ancient Lake Cahuilla is one of substantial variability. Settlement appears to have been the densest in the northwest part of the former lake in the area that is now the Coachella Valley. Relatively little is known of the southern part of the lake, both the "toe" that is across the border in Mexico and in the project area. Whereas V-shaped fish-traps and tabular sandstone oval/round storage structures have been observed and documented outside the project in landscape regions associated with Lake Cahuilla, none has been observed thus far within the Solar Two project area of analysis.

The project area and the project area of analysis are contributors to the ALCIS. While the primary emphasis is on the interaction sphere as an archaeological concept and focuses on cultural features of the landscape, the ALCIS also incorporates the natural history of the landscape and historical dimensions of the interaction sphere. With the lake as a focal point, the spatial proximity of the different elements of a highly diverse topography form numerous life zones and climates. The project area lands are currently administered by the BLM on behalf of the public.

As physical components of the ALCIS, archaeological research in the Solar Two project area has recorded the presence of ancient trails that extend almost from the eastern project boundary to the western boundary. Overall, these trails appear to connect local settlements with local resource areas and there is little evidence of interconnections with larger regional trail systems. However, Instrumental Neutron Activation Analysis (INAA) studies of southern California prehistoric ceramics obtained from sites along an east-west transect between the Colorado River and the Pacific Coast (Hildebrand et al. 2002:123) that passes through the southern part of the Lake Cahuilla basin and includes samples from the Dunaway Road Site, which is within the project area, shows the transport of Salton Brown ceramics from the Salton Trough to the mountains of the Peninsular Range.

The technical studies required by the BLM have resulted in the recording of more than 300 locations of prehistoric use and settlement. The locations that are still visible range from the sites of the short-term manufacture of stone tools to larger sites that were occupied for longer periods of time while seasonal natural resources were harvested. In general, the largest sites are those closest to the former lakeshore. Possible cremated human remains recorded in a number of locations are another indication of longer-term settlement in the project. Overall, the archaeological data from the project indicate that the prehistoric inhabitants were focused on exploiting local food resources and producing their tools from locally available materials. As stated before, the large V-shaped fish-traps for which the area is known do not occur in the project area, although a small portion of the ancient lakeshore is within the project area.

Introduction to Prehistory of the Colorado Desert

The project area is situated within the Colorado Desert in a region that had few archaeological investigations until the 1980s. As more extensive archaeological excavations are completed, a clearer picture of the cultural history of the Colorado Desert is beginning to emerge. As Schaefer and Laylander (2007) point out in a recent review of the prehistory of the Colorado Desert, the archaeology here is embedded in a larger context that includes the Mojave and Sonoran Deserts but that has its own distinct archaeological manifestations. Also, the course of prehistory in the area was influenced throughout the Holocene by the Colorado River as it periodically inundated the Salton Trough and created Lake Cahuilla (Weide 1976; Schaefer and Laylander 2007).

These events increased freshwater resources and created areas with a more fertile environment able to sustain larger populations. The most recent research indicates the existence of no fewer than 3 cycles of inundation and desiccation between AD 1200 and 1600 (Schaefer and Laylander 2007). The periods of inundation for Lake Cahuilla before this period are poorly known and, as noted above, innovative research by Li (2008a, 2008b) suggests that, in contrast to previous interpretations, the lake was never completely dry.

Malcolm Rogers conducted the most extensive archaeological survey and report of the Colorado Desert in the 1920s (Weide 1976). His theories on the periods for many of the sites he found are uncertain because most of the cultural material is non-stratified surface remains, and at that time the artifact chronology was in early stages of development (Rogers 1939). Several sites recorded have no artifact assemblage associated with them; they are merely cleared circles of about 6 feet in diameter and are sometimes defined by a low wall around the perimeter. Rogers interpreted these sites as “temporary bedding platforms.” These bedding platform features and other sites containing artifact assemblages of heavily patinated crude tools were the basis of Rogers’s suggestion that they were associated with a pre-projectile point culture (Pre-Paleoindian period). The absence of dateable material makes this hypothesis inconclusive.

Aside from the disputed Pre-Paleoindian period, archaeological research in southern California over the past century has resulted in the development of a temporal scheme for regional prehistory that is generally accepted by the archaeological community (Moratto 1984). The temporal periods include the Paleoindian period, 12,000 to 7,000 BP; the Archaic period, beginning between 8,000 and 7,000 years before present (YBP); and (transitioning to) the Late Prehistoric period at approximately 3,000 BP.

Most local chronologies invoke an Intermediate Period between the Archaic and Late Prehistoric. The literature referenced for this report has not clearly defined this Intermediate Period, other than it is a period between 500 BC to 500 AD (Justice 2002). A discussion of time and culture (Justice 2002) in the Southwestern United States presents the Intermediate Period as a time period which witnesses the emergence of agricultural communities in the Southwest, and at the time of Basketmaker. Although specific dates are given, the beginning and end dates for each period are not static because technological innovations occurred at different times within this region. For example, the introduction of the bow and arrow closely coincided with the introduction of pottery, but their introduction does not appear to have occurred simultaneously throughout the region (Moratto 1984).

Prehistoric site types common to the project area include (from most to least complex): open camps, with a variety of artifact classes (chipped stone, ground stone, and ceramics) and sometimes features; lithic scatters, with varying frequencies of cores, core tools, flakes, flake tools, and hammerstones; and trails, linear features with or without associated artifacts. To this basic site typology can be added isolated artifacts, which are most valuable in the aggregate. In the absence of chronometric age estimates and/or temporally diagnostic artifacts (e.g., projectile points and ceramics), assigning an age range to each of these loci of human activity is difficult and, oftentimes, impossible. The problem is exacerbated by the fact that many sites are probably palimpsests; that is, dense mixtures of occupational debris scattered over a large area, created through constant use or repeated seasonal use of a location. Thus, artifacts from late occupations may be conflated (through natural or cultural factors) with artifacts from earlier occupations, making it difficult to "tease apart" the multiple strands of human occupation and activity.

Paleoindian Period "San Dieguito" (12,000 to 7,000 YBP)

San Dieguito is the earliest established and dated period for the Colorado Desert region (Weide 1976). The start of the Paleoindian period is marked by increased rainfall and cooler temperatures that resulted in the formation of deep pluvial lakes and marshes even in interior desert regions and offered a multitude of subsistence options. Although temperatures warmed and the lakes began to recede around 11,000 YBP (Moratto 1984), the recession was so gradual that the pluvial lake environment was still in existence for several millennia.

These cultural patterns composed the Western Pluvial Lakes Tradition, which included developing methods of procuring foods and materials based on the plants and animals that lived around the lakes (Moratto 1984). Marshes in particular offered a variety of plants with edible seeds, roots, and stems. This habitat provided frogs, turtles, fish, and water rats and attracted ducks and other waterfowl, which were good for meat and eggs. Sites located adjacent to the west and south of the former shore of Lake Cahuilla reveal that these people had developed a flaked-stone industry with an extensive number of tool forms, including ovate bifaces, chipped stone crescents (called amulets by Rogers), drills, cleavers, pulping planes, and keeled scrapers (Rogers 1939). Milling tools are conspicuously absent from these sites, implying that hard seeds were not included in the diet (Moratto 1984).

Curiously, the evidence for human presence in the Colorado Desert in the Late Pleistocene and Early Holocene is scarce. This lack of evidence is in marked contrast to well documented occupations in the surrounding regions of the Mojave Desert and coastal southern California (Schaefer and Laylander 2007). Circumstance such as the ephemeral nature of settlement during the period, the instability of landforms, or sampling bias of research locations may explain this lack of evidence rather than an actual gap in occupation.

As noted above, locating Paleoindian period sites in the project area is particularly problematic because few large mammals were hunted in the Yuha desert or the Salton Basin and there are few opportunities to identify the by-products of the manufacture, discard, loss, or prehistoric curation of the archetypal projectile points that are characteristic of this period. Furthermore, it has oft been stated that heavily patinated artifacts found in desert environments are indicative of greater age, but patination is the product of a complex interaction of natural and cultural factors, the interpretations of which are often subjective and idiosyncratic. One can be confident, however, that heavily patinated artifacts are most likely older than less patinated and unpatinated artifacts, if one is so lucky to have such gradations of artifacts present in an assemblage. Thus, sites without diagnostic artifacts can only be categorized as of unknown age.

In an effort to define and delimit extensive scatters of undated lithic artifacts in the Yuha Desert, situated immediately south of the project area, the BLM El Centro Resource Area nominated in 1981 the Yuha Basin Discontiguous District (District) for listing in the National Register of Historic Places (Welch 1983). They described the district as four separate, but archaeologically related areas that share common features and create a unified whole. Most of the sites are classified as surface lithic scatters on a stable desert pavement surface that define “concentrated Paleoindian cultural resources.” (Welch 1983). The sites in each area are generally composed of large percussion flaked bifaces and bifacially flaked cobbles, and resultant debris (i.e., flakes), without pottery and sometimes with features, which are ascribed to the Paleoindian San Dieguito cultural tradition (Welch 1983). Many of the artifacts are heavily patinated, which some archaeologists believe reflects long exposure to weathering, but that interpretation is by no means universally accepted. Associated features include cairns, cleared circles, rock alignments, and trails. These sites are predominantly located on terrace remnants and residual ridges, overlooking drainages and the former basin of Lake Cahuilla. It has been interpreted that San Dieguito people followed a generalized hunting and gathering pattern of settlement and subsistence, with an emphasis upon hunting.

More direct, and seemingly more definitive, evidence of Paleoindian occupation was documented by the Yuha burial (4-IMP-115) located south of the project area. This burial consisted of a nearly complete skeleton encased within a large rock cairn (Chartkoff and Chartkoff 1984: 56). A radiocarbon age estimate of 21,500 ± 2,000 years BP and 22,000 ± 400 years BP were obtained on caliche that encrusted the human bone (von Werlhof and von Werlhof 1977). Most archaeologists judge this date to be unreliable, however. Moreover, the burial style is unlike any other known Paleoindian burials and similar to more recent styles (Chartkoff and Chartkoff 1984: 56).

Thus, unambiguous evidence of Paleoindian occupations in the project area has not yet been found. It will take more data, particularly from chronometrically dated contexts or in association with diagnostic artifacts, to resolve the uncertainty.

Archaic Period (7,000 to 3,000 YBP)

Evidence for Archaic Period sites is nearly as scanty as that for Paleoindian in the project area. Again, in the absence of chronometrically datable materials, temporally diagnostic artifacts distinguish the occupational period. Pinto series (stemmed indented) projectile points define the Early Archaic, while Elko (corner-notched and side-notched) and Gypsum (contracting stem) points represent the later Archaic Periods (Apple et al. 1997: 2–19). Groundstone artifacts are also common on Archaic sites in the area, especially on open camps, which are mostly located in the transitional zone between and within the Fan Apron landforms in the central portion of the project area and the Beach Zone.

Some sites in the project area contain *Olivella spp.* shell beads, but are probably related to more recent occupation of the project area. If Middle and Late Archaic sites are located in the project area, they are most likely buried and located within the Fan Apron landforms in the central portion of the project area and the Beach Zone.

With an increase in temperature and the evaporation of the pluvial lakes during the early Holocene, it is believed that the population of the Colorado Desert likely dropped. The number of archaeological sites that have been found to date from this period continues to be limited, and dating for these sites is questionable.

A few Pinto-like points have been found in the Colorado Desert, such as one at the Split Mountain Sand Dune site. Because the stratum where the point was recovered was radiocarbon-dated to 770 YBP, the point likely represents reuse by a later cultural group rather than the presence of Pinto cultural group. A substantial study from this period comes from the Indian Hill rock shelter (CA-SDI-2537). This study seems to indicate a fairly stable use of the site with cached resources used on seasonal visits (McDonald 1992). Similar slab-lined pits have been found in a rock shelter near Palm Springs (CA-RIV-45), which may suggest logistical foraging by mobile groups (Bean et al. 1995).

Pinto points have also been recorded at sites located along relict terraces of Ancient Lake Cahuilla. These sites indicate that the lake may have refilled temporarily during this period (Weide 1976) The presence of these sites, the Truckhaven Man burial (radiocarbon date of 5,840 YBP), and a quartz point of unspecified type from a stratum radiocarbon-dated at 4,980 YBP (Weide 1976) suggest that the Colorado Desert region was not entirely unoccupied during the early and middle portions of the Archaic Period; people may have been present only on a seasonal basis because of lack of resources (Fagan 2003). As the presence or absence of Lake Cahuilla is not well known from this period, the scarcity of sites may indicate that the Salton Trough was generally dry (Schaefer and Laylander 2007).

The evaporation of the Lake Cahuilla lakes also caused a shift in flora to plants adapted to arid climates. The hard seeds of mesquite (*Prosopis juliflora*) and screwbean (*Prosopis pubscens*) and foods from other desert-adapted plants, such as various types of cactus and agaves, became staples of the Native American diet (Barker 1976).

Groundstone tools, including manos, metates, mortars, and pestles, were developed to aid in the processing of these new foods, and are commonly found in artifact assemblages throughout the Mojave and Colorado deserts (Moratto 1984). In addition to stone tools, people of the Colorado Desert may have made wooden milling utensils and other artifacts of organic materials that are usually not preserved in the archaeological record. Ethnographic records show use of wooden mortars and pestles, items such as hooked sticks for shaking mesquite pods down from trees, nets in which to collect cactus and then beat against the ground to remove the needles, digging sticks for excavating rodents from burrows or digging up plants, and throwing sticks for hunting hare and other small game (Barker 1976). These tool types likely persisted for millennia with little change in technology or style.

Recently, a number of late Archaic sites have been documented from the northern Coachella Valley (Love and Dahdul 2002). These sites show evidence of substantial occupation, with deeply buried midden deposits containing clay-lined features, cremations, hearths, and living surfaces. These sites contain milling equipment and the faunal assemblage is dominated by lagomorphs. These sites suggest a more sustained settlement type than previously known for the Archaic Period in the area and are likely related to highstands of Lake Cahuilla.

Late Prehistoric Period (3,000 YBP to European Contact–AD 1769)

Evidence from recent archaeological investigations at late prehistoric sites along the Lake Cahuilla shoreline indicate 3 cycles of inundation and evaporation over the next 400 years (Schaefer and Laylander 2007). Recent studies by Li et al. (2008a, 2008b), however, indicate that these periods of evaporation may have been only partial and that some water always remained in the basin. Prehistoric fish traps of linear cobble arrangements (Fagan 2003), and shallow excavated pits, measuring approximately 3 m wide by 1 m deep (Singer 2008), are visible in some locations arranged in linear fashion, and marking the retreating shoreline of Lake Cahuilla.

The insertion, expansion, and retreat of this large body of water in the midst of a very arid region had profound consequences for the prehistoric occupation of the region (Schaefer and Laylander 2007).

Recent research shows that around AD 1200, the Colorado River shifted course and refilled Lake Cahuilla (Schaefer and Laylander 2007). This refilled lake provided a stable year-round water supply in the Colorado Desert. People began to repopulate the Colorado Desert, some following the river on its route from the Colorado River Valley and some attracted from the Mojave Desert or the mountain ranges to the west (Moratto 1984; Weide 1976). Ceramic wares, which had been introduced centuries before in other areas, were brought into this region with the influx of people. Beginning around AD 870, Patayan I ceramic types such as Colorado Beige, Colorado Red, and Black Mesa Buff appear on the shoreline of Lake Cahuilla (Schaefer and Laylander 2007). The Lower Colorado Buff wares, in common use since AD 800, show new attributes around AD 1050, such as stucco finishes, recurved jar rims, and tab handles on scoops. These attributes aid archaeologists in dating sites that appear in the area (Moratto 1984).

Late period assemblages beginning circa AD 1250 are typified by the profusion of the Desert side-notched and Cottonwood arrow points, which replace the larger projectile point traditions of earlier eras (Jones et al. 2007). These smaller points indicate the introduction of the bow and arrow and the replacement of the atlatl (Moratto 1984). These projectile point types are common throughout California during this period and into the historic period (Justice 2002).

People began to occupy permanent settlements and exploit different food sources at different times of the year because enough resources were present to provide year-round sustenance. Evidence for these settlements can be seen in coprolite analyses, which reveal the remains of plant and animal foods available during different seasons (Moratto 1984). Trade networks between coastal peoples and the occupants of the desert interior began to develop around AD 1000. This development is apparent in the archaeological record by the exponential increase in shell beads within Colorado Desert sites (Fagan 2003).

Around AD 1400, the course of the Colorado River shifted eastward, and as Lake Cahuilla gradually dried up, native peoples were confined to a decreasing fertile area (Moratto 1984). As the lake receded, surrounding areas experienced an increase in occupation as the population shifted to more abundant lands, such as the Colorado River Valley and mountains to the west of the Salton Trough (Weide 1976; Moratto 1984). People persevered in this desert environment, as evidenced in a series of stone-lined fish traps marking the progress of the receding waterline (Moratto 1984). As subsistence resources disappeared along with the lake, people also attempted to rely on limited agriculture. As the aridity increased, the local inhabitants expanded their utilization of the resource base to include several hundred plants for food manufacture and medicine (Fagan 2003). Evidence of water control techniques, such as the use of wells and springs for irrigation and the construction of reservoirs and ditches, is apparent (Weide 1976).

Materials used in projectile point production include chalcedony, chert, quartzite, quartz, fine-grained basalt, andesite, and obsidian. Isotropic materials such as obsidian were preferred sources for projectile points, and the receding shoreline of Lake Cahuilla exposed an ideal obsidian source, Obsidian Butte, which is located between 131 feet AMSL and 230 feet BMSL at the southern end of the Salton Sea. This lithic source was exposed intermittently during the Late Prehistoric period and subsequently exploited for use in flaked stone tool manufacture. Although a local source of obsidian was available, its application to tool manufacture was supplementary and accounts for no more than 10% of debitage assemblages from montane and coastal southern California. Obsidian hydration dates for the source range from AD 1200 to 1800 (Laylander 1997).

Ethnographic Background

With minimal updates and editorial contributions, the following text was adapted from URS (2008: Section 2.1).

Across the local landscape, prehistoric settlement and subsistence patterns are evident in the archaeological record. Potential traditional use areas have been identified north, northeast, and south of the proposed project area. The project area is surrounded to the west by Fish Creek and the Coyote Mountains, to the northeast by the Superstition

Mountain Range, to the east by the Chocolate Mountains and Indian Pass, and to the south by Mount Signal. All these landforms are associated with archaeological deposits and were dominant geographic elements of the prehistoric landscape. Several significant geoglyphs related to Yuman origin stories have been recorded south of the project area. The project area has the potential for a unique archaeological signature and a signature related to the established archaeological district. Love and Dahdul (2002) describe archaeological deposits similar to the deposits in the project area in their article that focuses on sites identified south of Palm Springs and north of Coachella located on the northern extent of the high water mark of Lake Cahuilla.

Kroeber's 1925 inventory of California Indian groups found that the Salton Trough was occupied at least intermittently by the Kamia (Heizer 1966), a band that has been more recently linked to the Ipai and Tipai tribes. The bands shared the Tipai language, classified in the Yuman language family, Hokan stock (Luomala 1978). Together, the Ipai and Tipai ranged from the Colorado Desert to the coast, and along the coast from Agua Hedionda past the Todos Santos Bay (Luomala 1978). The Tipai were thought to have lived along the coast and in the mountains for millennia before migrating east into the Mojave Desert and south along the Colorado River around AD 1000; eventually Tipai people moved farther into the Colorado Desert, including around Lake Cahuilla (Luomala 1978). As Lake Cahuilla receded, some Tipai migrated back to the mountains and others relocated to the banks of the New River and the Alamo River.

The Kamia band occupied a small area of the Ipai/Tipai area and was found primarily in Imperial Valley (Gifford 1931). Heintzelman recorded a population of 254 Kamia living along the banks of the New River in 1849 (Barker 1976). The Southern Diegueño (an older ethnographic designation for groups that today are variously called Ipai, Tipai and Kumeyaay) occupied the peninsular ranges to the west of the Colorado Desert, and the Kamia kept in close contact with this group, though they spoke different dialects and had different social structures and subsistence collection methods (Barker 1976). The Kamia would frequently exchange agricultural produce with their Southern Diegueño neighbors for gathered food staples abundant at higher elevations, such as acorns, dried cakes of mescal, and piñon nuts (Gifford 1931; Barker 1976). Interaction between the Kamia and the Southern Diegueño was so extensive that Gifford had difficulty defining a territorial boundary between the two (Gifford 1931).

As another manifestation of the continuity of the ALCIS into the historic period, the Kamia apparently also had strong relationships with another group of Yuman speakers, the Quechan tribe to the east, who occupied the Colorado River Valley (Luomala 1978). The two tribes were so familiar with each other that it was reported in 1849 that the "Grand Chief of the Cuchans" (Quechan) was a Kamia and born in a New River settlement (Gifford 1931). The two tribes shared many traits, including the practice of agriculture, and frequently were allied in battle (Gifford 1931). As with the Southern Diegueño, friendly relations made territorial boundaries between the Quechan and the Kamia difficult to ascertain, and Gifford even records Kamia living in Quechan territory, on the west bank of the Colorado River (Gifford 1931).

Some overlapping of territory may also have occurred with the Cahuilla, whose boundaries lay close to the north, extending from the Salton Trough up to the San Bernardino Mountains (Bean 1978). No record of interaction with the Kamia exists; the

Cahuilla preferred to trade and intermarry among tribes more closely related to their own language and culture, such as the Gabrielino, found along the coast near present-day Los Angeles (Bean 1978). Their language belongs to the Cupan subgroup of the Takic family of Uto-Aztecan stock (Bean 1978). Because the environment of the Cahuilla was similar to that of the Kamia, subsistence tactics were essentially the same for both, though the Cahuilla relied less on agriculture (Bean 1978).

Although European contact with the Tipai occurred with the arrival of the Spanish in 1540 (Luomala 1978), the inland band of Kamia may not have encountered colonists until 1769. It was at this time that the Spanish took an interest in inland routes and Gaspar de Portolá, governor of the Spanish territory Las Californias, led an expedition through Mexico and across the Colorado Desert region to San Diego (Chartkoff and Chartkoff 1984). Still, even before this time, the effects of the contact on the coast rippled through native settlements, resulting in population drops even among the interior tribes due the introduction of new European pathogens (Cook 1978).

The Kamia band of Tipai were a semi-sedentary people who, in contrast with the rest of the Tipai, practiced horticulture during summer months, after the floods of the Colorado River had peaked (Luomala 1978; Barker 1976). Crops such as maize (*Zea mays*), tepary beans (*Phaseolusacutifolius* var.*latifolius*), and several species of gourds and melons were grown, as were cowpeas (*Vigna sinensis*), which had been introduced by the Spanish (Barker 1976). Irrigation canals were typically not used in most areas, with the exception of the Jacumba Valley, but occasionally sloughs were dammed to thoroughly soak an area before planting (Gifford 1931). Agricultural practices were supplemented by gathering wild plant foods, with a particular reliance on mesquite and screwbean (Barker 1976). They also practiced hunting rabbits, deer, sheep, and small mammals, and fishing in sloughs around the New River (Barker 1976). The last Kamia chief died in 1905 and was not replaced because the population was too scattered (Barker 1976).

Diegueño ceramics were created with the paddle-and-anvil technique. The clay was ground and no temper was added. Included in the Diegueño ceramic assemblage are ollas, bowls, pots used for cooking, and pipes. Of notable interest are the large storage ollas, reaching 33 inches in height, which served as granaries and were “highly valued by their owners, who made every effort to preserve them and keep them serviceable” (Rogers 1973:18). Only a small percentage of ceramics created by the Diegueño was painted or incised. Group interaction involving ceremonies, dances, and gambling games were also a large part of Diegueño life. In fact, Diegueño ties with the Kamia were so strong it was common for them to travel to Kamia territory during the winter months to enjoy the warmer temperatures and the produce farmed by the Kamia (Gifford 1931).

The Kamia created pottery using the paddle-and-anvil technique and, according to Rogers (1973), produced the greatest variety of ceramics among Yuman bands. Included in the assemblage were ollas, jars, canteens, bowls, rattles, plates, scoops, cups, and parchers, remnants of which are identifiable within the project area. They also created small figurines with “coffee bean” shaped eyes, which were also traded with other bands and miniature vessels that Gena Van Camp, author of "Kumeyaay Pottery,” believes were potential funeral offerings (Van Camp 1979:57). Clay for ceramics was obtained from old lakebed deposits in the central region of the Colorado Desert. Some Kamia ceramics had a small amount of crushed rose quartz added to the temper, while others contained very fine inclusions. The surface color of the ceramics varies from pink, to buff, to an "oyster white" (Rogers 1973). After firing, designs were painted with red and/or black designs. The coloring was obtained from red ochre and boiled mesquite bark (Gifford 1931).

As noted above, new studies of the ceramics produced in the project area of analysis (Hildebrand et al. 2002) has brought a new perspective, solidly based on chemical analyses of the clays used to produce the ceramics and the ceramics themselves, to the protohistoric and historic production and distribution of the ceramics found at sites in the project area.

The Cahuilla oral traditions include numerous accounts of the existence of a lake in the Salton Sea basin. William P. Blake was the first European to document these traditions in the mid-19th century. The Cahuilla had limited contact with the Kamia. The linguistic and cultural differences between the tribes were enough to limit the communication between the tribes. Though these cultures existed adjacent to each other and the Ancient Lakeshore, it is possible that variations in settlement and subsistence practices can be identified. Modern research conducted along the receding Lake Cahuilla shoreline has exposed extensive cultural deposits associated with a lacustrine environment (Apple 1997).

The Quechan lived in a series of settlements called *Rancherias,* which were scattered along the banks of the Colorado River. These settlements were moved seasonally, as the Colorado River would typically flood during the spring and then recede during the winter. The Quechan were primarily agriculturists, growing crops of maize, squash, and beans. After the European invasion, they also grew a variety of melons, wheat, and black-eyed peas. They supplemented their diet by gathering wild plants such as mesquite and screw bean pods, and it is important to remember that mesquite groves were privately owned. Fish from both the Colorado and Gila Rivers was also a staple of the Quechan diet, but hunting was relatively unsuccessful due to the harsh desert climate (Bee 1983:10). The Quechan used a variety of nets and fish traps, along with cactus spine hooks and the bow and arrow, to fish during the spring and fall months when the fish were most plentiful (McGuire 1982).

The lower Colorado River tribes were organized militarily and warfare played a significant role in Quechan life. The Cocopah and the Maricopa were enemies of the Quechan. The Quechan would join their Mohave neighbors to the north and strike out against their collective enemies (Bee 1983:93). The Quechan most likely acted as "middlemen" who extracted a portion of trade goods in exchange for safe passage through pre-contact trade routes at the Colorado River crossing. After European contact, this role may have increased conflict with the Spanish and other tribes, as trade with the Spanish became an economic factor.

The Quechan created pottery using the paddle-and-anvil technique and "had a long pottery tradition inherited from the Patayan" (Moratto 1984). "They made large storage vessels capable of floating food and goods across the Colorado River" (Hayes and Blom 2006:138). Other types of ceramics made by the Quechan included bowls, parchers, cooking pots, small figurines, and a “rare floating bowl” that was used by women to hold perishables and infants, which could be pushed ahead as they swam through the river (Campbell 1999). These ceramics were also included in the study by Hildebrand et al. (2002) and demonstrated transport of Colorado River ceramics as far west as the Peninsular Range, almost certainly passing through the project area, around the southern shore of the lake.

The Cocopah, also part of the Yuman language family, occupied an area along the lower Colorado River and its delta, south of the Quechan and extending into northwestern Mexico (Alvarez de Williams 1983:99). Their habitat was somewhat unique, as the summer floods from the Colorado River would “convert the delta region into a land rich in flora and fauna” (Alvarez de Williams 1983:99). The Cocopah were semi-nomadic, hunter-gatherers who also used the delta region of the lower Colorado River to farm crops including beans, squash, and maize.

They supplemented their crops with wild plants such as mesquite, screw bean pods, cattail reed pollen, and tule roots. Game was plentiful and the Cocopah hunted deer, wild boar, rabbits, wood rats, and beavers. They fished in the rivers using nets made from plant fibers, basketry traps, spears, and, at times, the bow and arrow.

Warfare was part of Cocopah life. As previously noted, the Quechan were one of their enemies. However, unlike the Quechan, the Cocopah had a vast array of weapons, which included hardwood daggers, wooden war clubs, spears, and bows and arrows. Cocopah bows were typically 5 feet or more in length, painted, and the bowstring was made of 3-ply, plant fibers or sinew. Arrows were made from cane or arrow weed and at times were gall-tipped for poison (Alvarez de Williams 1983:107).

The Cocopah were introduced to pottery manufacturing around AD 700 and became very skilled at creating ceramics. They created a variety of vessels used for storage and cooking using the paddle-and-anvil technique. Clay was ground and winnowed, then a temper of ground sherds was added. Firing was done in a shallow pit or open area using mesquite chips, dung, or arrow wood for fuel. The Cocopah also used stone and clamshell knives, stone metates and manos, awls made from wood and bone, and canteens made from gourd or clay for travel (Alvarez de Williams 1983:106).

Occupation of permanent settlements and exploitation of different food sources at different times of the year occurred when enough resources were present to provide year-round subsistence. Evidence for these settlement patterns can be seen in coprolite analyses, which reveal the remains of plant and animal foods available during different seasons (Wilkie 1976, 1978). Trade networks between coastal peoples and the occupants of the desert interior began to develop around AD 1000. This development is apparent in the archaeological record by the exponential increase in shell beads within Colorado Desert sites (Fagan 2003; Becker and Altschul 2008).

Late period assemblages, beginning circa AD 1250, are typified by the profusion of the Desert Side-notched and Cottonwood arrow points, which replace the larger projectile point traditions of earlier eras (Jones et al. 2007). These projectile point types are common throughout California during this period and into the historic period (Justice 2002).

The ethnographic literature establishes that all Native American tribes associated with the project area cremated their dead. All of the tribes used trails for transportation and exploited the environment similarly. Although each group had a specific approach to creating ceramics, these items were traded, along with shells and localized meats and vegetables. Data gathered on the ceramics in the project area show evidence of a variety of ceramic types such as Tizon Brownware and Colorado Buffware. Prehistoric trade networks and trails in the project area may have ultimately brought much of the surface deposits to the project area. Other evidence infers the ritual, domestic and economic use of the project area. Quartz smashes, killed metates, and other unique items observed in proximity to cremations all are indicators of ritual and ceremonial use of the project area. Trails represent both economic (trade routes) and transportation, and are associated with ritual activities. Open camp sites containing hearth features, groundstone, ceramics, and lithic tools represent domestic use, subsistence procurement and processing activities, and settlement patterns in the project area. It is unlikely that surface evidence would directly relate the project area to a particular tribe. Currently, it appears that the project area was exploited primarily by the Kamia and Kumeyaay.

The Kamia and Diegueño occupied the project area during the late prehistoric period. Evidence of that occupation is reflected in artifacts, features, and sites recorded in the project area. Survey crews recorded cremation sites in context with what appears to be Kamia-made ceramics, open camps, and “killed metates.” Evidence of migration and/or trade is reflected in the artifacts recorded in the project area, such as a large stone pestle used for high elevation plant processing. Although fish traps are absent, it is possible to infer that the Kamia were exploiting the lacustrine environment. Survey crews recorded possible elements of Kamia culture such as ceramics and cremations, in association with fish bones, at Temporary Site Number EBR-019. Colorado Buffware ceramics observed on this site generally date from 1500 to post AD 1800. Subsurface investigations of Temporary Site Number EBR-019 could provide additional information related to subsistence and settlement patterns of the Kamia and Diegueño.

The frequency and complexity of sites recorded in the project area increase relative to the proximity of the prehistoric Lake Cahuilla shoreline. This pattern may signify the increasing complexities of societies in direct relation to the presence of Lake Cahuilla. It is not possible, based on the surface deposits alone, to determine cultural distinctions or interpret specific subsistence and settlement patterns related to the environment created when Ancient Lake Cahuilla was at the maximum high water mark.

Historic Background

(With minimal updates and editorial contributions, the following text was adapted from URS response to Data Request 124 from Energy Commission Staff.)

Spanish Period (1540 to 1821)

The Spanish Period describes nearly three centuries of Spanish exploration and settlement in the northern Sonoran Desert portion of New Spain, beginning with the 1542 expedition of Juan Rodriguez Cabrillo and ending with the Treaty of Córdoba that established Mexican independence. The period is dominated by Spanish attempts to link their territories in Mexico and New Mexico with their outposts in California and protect their possessions from encroachment by other world powers, such as Britain and Russia. Several expeditions were sent out, especially toward the end of the 18th century, to develop a trail system connecting Sonora to California. One of these expeditions, led by Captain Juan Bautista de Anza, set out in 1774 from the mission in Tubac, south of present-day Tucson, Arizona, to find an appropriate overland route to the mission at San Diego along coastal California. Traveling with a group of soldiers and two Franciscan friars, Anza arrived in February 1774 at the confluence of the Gila and Colorado rivers, where they encountered a party of Yuma Indians, who they described as welcoming and peaceful. They spent a night at another Yuma village and continued the next day across the present-day U.S./Mexico border, arriving at a water storage basin known today as Laguna Maqauta, where they were greeted by an even larger party of Yuma. Admiring the people immensely, Anza described them and their elaborate hair styles in his diary. In March 1774, the Anza party camped southwest of the Yuha Well. They continued from there, eventually reaching the San Gabriel Mission on the coast in March 1774. Several years later, the Yuma Indians reacted to ill treatment by the Spanish and attacked villages established by the Spanish along the Colorado River, killing many of the settlers, including one of the friars who had traveled with the Anza expedition. By the close of the 18th century, no reliable overland route to the settlements along the Pacific coast had been established, and the Spanish continued to rely on sea-going vessels to supply those settlements.

The northern Sonoran Desert was rarely visited by Europeans until the intensive settlement of the 20th century because of the desert's remoteness and nearly waterless environment. One early European explorer of the region was Hernando de Alarcon, believed to be the first Spanish explorer to see the Colorado River in the 1540s. Spanish explorers would visit the desert region over 200 years later as they attempted to locate a more direct travel route between their older and well-established missions in Sonora and New Mexico and the missions of San Diego, San Gabriel, and Monterey. The latter missions were all located along coastal Alta California (northern California) and were on the frontier with Russian fur trappers, who were moving south along the Pacific coast. Thus, as Weber (1992) points out, "the success or failure of New California as a bastion against Russian expansion seemed to depend on the rapid delivery of reinforcements, food, and supplies."

Spanish officials and clerics in California made many attempts during the mid-18th century to establish a reliable supply network. Antonio María de Bucareli, at the urging of Father Junípero Serra, enlisted the aid of the Sonoran frontier officer Captain Juan Bautista de Anza in 1773 to find an appropriate overland route from Sonora to San Diego and on to Monterey. Along with the overland route, a sea venture was also formulated with the effect that both the sea and land routes would send a message to the Russians that Alta California belonged to Spain. Anza acquired the assistance of a small group of soldiers and two Franciscan friars, one of whom was Francisco Garcés, who made the trip through the lower Colorado Desert several times. The Anza-Garcés journey began in 1774 at the mission in Tubac, south of present day Tucson, Arizona. It proceeded south to Altar in the state of Sonora, Mexico, and one month later arrived at the junction of the Gila and Colorado rivers. Two Anza-Garces campsites have been located in the project area of analysis; one of these is north of the project area and one is south.

The corridor that makes up the Juan Bautista de Anza National Historic Trail is a 2.5-mile wide linear alignment that runs south-north through the project area. According to the National Park Service (NPS), the trail approaches the project area from the south, running past Mount Signal until it comes to Yuha Well (both of these areas are south of the project area boundary). The corridor continues north into the project area and passes generally through the Plaster City area, continuing north to the San Sebastian Marsh where the corridor turns west and into the mountains. In 1996, the NPS published the Comprehensive Management and Use Plan and Final Environmental Impact Statement: Juan Bautista de Anza National Historic Trail. Within this document was a summary of the key stops and camping sites the expedition used. The plan lists four sites in Imperial Valley (Mission Purísima Conception; Expedition Camp #42: Pilot Knob; Expedition Camp #47: Wells of Santa Rosa/Yuha Well, and Expedition Camp #49: San Sebastian Marsh/San Felipe Creek). None of these sites fall within the project area. Camp #47 sits just south of the project area boundary, while Camp #49 is located several miles north (http://www.nps.gov/archive/juba/plan/appendB.htm). Within the project area, it is known that the expedition camped in or near Arroyo Seco in the vicinity of the present-day Plaster City OHV area (http://www.solideas.com/DeAnza/TrailGuide/Imperial/index.html).

No archaeological evidence of the Anza expedition was located during the survey to date. The transitory nature of the expedition, along with the harsh environment that the group passed through, ensured that few physical traces remain. As the 1996 NPS plan notes: “Little historic fabric remains from 1775–76. Even the missions which Anza visited have changed, for they were temporary structures at the time of his visits” (http://www.nps.gov/archive/juba/plan/environment.htm). The expedition was often guided by indigenous tribal members and used established Native American trails, paths, or sites (such as villages). Some Native American sites such as Yuha Well (to the south of the project area) have been surveyed and recorded. It is not known if any archaeological sites directly related to the Anza expedition have been found anywhere along the length of the trail (in Mexico, Arizona, or California). The modern version of the Anza “trail” that runs through the project area is a 2.5-mile wide corridor that follows the rough path of the expedition and it is known that the Anza party stopped at Camp 47 (Yuha Well, south of the project area), before crossing the project area and spending a night at Camp 48, located somewhere near present day Plaster City, and then continuing on to Camp #49: San Sebastian Marsh/San Felipe Creek (north of the project area). The historic corridor is crossed and paralleled by two designated driving routes, BLM Roads 274 and 243, both having the symbol of the Juan Bautista de Anza National Historic Trail emblazoned on road signs.

By early 1774, the Anza-Garcés expedition crossed the Sonoran Desert, encountered the Yuma Indians along the Colorado River, crossed the San Jacinto Mountains, and reached the San Gabriel Mission (Weber 1992). In 1781, José de Gálvez ordered the construction of two outposts along the Colorado River to further secure the overland travel route between Sonora and the California coast: Purísima Concepción, near present-day Yuma, and San Pedro y San Pablo de Bicuñer, near present-day Laguna Dam (Weber 1992). Although Father Garcés was the leading priest for the villages, Teodoro de Croix became the first Comondancia General de Provincias Internas in 1777 (Texas State Historical Association 2001). In effect, de Croix was the commandant for the interior provinces of Mexico and was the person responsible for ensuring the success of the enterprise of the two newly established villages along the Colorado River.

Four years after the creation of the villages, the Yuma Indians, because of the ill treatment caused to them by the Spanish, attacked the villages, killing Father Garcés along with many of the settlers. In 1782, Pedro Fages argued for an increased force to defend against Russian encroachment and to quell Indian uprisings. Although Fages rescued several of the remaining Spanish captives in Yuman custody and managed to inflict heavy damage on the Yuman villages, no peace accords were established between the Yuma Indians and the Spanish. By the close of the 18th century, New Mexico still did not have a reliable overland route to its settlements along the Pacific coast of Alta California and was forced to rely on sea ventures to supply these settlements (Weber 1992).

Mexican Period (1821 to 1848)

The Mexican Period opens with the observation that Spain's influence in the world and its role as a colonial power waned at the beginning of the 19th century following the Napoleonic Wars. As a result, Spain began to relinquish some of its colonies in the New World. In 1821, following other uprisings in Florida and Texas, Augustin de Iturbide led a successful coup of the Spanish colonial government in Mexico City. In August 1821, Spain capitulated and signed the Treaty of Córdoba with Iturbide and the insurrectionists, and Iturbide declared himself Agustin I, emperor of New Spain. His despotic rule did not last long however, as Antonio López de Santa Anna led a successful coup and deposed Iturbide in 1824. Against the backdrop of these larger events, developments in the Sonoran Desert passed relatively unnoticed by the Mexican government, except when horse thieves were chased through the area. In 1826, Sub-Lieutenant Romualdo Pacheco, the aide-de-camp to the governor of Mexican California, and his troops built a small fort approximately 6 miles west of present-day Imperial. After a band of Kumeyaay attacked the post in April 1826 and killed three soldiers, Pacheco abandoned the post and led his remaining troops to San Diego. Imperial County served as the route for the American expedition that ended Mexican rule of California. In 1846, Brigadier-general Stephen Kearney led the Army of the West from Fort Leavenworth, Kansas, that first captured Santa Fe, New Mexico. From there, the Army marched across New Mexico and helped seize Tucson, Arizona. The force then continued west across the Sonoran Desert to San Diego, arriving in January 1847.

The downfall of Spain as a colonial imperialist in the New World likely had its most dramatic beginnings in 1810. The downfall occurred when a group of Anglo-Americans rebelled against the Spanish-controlled government in West Florida and captured the town of Baton Rouge on behalf of the United States government. Because of its domestic problems in the wake of the Napoleonic Wars, Spain could do little to provide economic assistance to its overseas ventures and in 1819 signed a peace accord, the Adams-Onís Treaty, which gave East Florida to the U.S. and de facto control of West Florida to the United States. Texas, a heavily contested region, was to remain under Spanish control.

In 1821, just 2 years after the signing of the Adams-Onís Treaty, Agustin de Iturbide led a successful coup against the Spanish colonial government in Mexico City. Iturbide was an officer in the Spanish military in New Spain who became disenchanted with the current Spanish government. In 1820, he was assigned to suppress an anti-colonial uprising, but instead Iturbide led the coup. In February 1821, Iturbide issued the “Plan of Iguala,” which laid the framework for Mexican independence from Spain. By August of 1821, the Spanish government signed the Treaty of Córdoba, which recognized the change of government to Iturbide’s insurrection. Soon afterward, in 1822, Iturbide declared himself Agustin I, emperor of New Spain. Because of his despotism, Antonio López de Santa Anna led a successful coup that deposed Iturbide in 1824. However, Iturbide had left a dangerous legacy for Mexico. In 1822, Iturbide permitted Stephen Austin and a small group of Anglo-Americans to construct a settlement inside the border of Texas, more likely as an act of appeasement to limit the increasingly frequent border disputes. This act, however, only furthered the cause of the Anglo-Americans to take control of the southwest.

Few, if any, development activities were conducted in the northern territories of Mexico during this period. The Sonoran Desert was nearly forgotten and only referenced as Indian (Yuman) horse thieves were chased through the desert. In 1826 and 1827, Romualdo Pacheco, who would become the first California-born governor of the State of California and was Sub-Lieutenant, Engineer officer, and aide-de-camp to the governor of Mexican California, made several exploratory expeditions through the region (Stott 1950). In 1831, a group of Anglo-American traders departed St. Louis, headed for Santa Fe, traveled through the Sonoran Desert, and ended in San Diego. One person of note in this trip was Jonathan Trumball Warner of Connecticut, who was a clerk on the expedition (Stott 1950). Warner later acquired San Jose Valley in San Diego County. The valley became known as “Warner’s Ranch,” the name it retains to this day.

American Period (1848 to Present)

The Anglo-American colonies established in Texas in the 1820s eventually rebelled and gained their independence from Mexico in the Texas War of Independence in 1836. The newly established Republic of Texas maintained its independence until 1845, when it petitioned for annexation to the United States.

When this annexation was completed in 1845, during the presidency of James K. Polk, the stage was set for war between an outraged Mexico and the United States. Border tensions escalated and the result was war and the United States invasion of Mexico in 1846. That year, President Polk enlisted the aid of Mormon volunteers to form a battalion and advance on the Mexican army in California. The Mormons already had a large population in the west, particularly in the Salt Lake City, Utah, area. By June 1846, Colonel Stephen W. Kearney, commander of the western army, with the assistance of Mormon leader Brigham Young, recruited 314 Mormon soldiers (Vurtinus 1979). By the fall of 1846, the battalion moved through the southwest toward California and reached San Diego on January 29, 1847. In the process, the western army, with the aid of the Mormon battalion, established garrisons in San Diego, Los Angeles, the mission of San Luis Rey, and established a battery in Cajon Pass, San Bernardino County (Vurtinus 1979).

By 1848, the U.S. had prevailed over the Mexican army and the Treaty of Guadalupe Hidalgo ended the war. By the terms of the treaty, the United States acquired all Mexican territory north and west of the Rio Grande and Gila rivers, including Texas, New Mexico territory, and Alta California. In the same year, Anglo-Americans discovered gold in the mountains of California, and the resulting gold rush brought a huge influx of Anglo-American settlement. This settlement transformed California from a Hispanic backwoods frontier to the new Anglo-American "Golden State," which was admitted to the Union as the thirty-first state in 1850.

Early Settlement

The settlement of the Imperial Valley owes much of its early history to Dr. Oliver M. Wozencraft. In 1849, Wozencraft, on his way to gold fields near San Bernardino from New Orleans, traveled through the Imperial Valley and noted the soil fertility and potential for arability. He was likely the first Euroamerican to recognize the valley's potential for agriculture, and he noted that because the Colorado River was much higher than the valley, it would be feasible to irrigate using a gravity canal from the Colorado River (Garnholz 1991).

Wozencraft's opinion of the fertile valley was reaffirmed in 1853 when Jefferson Davis, Secretary of the U.S. War Department, ordered a scientific expedition along the Colorado River for the placement of fortifications. In this expedition, which was led by Lieutenant R.S. Williamson and William Phipps Blake, a professor at Yale College, the particular fertility of the alluvial soil at the southern end of the Salton Trough was noted. Blake prophetically wrote, "It is indeed a serious question, whether a canal would not cause the overflow once more of a vast surface, and refill, to a certain extent, the dry valley of the ancient lake" (Garnholz 1991). Blake's expedition in the Salton Trough was the most scientific of its time and included soil scientists, geologists, geographers, and paleontologists. It was Blake's expedition that first scientifically described how the Colorado River had meandered through the valley, delivered enough silt to block the mouth of the Gulf of California, and recognized that the banks of the current Colorado River course were much higher than that of Imperial Valley (Smith 1979). During the 19th century, the Colorado River flooded the valley in 1840, 1842, 1852, 1859, and 1867 (Garnholz 1991).

Development of Canals and Irrigation

With the information gathered from the scientific expedition, Wozencraft pressed California into granting him approximately 1,600 square miles or 1,024,000 acres (essentially the entire present-day Imperial County and parts of Riverside County). However, the Federal Government retained title to the land in this region of California, and Wozencraft was unable to convince Congress, even with the results of the scientific analysis of the valley, to support his efforts. Wozencraft then approached George Chaffey to finance the project. Chaffey, who would successfully spearhead irrigation projects in San Bernardino County and Australia, was also unconvinced and noted that the "Imperial Valley was to [sic] hot for white men to prosper" (Garnholz 1991). Chaffey would later change his mind and near the end of the 19th century led the effort to irrigate the valley. Still undeterred, Wozencraft hired the Los Angeles County surveyor, Ebenezeer Hadley, in 1860 to draw up a plan to irrigate the valley by diverting the Colorado River through the Alamo River (Garnholz 1991). Wozencraft left California for Washington, D.C. to lobby Congress. He died several years later without ever convincing Congress and never saw his dream fulfilled. Although Wozencraft failed to create an irrigation network, his efforts during the mid-19th century led the way for future development efforts.

Between 1893 and 1894, the Colorado Irrigation Company, under the direction of Chief Engineer Charles R. Rockwood, followed up on Wozencraft's earlier attempts to irrigate the Imperial Valley. Originally known as the "Valley of the Dead," an understandable appellation considering that it receives less than 3 inches of rainfall per year, Charles Rockwood renamed it "Imperial Valley" as part of his grand vision of channelizing the Colorado through thousands of miles of canal lines, with the net effect of irrigating hundreds of thousands of acres of land in the Sonoran Desert (Reisner 1986). Teaming with George Chaffey, head of the California Development Company (CDC), Rockwood, who became the chief engineer of the company in 1901, continued on the plans established by Wozencraft in the mid-19th century to have a canal, referred to as the "main channel," constructed from the Colorado River through the Imperial Valley using an ancient overflow channel of the Colorado known as the Alamo River (Sperry 1975). Chaffey, to avoid conflict with the Mexican government over land development—the canal was to be developed almost entirely on the south side of the border, which, because it was conducted by a foreign agency, was prohibited by Mexican law—established a subsidiary to the CDC, the Sociedad de Irrigación y Terrenos de la Baja California (Smith 1979). By 1901, the Imperial Valley was irrigated and attracted many new settlers and farmers from the Midwest. In 1907, Imperial County was established from the western portions of San Diego County. The establishment of Imperial County helped boost the population of the valley. In 1902, the towns of Imperial and Calexico were founded, followed in 1905 by El Centro. The 1910 Census reported that 13,591 people lived in the newly formed county. By 1990, that number had grown to 109,303 and there were dozens of cities, towns, and unincorporated communities.

The Coming of the Railroad

The railroad had reached the Imperial Valley several years before the county was organized. The Southern Pacific Railroad established a line from Los Angeles to Yuma in 1877. The line entered the valley near Betram and ran southeast through Niland to Yuma (Farr 1918). This line eventually became part of the famed Sunset Route that linked Los Angeles with New Orleans (Solomon 1999). The Southern Pacific soon had spurs or lines running to Calexico and El Centro, but did not run west to San Diego. In 1906, it was announced that the San Diego and Arizona Railroad (SDAR) had been formed and work soon began on a direct line from San Diego to the Southern Pacific line in El Centro. Construction was difficult and the line proceeded slowly. By 1914, some sections had been finished, including the line between El Centro and Dixieland. But the entire route was not finished until November 1919. The railroads quickly developed iced freight cars that could transport fruit and vegetables grown in the valley, a use that continues today. Pullman service was inaugurated between San Diego and Chicago, and passenger trains ran along this route until 1951, when declining ridership led the Southern Pacific Railroad (which had purchased the SDAR in 1933) to end passenger service along this line (Dodge 1956).

Flood Control

George Chaffey replaced Charles Rockwood at the Colorado Irrigation Company because of his experience in working on canal projects and deep financial interests in seeing the development of the southwest. Under his direction, an extensive canal system was developed in both the Imperial Valley and across the border in Mexico. Diversions were built that took water from the Colorado and channeled it into the Alamo River. Almost immediately it was found that silt deposits, carried by the river, were fouling the diversions, head gates, and canals. In 1905, the water levels coming down the river were lower than usual, and the high levels of silt impeded the flow of water through the gravity-fed system. It was decided that a cut would be made in the side of the river, up-stream from the silted-in portions, to allow a fuller flow. A temporary, wooden structure referred to as the "Chaffey Gate" was constructed with the assumption that the cut would be closed and the gate removed before the spring runoff (Sperry 1975; Tout 1932). Before this could happen, several floods poured down the river, and the fifth one completely destroyed the remaining gates and dams along the canal network system. The Colorado River, which had flowed toward the Gulf of California, had changed its course and started flooding the Alamo River to the Salton Trough in Imperial Valley. The Salton Sink began to fill, eventually becoming known as the Salton Sea. Frantic efforts were made to close the cut, but the river swept away each one.

Many businesses that were situated along the Salton Trough were threatened by the floodwaters. The Southern Pacific Railroad, which had acquired the CDC, saw its interests threatened, and it took on the task of the flood control. The railroad's president, E.H. Harriman appointed a new engineer and gave him a large budget (Sperry 1975). Harriman and the business leaders of the Valley asked the Federal Government to intervene. President Theodore Roosevelt seemed sympathetic, but told Harriman that with Congress in recess, there was little he could do, though he implied that any funds expended by the railroad would be reimbursed by the government. Ultimately, the Southern Pacific spent $3 million and closed the breach in 1907. When the railroad requested that amount from the federal government, they were turned down—it took almost 22 years of negotiation before Congress finally awarded the railroad $1 million in compensation (Sperry 1975; Tout 1932). It took the construction of the Hoover Dam, which was completed in 1935, to achieve full control over the Colorado River for irrigation purposes.

Introduction of Electric Power to the Region

At about the same time that Rockwood and Chaffey were devising plans to irrigate the Imperial Valley, W.F. Holt was developing an idea to introduce electricity to the region through hydroelectric power. Holt formed the Holton Power Company in 1903 with the purpose of constructing a 40-foot drop on the Alamo River. By 1916, the Holton Power Company was successfully producing enough energy to supply the needs of the entire Imperial Valley. Soon after, the Nevada-California Electric Company acquired the Holton Power Company; however, Nevada-California had problems in producing enough reliable electricity for the expanding agricultural economy of the valley, and the electricity rates to produce the power needed were becoming too high for the average farmer.

The Imperial Irrigation District (IID) was organized in 1911 to acquire the land rights of the defunct CDC, and its Mexican subsidiary Sociedad de Irrigación y Terrenos de la Baja California, from Southern Pacific. By the mid-1920s, IID was delivering water to over 500,000 acres of arable land (IID 2006). The Boulder Canyon Act, passed in 1928, authorized the Bureau of Reclamation to construct Boulder (Hoover) Dam, completed in 1935, along the Colorado River. The Imperial Valley and IID benefited greatly, as the act and the dam provided immediate hydroelectric power to the valley. The act also provided for the construction of the All-American Canal. In 1932, the Secretary of the Interior and IID signed an agreement to allow IID to use the hydroelectric power from the canal system to repay the costs of the canal construction. The All-American Canal was begun in 1934 and the first diesel-generating plant was constructed near Brawley in 1936 (IID 2006). Construction on the canal continued until 1942, when work was interrupted by the U.S. entry into World War II. Work resumed in 1944, and was largely completed by 1948. That same year saw construction begin on the Coachella Canal distribution system, which was completed by 1954 (U.S. Bureau of Reclamation 2008).

These water systems helped develop hundreds of thousands of acres of farmland that produced all types of crops, livestock, and dairy products. In 1910, 87,141 acres of crops (barley, cotton, alfalfa, etc.) were planted, and by 1980, 703,453 acres were being cultivated. The same trend is reflected in cattle production. In 1910, 63,180 head of cattle were being raised in the valley, and that number had risen to 1,046,805 by 1990 (Birdsall 2007).

Railroad lines were not the only transportation system linking the valley to San Diego. Residents of the valley were clamoring for a network of roads, but the terrain made road construction difficult, especially on the eastern side of El Centro, where the shifting sand dunes hampered passage. In 1915, a plank road was built that crossed the Algodones sand dunes and linked Yuma and Holtville. In 1915, construction began on State Highway 80, which ran from San Diego to Imperial Valley. Paved with concrete when it was built, the road stretched across the desert floor, linking towns such as Ocotillo, Plaster City, Dixieland, Seely, and El Centro. In 1926, it was renamed U.S. 80 as part of the burgeoning U.S. highway system (Cooper 2005). In 1929, Imperial County widened and repaved the road (Tout 1932).

Many of these towns and communities had been founded in response to the widespread development of agricultural properties. One such community was Dixieland, located just to the east of the Westside Main Canal. In 1909, there was talk of building another canal even farther west to open more land for agriculture. A town was platted, streets were laid out, and a concrete-and-brick school was built. Its founders hoped to serve area farms that would be coming and the travelers using the highway, but Dixieland never met the expectations of its developers. The western canal was never built, and the would-be town never had enough people living in it to incorporate (Tout 1932). Today only the shell of the former school and a few modern buildings remain on the north and south sides of U.S. 80.

Mining Developments

Farther west on U.S. 80 is Plaster City, a large drywall production facility that stretches for almost a mile along both sides of the highway. In 1920, Samuel Dunaway formed the Imperial Gypsum and Oil Company to extract the estimated 25 million-ton gypsum deposit that lay on the western edge of the valley. An ore processing plant was built at a spot along U.S. 80 and the San Diego and Arizona rail line, and a narrow gage rail spur brought the ore down from the mines. In 1922, the first load of processed gypsum was shipped from the valley. The company soon ran into financial troubles and was acquired by the Portland Cement Company in 1924, which expanded the processing facility. In 1927, a fire destroyed the original plant, leading to extensive rebuilding (Tout 1932). In 1946, the U.S. Gypsum Company (today known as USG) purchased the plant and greatly expanded it. In 2001–2004, USG spent almost $300 million modernizing and rebuilding the plant yet again.

The Desert Training Center Presence

The dry climate and large expanses of land brought the U.S. military to the valley during World War II. In early 1942, Major General George S. Patton was ordered to find a site suitable for large army units (divisions, corps, and armies) to train. A California native, Patton had participated in training exercises in the Mojave Desert. The army began acquiring land for the Desert Training Center (DTC), also known as the California/Arizona Maneuver Area, which eventually covered 18,000 square miles, making it the largest military base in the world. The area stretched from the outskirts of Pomona, California, east toward Phoenix, Arizona, south toward Yuma, Arizona, and north to the tip of Nevada (California State Military Museum 2008). Much of the land that lay to the east of the Salton Sea and El Centro was consolidated into the DTC, and it is possible that training may have taken place in the open desert north and south of Plaster City as well. Artifacts including 0.50-caliber and 20-millimeter shells, military benchmarks, and ammunition belts were recorded during survey and appear to date to this period.

Camp Seeley

The U.S. Army established Camp Seeley on the northern edge of Seeley, California in November 1940. It was originally established and built to accommodate certain components of the 11th Cavalry Horse Regiment, including the First Squadron, Provisional Squadron, and the Regimental headquarters. Camp Seeley was originally used to train men and horses in desert terrain and horse skills. Additional men were assigned to Camp Seeley in March 1941, when approximately 700 draftees were added to the regiment. Training continued through December 7, 1941, when the Japanese attacked Pearl Harbor. The Regiment at Camp Seeley was ordered to force-march to Camp Lockett, 5 miles southwest along the Mexican Border at the town of Campo. After the 11th Cavalry left Camp Seeley, horse-drawn artillery units began to move into the camp (CSMM 2009).

The U.S. Army acquired 16,295 acres of land, located approximately 10 to 12 miles northwest and southwest of El Centro, California, on August 21, 1941. The next day, they acquired an additional 1,280 acres of land (CSMM 2009; U.S. Army 1997). The land was to become the Camp's vehicle proving ground and ordnance training centers. The Quartermaster Corps initially operated the testing and proving grounds, but after August 1942, these operations reverted to the Ordnance Department, which designed, developed, procured, supplied, and maintained the U.S. Army's motor vehicles (U.S. Army 1999). Known first as the Quartermaster Desert Test Command, with its principal units stationed at Camp Seeley, it would later be known as the Ordnance Desert Proving Ground (U.S. Army 1999; Way 1997). The Desert Test Command initially established the Camp Seeley Proving Ground to ascertain the traction capabilities and limitations of the U.S. Army's motorized vehicles in the desert and to determine other effects of dust and dirt on the vehicles while in desert terrain. This was done in preparation for the November 1942 planned invasion of North Africa (U.S. Army 1999).

Early vehicle testing in the first few months of 1942, while under the supervision of the Quartermaster Corps, enabled the development of low-pressure tires that enabled large vehicles to cross sandy areas with greater ease (U.S. Army 1999). New synthetic rubber tires were developed in cooperation with some U.S. tire manufacturers to provide flotation and traction in the soft sands. These tires were very effective and needed little or no alteration to traverse the soft terrain, unlike standard tires that required a reduction of air pressure by 40% to maneuver through the sands (Way 1997). Desert testing on combat vehicles did not occur at the testing grounds until March 1943, two months after fighting in North Africa had ceased. Tanks were tested at the facility, but not until March of 1943. The tank's wheel and track assemblies were to be tested against desert conditions, specifically the synthetic rubber components. The testing was expanded beyond the rubber components to include all aspects of desert conditions and focused on the effects of high temperatures and dust on rubber parts, fuels, and lubricants (U.S. Army 1999).

Major Jean Engler supervised Camp Seeley and its desert testing program. He was interested in exploring the limitations of military vehicles under adverse natural and man-made conditions. The area's temperatures were consistent with the temperatures and conditions of North Africa. Because the availability of specification fuel in combat was unpredictable, tests were needed to determine the ability of the vehicles to use various octane fuels. Major Engler was also concerned about the ability of the vehicles to maneuver in soft sands, which were usually located in dry riverbeds. Open, hard-packed terrain was not always the best route to travel due to lack of protection from enemy fire. Dry riverbeds offered better protection, but vehicles bogged down in the soft sands, which could limit or halt movement. The fuel tests were organized on June 8, 1942. A test track was chosen north of U.S. 80, between the gypsum spur at Plaster City and west of Dixieland, in the large Coyote dry wash. One tank course and one wheeled vehicle course were set up for the tests. Seventeen vehicles were tested, including all 9 models of the Quartermaster trucks and jeeps. Actual testing started on June 16, 1942 and was completed on July 10, 1942 (Way 1997).

Sand and Gravel Mining

The area has historically supported several types of mining activities, but the mining of building materials (crushed stone, gravel, sand, clays, lime, sodium, and gypsum) predominated (CSMB 1916, 1921). Early mining facilities include the Plaster City plant, whose mine was located several miles north of the project area. Another plaster mining operation was located approximately 4 to 5 miles west of Plaster City (CSMB 1916, 1921). A pure white quartz sand deposit, used for making glass and porcelain, is reported to be located near the Boulevard (U.S. 80), 1 mile from the San Diego and Arizona Railroad and 7 miles north of Coyote Wells. The deposit is 50 feet thick and stretches for one-quarter mile (CSMB 1916, 1921). As the demand for building and manufacturing materials increased by the 1920s, due to population increase and the ongoing construction of roads throughout the county, additional mines began to appear in the area.

Several historic sand and gravel pits are located inside the project area. The Wixon Gravel Pit, which consists of three distinct areas of sand or gravel open-pit mining, is located on the eastern edge of Section 5 of Township 16 South, Range 11 East. This open-pit mine is distinguished by linear and round cuts that are serviced by a packed dirt road leading to it from a dirt road east of Dunaway Road. The exact opening date of the gravel mine is unknown, but it is shown as a “gravel pit” on a 1940 U.S. Geological Survey (USGS) map, and the unimproved dirt access road is also shown (USGS 1940). A previous issue of that map, a 1915 reprint of a 1908 map, shows no gravel pits or roads within the project area. It should be noted that the map is marked “sand” just north of this gravel pit (U.S. Army Corps of Engineers 1915). A 1943 U.S. Army Corps of Engineers map shows the gravel pit and access road in the same place as the 1940 map, but is now labeled as the “Wixon Gravel Pit” (U.S. Army Corps of Engineers 1944).

Located north of the Wixon Gravel Pit, near the “sand” marked on the 1915 map, is another open sand or gravel pit. This open-pit mine is located in the southwest quarter of Section 10 of Township 16 South, Range 11 East. The mine consists of a large open-pit bowl and a dirt access road leading to it from a dirt road located east of Dunaway Road. The exact date for the opening of the gravel mine is unknown, but it is shown on a 1940 USGS map with a mine symbol, and the unimproved dirt access road is also shown (USGS 1940). On the 1915 reprint of the 1908 map, neither this mine nor any other roads are shown within the project area (U.S. Army Corps of Engineers 1915). A 1943 U.S. Army Corps of Engineers map shows the open-pit mine and an access road in the same place as the 1940 map (U.S. Army Corps of Engineers 1944).

A large complex of open gravel pits is located in Sections 7, 18, and 19 of Township 16 South, Range 11 East. Two gravel pits are also located north of U.S. 80 in Sections 1 and 12 of Township 16 South, Range 10 East. These open-pit mines consist of linear and round cuts associated with loose surface, graded dirt roads leading south from U.S. 80. One of the mines is shown as the “County Gravel Pit” on the 1940 USGS map near the center of Section 18 of Township 16 South, Range 11 East. The loose surface, graded dirt access road is also shown leading to the mine (USGS 1940). No gravel pits or roads are shown at this location on the 1915 reprint of the 1908 map (U.S. Army Corps of Engineers 1915). A 1943 U.S. Army Corps of Engineers map shows the open-pit mine and an access road in the same place as the 1940 map, and it is still named the “County Gravel Pit” (U.S. Army Corps of Engineers 1944). The BLM General Land Office (GLO) plat map for this township indicates that most of the land in Section 18 was used as a material site, with a date of action on August 5, 1940 and a closing date of October 6, 1995 (BLM GLO 2004). A material’s site usually refers to an area used to store road maintenance materials. This is consistent with its designation as the County Gravel Pit, which would most likely use sand or gravel for road construction or maintenance.

Energy Infrastructure Development.

The volcanic history of the Salton Sea basin has made it an ideal location for the development of geothermal energy. Active extraction of geothermal energy is already underway in the area around Obsidian Butte at the southern end of the Salton Sea and additional plants have been proposed. Whereas the previous economic development had been limited to corridors (primarily railroads, transmission lines, roads, and canals) or small horizontal spaces (the geothermal plants and gravel and gypsum mines) modern development is, for the first time, destined to affect large parcels of the landscape. Proposed solar energy projects covering hundreds and thousands of acres are under study and development near Borrego Springs and Ocotillo Wells, in the Salton Sea and the Yuha Desert. In summary, much of the desert area of the ALCIS has been proposed for solar development (and multiple locations in the mountainous area of the ALCIS have been proposed for wind energy development). There are extensive and potentially significant cultural resources throughout the ALCIS, many of which may be determined to be eligible for nomination to the National Register of Historic Places. The careful assessment of cumulative effects will be essential to the protection of the cultural heritage of the project area of analysis.

It is also clear that the shoreline of Ancient Lake Cahuilla, the area of project analysis and the extent of the ALCIS extend across the international border into northern Mexico. The initiatives that are underway for cooperative alternate energy development between Imperial County and northern Mexico also need to be considered in assessments of cumulative effect and assessments of impact on cultural resources.

C.3.4.2 CULTURAL RESOURCES INVENTORY

The analysis of the proposed action requires the development of a cultural resources inventory for the area where the action has the potential to disturb or destroy cultural resources. The development of the inventory has entailed the identification, description, and preliminary interpretation of the cultural resources in that area. More specifically, the effort to develop the inventory has involved a sequence of investigatory phases that includes background research, consultation with Native Americans and the broader public, primary field research, and the interpretation of the resultant information.

History of the Investigation

The inventory effort began with the development of a geographic scope of investigation that would capture enough information to support a defensible cultural resources analysis. The scope of investigation for the proposed action includes considerations of both the geographic extent and the intensity of the geographic coverage of each investigation that contributes to the inventory effort. The geographic extent of the inventory investigations includes the different areas in which the proposed action has the potential to directly or indirectly effect cultural resources. The total of such areas is the project area of analysis (see “The Project Area of Analysis and the Area of Potential Effects” subsection, above).

The intensity of the geographic coverage for the inventory investigations is different for the background research and the primary field research, and has evolved during the development of the cultural resources inventory. The ideal intensity of the geographic coverage in a project area of analysis would be 100% for all investigations done for or in that area. The development of the cultural resources inventory for the proposed action began with the intent of conducting both the background research and the primary field research to cover 100% of the project area of analysis. The background research does include this level of coverage. The primary field research does not.

The geographic coverage for primary field research in the project area of analysis presently includes a useable sample of 25% of the archaeological sites found in that area and a 100% sample of built-environment resources and ethnographic resources. The applicant began the primary field research on the archaeology of the project area of analysis with a 100% pedestrian survey to identify and document every archaeological site on the surface of that area (Cultural Resources Table 6) (SES 2008c, SES 2008e). The reported results of that survey were too coarse in descriptive resolution to enable the reliable identification and interpretation of the archaeological resources found. BLM and Energy Commission staff sought early (December 2008) in the discovery phase of the Energy Commission siting case for the proposed action to acquire, among other information, more precise and objective data on the character and the physical contexts of the surface archaeological resources (see Data Requests 111–113 and 115–117, CEC 2008h). The March 2009 responses of the applicant to the initial round of cultural resources data requests (SES 2009h), while offering useful information on the geomorphology of the project area of analysis as a whole (see responses to Data Requests 111 and 112, SES 2009h), did not adequately identify and articulate the physical context of each surface archaeological site, or describe and interpret the contents of and the spatial patterns that structure the material culture deposits that make up each site, notwithstanding additional fieldwork that the applicant had done. As a consequence, the information on the surface archaeological sites remained insufficient to support defensible assessments of the potential effects that the implementation of the proposed action may have on historically significant sites.

As BLM and Energy Commission staff began to develop a second round of data requests, information became available that made the coarse resolution of the original archaeological survey data more objectively apparent. A May 8, 2009 preliminary field check by BLM staff and a third-party consultant of the accuracy of the archaeological site descriptions that the applicant had prepared in response to Data Request 117 found enough variation between those descriptions and the actual character of the resources on the ground to warrant concern. Energy Commission and BLM staff agreed that a formal field check of a controlled sample of the archaeological sites that had been found on the original archaeological survey would be a useful way to quantify the accuracy of the March 2009 revisions to the archaeological site descriptions and would allow staff to more securely account for the range of error in the descriptions during the preparation of the analysis. From May 20 to May 22, 2009, a third-party consultant to the BLM conducted a ground-truthing survey of an approximately 20% sample of the 302 archaeological sites then known for the project area of analysis (LSA 2009a). The BLM's third-party consultant found that the documentation by the applicant for approximately 43% of the archaeological sites in the project area of analysis was probably inadequate and would require additional fieldwork to correct. The consultant also concluded that the applicant may not have found approximately 8% of the archaeological sites in the project area of analysis and that approximately 5% of the archaeological sites that the applicant has found may not actually be archaeological sites. The consultant concluded that the extant documentation for the archaeological sites in the project area of analysis was inadequate for assessing either the historical significance of the resources or the effects that the proposed action would have on them (LSA 2009, p. 27).

The second round of data requests for cultural resources (CEC 2009X) took into account the results of the third-party ground-truthing survey. The primary focus of Data Requests 142–144 was for the applicant to conduct a program to revisit and re-record 100% of the newly found archaeological sites in the project area for the proposed action. The requests provided the applicant with a field protocol for the re-recordation effort and recommended that the applicant more precisely observe and document the geomorphic context of each site. The requests also asked the applicant to revise the March 2009 descriptions of the newly found archaeological sites in the proposed project area to more closely conform to the original guidance in Data Requests 113 and 117. In response to a request from the applicant at the May 7, 2009 second data response workshop in El Centro, staff provided a template to the applicant, as an attachment to the second round data requests, to ease the further revision of the archaeological site descriptions. The data requests and the attachment were published on June 18, 2009. The applicant had begun the archaeological site re-recordation effort the previous day having seen the draft second round data requests and having sought further clarification from staff on the re-recordation field protocol.

Coordination on Programmatic Agreement for Section 106 Compliance

Concurrent with the discovery phase of the Energy Commission siting process, BLM and Energy Commission staff were developing an alternate approach to jointly satisfy agency NEPA, Section 106, and CEQA regulatory obligations. From approximately March 9 through August 12, 2009, Energy Commission staff, in consultation with BLM staff, conducted a series of intra- and interagency discussions about how Energy Commission staff might use the Section 106 consultation process to satisfy Energy Commission obligations to comply with CEQA in relation to cultural resources. More specifically, Energy Commission staff sought to participate in the development and execution of a type of agreement document that BLM staff came to the decision to use to comply with Section 106, which the BLM would use, in turn, to satisfy their obligations under NEPA to consider the effects of the proposed action on cultural resources. The subject type of agreement document is known as a complex undertaking programmatic agreement (PA). The purpose of a complex undertaking PA is to afford a Federal agency a procedural mechanism to provide for the phased identification, evaluation and deferment of final evaluations for projects involving large land areas and corridors, as well as, the consideration and treatment of historically significant cultural resources when the effects of a proposed action on such resources, for different reasons, cannot be fully determined prior to the approval of that action. A complex undertaking PA is a document that sets out a regulatory process which deviates from the standard Section 106 process and which addresses circumstances unique to a particular proposed action. The regulatory process set out in a complex undertaking PA is the result of negotiations among the lead Federal agency, other involved Federal agencies, the Advisory Council on Historic Preservation, the State Historic Preservation Officer, Native American groups, state and local governments, and the interested public. Such a regulatory process provides for the post-decision completion of steps in the standard Section 106 process that normally occur prior to a decision on a proposed action. On August 12, 2009, Energy Commission staff got internal approval to participate in the Section 106 consultation process for the proposed action under consideration here and to recommend to the Energy Commission the regulatory process that would be negotiated under Section 106 as the means to satisfy agency obligations under its CEQA certified regulatory program.

BLM staff, in consultation with Energy Commission staff, subsequently began to initiate formal consultation on the development of the complex undertaking PA and to implement the broad outline of the regulatory process that would become the framework for that document. BLM and Energy Commission staff came to the decision to base the present cultural resources analysis on a statistically valid, 25% sample of the archaeological sites known from surface observation, on 100% of built-environment resources, and on 100% of known ethnographic resources. BLM and Energy Commission staff believe that a controlled and well-documented 25% sample of the archaeological sites on the surface of the project area of analysis is a sufficient basis for a reliable assessment of the potential effects of the proposed action on that class of cultural resources and for the development of general processes and specific programs and protocols to resolve any significant effects that the analysis may identify. The proposed PA will stipulate the completion of the documentation for the 75% of the surface archaeological sites in the project area of analysis that are not part of the 25% sample that is the focus here, final refinements to the 25% sample, the execution of a program to evaluate the historical significance of archaeological landscapes and districts, archaeological site types, and individual archaeological sites, refinements to the character of the potential effects of the proposed action on different aspects of the archaeological resource base, and refinements to and the execution of multiple treatment plans to resolve those potential effects that are found to be significant.

In anticipation of the August 12, 2009 internal Energy Commission decision to approve Energy Commission staff participation in the Section 106 consultation for the proposed action, BLM and Energy Commission staff began the effort to select and conclude the documentation of the 25% sample of the archaeological sites that would serve as a major component of the present analysis just prior to the date of that decision. BLM staff directed the third-party consultant who had conducted the May 2009 ground-truthing survey to develop a stratified random sample of 25% of the known archaeological sites on the surface of the project area of analysis (LSA 2009b). The applicant was to then use that sample to conclude the archaeological site re-recordation program that the applicant had begun in late June 2009. The applicant began the implementation of the sample on August 26, 2009, concluded the fieldwork for the sample on September 28, 2009, and submitted the second round of revisions to the site descriptions for the sample sites 17 days later on October 15, 2009 (SES 2009XX). BLM and Energy Commission staff made the decision that the October 15, 2009 results of the 25% re-recordation effort (Cultural Resources Table 7) would be taken as sufficient to assess the potential effects of the proposed action on archaeological resources. The results of that effort therefore provide the basis of the analysis of the archaeological resource base in the present section.

The “Cultural Resources Inventory” subsection covers the methods and results of each phase of the background research and of the new field investigations that have been done to construct a cultural resources inventory for the project area of analysis. The subsection includes discussions of the archival research and the consultations that have taken place with Native American groups and the broader public about the project area of analysis as a whole. The subsection will also provide discussions of the recent field investigations for the analysis. The investigations include a geoarchaeology study of the project area, the original pedestrian archaeological survey of the project area of analysis and the 25% re-recordation effort, and built-environment and traditional use area surveys. Separate subsections below explore the historical significance of the cultural resources found, assess the potential effects of the proposed action on significant cultural resources and on previously unidentified, buried archaeological resources, and propose mitigation measures for all significant effects.

Background Research

The background research for the present analysis employs information that the applicant and the BLM gathered from literature and records searches and information that the BLM and Energy Commission staff gathered as a result of consultation with local Native American communities and with other potential public interest groups. The purpose of the background information is to help formulate the initial cultural resources inventory for the present analysis, to identify information gaps, and to contribute to the design and the interpretation of the field research that will serve to complete the inventory.

Literature and Records Searches

The literature and records search portion of the background research attempts to gather and interpret documentary evidence of the known cultural resources in the project area of analysis. The sources for the present search include the South Coast Information Center (SCIC) at San Diego State University and the Southeast Information Center (SIC) at the Imperial Valley Desert College Museum, both of the California Historical Resources Information System (CHRIS). (Note: subsequently, the SIC has been closed and all records are now on file at the SCIC.)

CHRIS Records Search

Methods

Records searches were conducted for all of the project area and a 1-mile radius around it. On January 16, 2007, Matthew Armstrong, a URS Archaeologist, requested a records search from the SIC. A second records search was conducted by Elizabeth Roberts, URS Archaeologist, on February 26 and 27, 2008 at the SIC to cover the area of the proposed transmission line, which had not been identified at the time of the initial records search.

In addition to these efforts, site-specific and general primary and secondary research was conducted at the Imperial Valley Pioneer Society; Imperial County Free Library – El Centro Branch; San Diego State University Library; University of California, San Diego Geisel Library and Mandeville Special Collections; San Diego Public Library; and numerous online resources (e.g., Calisphere – A World of Digital Resources, California Historic Topographic Map Collection). The research was conducted between April 3 and 7, 2008. Overall, the research provided insight into the historic contexts and themes of the area and specific information concerning the properties within the project area (e.g., date of construction, architect/builder, and historic landownership).

Results

Previous Investigations

The records search investigations identified 31 records related to cultural resources investigations conducted within 1 mile of the project area. Several of these records were for projects conducted within the Solar Two project area. The following is a list of projects conducted within the Solar Two project area boundary: point surveys 0853–0873; area surveys 09113, 0737, 0251, 0330, 0325, 0262, 0251, 0172, 01073, 0972, 0962, and 0960; and portions of linear surveys 0233, 0297, 0310, 0311, 0314, 0315, 0316, 0319, and 0946. The 31 reports are listed in Cultural Resources Table 2.

Cultural Resources Table 2
Previous Surveys in the Records Search Area

NADB No.	Project Name	Prepared By	Prepared For	Date Submitted
1100108	Archaeological Survey of the Yuha Basin, Imperial County	Jay von Werlhof and Sherilee von Werlhof	U.S. Department of the Interior, Bureau of Land Management, Riverside, CA	June 20, 1977
1100207	Class II Cultural Resource Inventory of the East Mesa and West Mesa Regions, Imperial Valley, California	WESTEC Services, Inc.	USDI, BLM, Riverside, CA, Contract No. YA-512-CT9-75	July 1980
1100233	Cultural Resources Study of a Proposed Electric Transmission Line From Jade to the Sand Hills, Imperial Valley, California	Carol J. Walker, Charles S. Bull, Jay von Werlhof	San Diego Gas & Electric	February 13, 1981
1100251	Volume II Appendix Phase II, Archaeo-logical Survey of the La Rosita 230 kV Interconnection Project	Cultural Systems Research, Inc.	San Diego Gas & Electric	November 1981
1100262	Archaeological Field Investigation of the Cultural Resources Associated with the Proposed Imperial Valley Substation (7A) Access Road	Cultural Systems Research, Inc.	San Diego Gas & Electric	March 1982
1100279	Volume I Phase III Archaeological Survey of the Mountain Springs (Jade) to Sand Hills Portion of the APE/SDG&E Interconnection Project 500 kV Transmission Line	Cultural Systems Research, Inc.	San Diego Gas & Electric	1982

NADB No.	Project Name	Prepared By	Prepared For	Date Submitted
1100286	South Brawley Prospect Geothermal Overlay Zone Draft Program Environmental Impact Report Volume I	County of Imperial	Unknown	January 28, 1983
1100289	Cultural Resource Inventory of the La Rosita to Imperial Valley Interconnection Project 230 kV Transmission Line, Imperial Valley, California	Greenwood and Associates	Unknown	March 18, 1983
1100297	Archaeological Examinations of Petty Ray Geophysical Transects on West Mesa	Jay von Werlhof, Imperial Valley College	BLM, El Centro Area Office	June 15, 1983
1100301	Appendix B Cultural Resources Inventory for Thirty Proposed Asset Management Parcels in Imperial Valley, California	Patrick Welch	Unknown	July 1983
1100310	Southwest Powerlink Cultural Resources Management Plan Volume III-B	Jan Townsend, WIRTH Environmental Services	San Diego Gas & Electric	March 1984
1100311	Southwest Powerlink Cultural Resources Management Plan Volume II	Jan Townsend, WIRTH Environmental Services	San Diego Gas & Electric	March 1984
1100314	Volume III Data Recovery on the Mountain Springs (Jade) to the Sand Hills Segment-Southwest Powerlink Project	M. Steven Shackley, WIRTH Environmental Services	San Diego Gas & Electric	September 1983
1100315	Volume IV Data Recovery on the Mountain Springs (Jade) to the Sand Hills Segment-Southwest Powerlink Project	M. Steven Shackley, WIRTH Environmental Services	San Diego Gas & Electric	April 1984
1100316	Volume II – Appendixes Data Recovery on the Mountain Spring (Jade) to Sand Hills Segment, Southwest Powerlink Project	M. Steven Shackley, WIRTH Environmental Services	San Diego Gas & Electric	April 1984

NADB No.	Project Name	Prepared By	Prepared For	Date Submitted
1100319	Volume I Archaeological Investigations in the Western Colorado Desert: A Socio-ecological Approach	M. Steven Shackley, WIRTH Environmental Services	San Diego Gas & Electric	April 1984
1100325	West Mesa Resource Survey and Site Evaluation, Imperial Valley, California	WESTEC Services, Inc.	USDI, BLM, El Centro Area Office	1984
1100330	Camps and Quarries After the Lake: A Survey of 547 Acres Below the Relic Lake Cahuilla Shoreline in the Vicinity of Interstate 8 and Dunaway Road	Mooney-Lettieri and Associates	USDI, BLM	January 1985
1100446	Yuha Rehab and Mechanical Restoration	Unknown	USDI, BLM, El Centro Area Office	April 29, 2003
1100737	Desert Material Sites: West Imperial County Bear, Coyote, Plaster City, Underpass, Yuha	Unknown	Unknown	May 1989
1100804	AT&T Wireless Services Facility No. IM004, Imperial Valley, California	Curt Duke, LSA Associates, Inc.	GeoTrans, Inc.	March 29, 2002
1100820	Cultural Resources Survey and Assess-ment of a Cellular Phone Tower Emplacement and Associated Access Road Along Old Highway 80 Near Dixieland, Imperial Valley, California	Professional Archaeological Services	Phase One, Inc.	May 2000
1100853	NEPA 2000-55, CA-42103 Hunter’s Alien Waters	Unknown	USDI, BLM, El Centro Field Office	March 7, 2001
1100873	NEPA 2001-51, CA Hunter’s Alien Waters FY2001	Unknown	USDI, BLM, El Centro Field Office	October 18, 2001
1100892	NEPA 2001-39, CA-42904 NTCHCA, inc. DBA Rio-Tel Communication site	Unknown	USDI, BLM, El Centro Field Office	July 17, 2001
1100916	Section 106 Consultation Request for American Tower Corporation Cell Site CA7 – New Site #58	Phase One Inc. SM	Unknown	May 2000

NADB No.	Project Name	Prepared By	Prepared For	Date Submitted
1100984	Proposed Cellular Phone Communications Tower & Facility, Evan Hughes Highway, Plaster City, California	Unknown	Unknown	April 18, 2005
1101057	Cultural Resources Study of the Mount Signal and Dixie Ranch, Imperial County Prison Alternatives, Imperial County, California	ERC Environmental and Energy Services Company, Inc.	California Department of Corrections Planning and Construction Division	January 1990
1101073	Cultural Resource Survey of a 230 kV Transmission Corridor from the Imperial Valley Substation to the International Border with Mexico	Judy A. Berryman, Ph.D.	SEMPRA Energy	September 11, 2001
1100757	Review of Alamosa PCS Site #82502-020, Imperial County, CA	Environmental Biologist, Inc. Ohio 43209	Unknown	Unknown
CA-670-2007-93/ CA 47740-01	Proposed Geotechnical Investigations for The Stirling Energy Systems Solar Two Site Imperial County, CA	URS Corporation Denver, CO	El Centro Field Office BLM 1661 South Fourth Street El Centro, CA 92243	
	San Diego Gas & Electric Company's Sunrise Powerlink Project	SDG&E, San Diego, CA	El Centro Field Office BLM 1661 South Fourth Street El Centro, CA 92243	July 2008

Source: SES 2008e.

Notes:
APE = Area of Potential Effects
BLM = Bureau of Land Management
CA = California
DBA = doing business as
FY = fiscal year
Inc. = Incorporated
kV = kilovolt
NADB = National Archaeological Database
NEPA = National Environmental Policy Act of 1969
No. = number
SDG&E = San Diego Gas & Electric
USDI = United States Department of the Interior

Previously Recorded Sites

The records search investigations identified 432 previously recorded cultural resource sites within the project area. Two of these resources were re-located during recent surface surveys. Cultural Resources Table 3 summarizes these findings.

Cultural Resources Table 3
Previously Recorded Cultural Resource Sites in the Project Area

Trinomial	Site Type	Dimensions
IMP-0112	Cremation Site	15 to 20 m × 15 to 20 m × 1 ft
IMP-0114	Lithic Scatter	20 m × 30 m
IMP-0269	Probable Seasonal Area	480 m × 890 m
IMP-0321	Yuman Site	Not on form
IMP-0364	Probable Seasonal Campsite	120 m × 130 m
IMP-0383	Temporary Campsite	11 m × 11 m
IMP-0453	Pottery Shards	Not on form
IMP-0456	Temporary Campsite	0.5 acre
IMP-0721	Ceramic Scatter - Small Campsite	3 m × 3 m
IMP-0722	Ceramic Scatter	1 m × 1 m
IMP-0723	Lithic Workshop	3 m × 3 m
IMP-0730	Cairn on Low Terrace - 65 Stones	2 m × 1 m
IMP-0731	Lithic Scatter	10 m × 10 m
IMP-0732	Lithic Workshop	2 m × 2 m
IMP-0733	Lithic Workshop	2 m × 2 m
IMP-0734	Lithic Workshop	1 m × 2 m
IMP-0735	Cairn of Porphyry Rock	90 cm × 90 cm × 7 cm
IMP-0737	Cairn	112 cm × 180 cm × 24 cm
IMP-0738	Lithic Workshop and 3 Tools	7 m × 3 m
IMP-0739-I	Ridge-Backed Scraper	103 mm × 83 mm × 27 mm
IMP-0740-I	(Isolate); Fist Axe	158 mm × 70 mm × 70 mm
IMP-0741	Cairn	1 m × 1 m × 20 cm
IMP-0743	Ceramic Scatter	20 m × 5 m
IMP-0744	Trail Marker	1 m × 1 m
IMP-0745	Trail	25 m × 25 m
IMP-0746	Ceramic Scatter - Campsite	50 m × 30 m
IMP-0747-I	Scraper	1 m × 1 m
IMP-0748	Cairn	2 m × 1 m
IMP-0749	Trail Marker	2 m × 2 m
IMP-0750	Ceramic Scatter	2 m × 3 m
IMP-0753	Ceramic Scatter	15 m × 4 m
IMP-0754	Ceramic Scatter	9 m × 8 m
IMP-0755	Ceramic Scatter	11 m × 8 m
IMP-0756	Hearth and Ceramic Scatter	24 m × 8 m
IMP-0758	Mound of Pebbles on a Sand Base	1 m × 1 m 35 cm × 7 cm
IMP-0759	Trail	80 m × 35 cm
IMP-0760	Lithic Workshop	30 m × 40 m × 20 cm
IMP-0764	Trail	804 m × 3 m
IMP-0776	Cleared Sandy Area with Ring of Pebbles	1 m × 1 m
IMP-0777	Trail	1,609 m × 1 m

Trinomial	Site Type	Dimensions
IMP-0778	Fire Pit	1 m × 1 m × 14.5 cm
IMP-0780	Fire Site	Not on form
IMP-0808	Trail	402 m × 1 m
IMP-0928	Temporary Camp	3 m × 3 m
IMP-0929	Temporary Camp	3 m × 3 m
IMP-0930	Temporary Camp	2 m × 2 m
IMP-0932	Small Lithic Workshop	2 m × 2 m
IMP-0934	Lithic Workshop	2 m × 2 m
IMP-0935	Lithic Workshop, Malpais or SD I	1 m × 1 m
IMP-0936	Small Lithic Workshop, Malpais	1 m × 1 m
IMP-0937	Assemblage of Porphyry Tools and Debitage; Lithic Workshop, Malpais	2 m × 2 m
IMP-0938	Lithic Workshop, Malpais	2 m × 2 m
IMP-0939	Lithic Workshop, Malpais	1 m × 1 m
IMP-0940	Lithic Workshop, Malpais	1 m × 1 m
IMP-0941	Lithic Workshop, Malpais	2 m × 1 m
IMP-0942	Lithic Workshop, Malpais	3 m × 3 m
IMP-0943	Lithic Workshop, Malpais	5 m × 6 m
IMP-0944	Lithic Workshop, Malpais	10 m (area)
IMP-0945	Small Lithic Workshop, Malpais	2 m × 2 m
IMP-0946	Lithic Workshop, Malpais	2 m × 2 m
IMP-0947	Sleeping Circle	400 cm × 280 cm
IMP-0948	Sleeping Circle	350 cm × 340 cm
IMP-0949	Sleeping Circle	470 cm × 400 cm
IMP-0950	Sleeping Circle	400 cm × 360 cm
IMP-0951	Sleeping Circle	350 cm × 370 cm
IMP-0952	Sleeping Circle	600 cm × 400 cm
IMP-0953	Sleeping Circle	400 cm × 300 cm
IMP-0954	Sleeping Circle	450 cm × 450 cm
IMP-0956	Trail	1,207 m × 1 m
IMP-0958	Cairn	1 m × 2 m
IMP-0959	Cairn	1 m × 1 m
IMP-0960	Lithic Workshop	2 m × 3 m
IMP-0961	Tools Along Trail	500 m × 1 m
IMP-0962	3 Scrapers, Possible Lithic Site	6 m × 6 m
IMP-0963	Trail	805 m × 6 m
IMP-0964	Cairn, Lithic Scatter	Not on form
IMP-0966	Agave Pit	Not on form
IMP-0972	Lithic Workshop	60.9 cm × 70.9 cm
IMP-0973	Lithic Workshop, Malpais	2 m × 2 m
IMP-0974	Temporary Campsite, Malpais	5 m × 6 m
IMP-0989	Trail, Probable Yuman	402 m × 1 m

Trinomial	Site Type	Dimensions
IMP-0990	Cairn (or Monument), Probable Yuman	1 m × 1 m
IMP-0991	Temporary Campsite, Yuman	30 m × 30 m
IMP-0992	Temporary Campsite, Yuman	150 m × 50 m
IMP-0993	Cremation Site, Yuman	3 m × 3 m
IMP-0994	Temporary Campsite, Yuman	3 m × 3 m
IMP-0995	Temporary Campsite, Yuman	30 m × 30 m
IMP-0996	Temporary Campsite, Yuman	30 m × 30 m
IMP-0997	Cremation Site, Yuman	3 m × 3 m
IMP-0998	Temporary Campsite, Yuman	3 m × 3 m
IMP-0999	Scattered Lithic Workshop, Yuman	15 m × 15 m
IMP-1000	Trail	50 m (length)
IMP-1001	Temporary Campsite, San Dieguito	5 m × 5 m
IMP-1002	Temporary Campsite, San Dieguito	8 m × 8 m
IMP-1003	Lithic Workshop, San Dieguito	1 m × 1 m
IMP-1006	Temporary Campsite, Yuman	10 m × 10 m
IMP-1007	Lithic Workshop, Yuman	10 m × 10 m
IMP-1009	05e: Lithic Scatter	600 m × 400 m
IMP-1010	Sleeping Circle	225 cm × 5 cm × 5 cm
IMP-1011	Sleeping Circles	320 cm × 5 cm × 5 cm
IMP-1012	Temporary Campsite, Yuman	15 m × 15 m
IMP-1013	Lithic Workshop, San Dieguito I	15 m × 15 m
IMP-1014	Trail	35 m × 1 m
IMP-1015	Temporary Campsite and Lithic Workshop	30 m × 15 m
IMP-1033	Ceramic and Lithic Scatter With Cairns	20 m × 36 m
IMP-1034	Cairn	2 m × 2 m
IMP-1035	Cairn	2 m × 2 m
IMP-1036	Cairn	2 m × 2 m
IMP-1037	Cairn	2 m × 2 m
IMP-1042	Temporary Camp with Loci	23 m × 25 m
IMP-1066	Small Lithic Workshop	1.5 m × 1 m
IMP-1067	Trail	208 m × 1 m
IMP-1069	Lithic Workshop, Malpais	Not on form
IMP-1070	Lithic Workshops	2 m × 4 m
IMP-1071	Campsite	100 m × 100 m
IMP-1072	Lithic Workshop and Cairn, Malpais	30 m × 50 m
IMP-1075	Lithic Workshop	100 m × 50 m
IMP-1078	Lithic Workshop, Mound of 19 Cobbles on Sand Base	33 m × 50 m
IMP-1122	Lithic Workshop, Cairns	15 m × 15 m
IMP-1408	Lithic Scatter, Ceramic Scatter	65 m × 40 m
IMP-1411	Felsitic Flake (Isolate)	1 m × 1 m
IMP-1412	Pot Sherd (Isolate)	1 m × 1 m
IMP-1413	Pottery and Lithic Scatters	1,700 m × 250 m

Trinomial	Site Type	Dimensions
IMP-1417	6 Sherds	8 m × 4 m
IMP-1418	3 Pot Sherds	10 m × 10 m
IMP-1419	Lithic Scatter, Pottery Locus	40 m × 40 m
IMP-1420	Pottery Scatter and Felsitic Flake Scatter	20 m × 30 m
IMP-1426	Village	10 m × 100 m
IMP-1597	Sleeping Circle	68 m × 3 m
IMP-1661	Pottery Scatter and Tools	Not on form
IMP-1662	Temporary Campsite	75.5 m × 38.4 m
IMP-1663	Campsite	3 m × 7.5 m
IMP-1724	Indian Trail Northeast	Not on form
IMP-1744	Crossed Express and Indian Trail	Not on form
IMP-1745	Crossed Express and Indian Trail	Not on form
IMP-1746	Crossed Express and Indian Trail	Not on form
IMP-1996	Lithic Workshop	3 m × 4 m
IMP-1997	Lithic Workshop with Chips	2 m × 3 m
IMP-1999	Scraper, Mano, and Destroyed Evidence	1 m × 0.5 m
IMP-2000	Lithic Workshop with Tools, Cores, and Debitage	8 m × 8 m
IMP-2001	Random Artifact in Extended Lithic Workshop	8 m × 5 m
IMP-2002	Single Artifact Along Extended Lithic Workshop	12 m × 12 m
IMP-2003	Miscellaneous Artifacts in Extended Lithic Area	1 m × 1 m
IMP-2004	Miscellaneous Tools in Extended Lithic Site	1 m × 1 m
IMP-2005	Single Artifact in Extended Lithic Area	1 m × 1 m
IMP-2006	Lithic Workshop with Tools, Cores, and Debitage	1 m × 1 m
IMP-2009	Lithic Workshop with Cores, Debitage, and Tools	10 m × 10 m
IMP-2010	Lithic Workshop	Not on form
IMP-2011	Lithic Workshops	50 m × 50 m
IMP-2013	Single Artifact Amid Misc. Worked Material	10 m × 10 m
IMP-2024	Miscellaneous Artifacts	1 m × 1 m
IMP-2025	Lithic Workshop	4 m × 4 m
IMP-2026	Lithic Workshops	3 m × 3 m
IMP-2027	Lithic Workshop with Combination Tools	5 m × 5 m
IMP-2028	Lithic Workshop	Not on form
IMP-2029	Chopper, Lithic Workshop	Not on form
IMP-2030	Single Artifact (Isolate)	1 m × 1 m
IMP-2032	Lithic Reduction Station	3 m × 3 m
IMP-2033	Chipping Station	10 m × 2 m
IMP-2034	Lithic Workshop	7.6 m × 7.6 m
IMP-2035	Single Artifact (Isolate)	1 m × 1 m
IMP-2036	Punctate And Debitage	1 m × 1 m
IMP-2038	Porphyry Core with Debitage	Not on form
IMP-2041	Lithic Workshop	7 m × 7 m
IMP-2043	Lithic Workshop	1.5 m × 1.5 m

Trinomial	Site Type	Dimensions
IMP-2044	Lithic Workshop	2 m × 2 m
IMP-2046	Lithic Workshop	2 m × 2 m
IMP-2071	Lithic Workshop	6 m × 6 m
IMP-2073	Chipping Station, Scrapers, Knives, Spokes Have	1 m × 2 m
IMP-2074	Lithic Scatter; Probably San Dieguito Site	1,001 m × 5 m
IMP-2075	Core, Gray Porphyry, 2 Choppers	3 m × 3 m
IMP-2076	Core and 3 Choppers	5 m × 5 m
IMP-2077	Core, Chopper, Debitage, and Scraper	30.4 m × 9.1 m
IMP-2078	Choppers and Core	30.4 m × 21.3 m
IMP-2081	3 Tools, Choppers, and Scraper	1 m × 30 m
IMP-2082	Chopper and 2 Cores	3 m × 18 m
IMP-2084	Chopper, 2 Cores, and Knife	5 m × 5 m
IMP-2085	Tools	5 m × 5 m
IMP-2086	Lithic	15 m × 30 m
IMP-2087	Chipping Station	10 m × 10 m
IMP-2088	Lithic Site	15 m × 15 m
IMP-2089	Lithic Tools	5 m × 5 m
IMP-2092	Lithic Tools	30 m × 10 m
IMP-2093	Chipping Station	30 m × 5 m
IMP-2094	Lithic Tools	30 m × 30 m
IMP-2095	Chipping Station	5 m × 5 m
IMP-2096	Lithic Site	15 m × 5 m
IMP-2097	Lithic	30 m × 5 m
IMP-2098	Possible Agave Pit with Tools	2.5 m × 7.3 m
IMP-2099	Lithic	1 m × 1 m
IMP-2100	Random Tools	10 m × 10 m
IMP-2105	Lithic Station	5 m × 5 m
IMP-2106	Lithic Workshop With Tool	10 m × 10 m
IMP-2107	Sleeping Circle	2 m × 2 m
IMP-2112	Lithic Workshop	53.3 m × 45.7 m
IMP-2122	Lithic Scatter with Tools	5 m × 5 m
IMP-2137	Lithic Workshop	3 m × 3 m
IMP-2139	Lithic Scatter	2 m × 2 m
IMP-2141	Lithic, Fist Axe, Core and Debitage	2 m × 2 m
IMP-2144	Lithic, Core and Small Knife	1 m × 1 m
IMP-2145	Random Tools at Pottery Scatter Site	1 m × 1 m
IMP-2147	Lithic Chips and Hammerstone	2 m × 2 m
IMP-2149	Lithic Flakes	1 m × 1 m
IMP-2154	Lithic, Core, and Flakes	1 m × 1 m
IMP-2156	Lithic Flakes	1 m × 1 m
IMP-2157	Lithic Tools	2 m × 2 m
IMP-2158	Lithic Flakes and Hammerstone	1 m × 1 m

Trinomial	Site Type	Dimensions
IMP-2176	Lithic Tools	1 m × 1 m
IMP-2177	Lithic Workshop and Sleeping Circles	30 m × 10 m
IMP-2178	Lithic Workshop, Chopper Core, Domed Scraper Plane	50 m × 10 m
IMP-2179	Lithic Workshop, Fist Chopper	11 m × 1 m
IMP-2180	Trail	15 m × 1 m
IMP-2181	Lithic Tool, Ovoid Scraper (Isolate)	1 m × 1 m
IMP-2182	Lithic Tools and Trail	1 m × 1 m
IMP-2183	Lithic Assemblage	1 m × 1 m
IMP-2185	Lithic Tool and Trail	1 m × 1 m
IMP-2189	Lithic Workshop and Cairn	30 m × 30 m
IMP-2190	Lithic Workshop	3 m × 3 m
IMP-2193	Flaking Station	2 m × 2 m
IMP-2194	Flaking Station	2 m × 2 m
IMP-2195	Flaking Station	2 m × 2 m
IMP-2196	Lithic Station and Worked Tools	30 m × 30 m
IMP-2197	Lithic Station	2 m × 2 m
IMP-2198	Lithic Station	2 m × 2 m
IMP-2200	Lithic Station	1 m × 1 m
IMP-2202	Lithic Workshop (3 Choppers)	20 m × 5 m
IMP-2203	Lithic Workshop (3 Choppers)	5 m × 3 m
IMP-2204	Lithic Workshop (Core and Debitage)	1 m × 1 m
IMP-2205	Sleeping Circle, 3 Flaking Stations	10 m × 10 m
IMP-2207	Lithic, Fist Axe and Hammerstone	2 m × 1 m
IMP-2211	Lithic Workshop (Core and 3 Choppers)	3 m × 3 m
IMP-2212	Lithic, Fist Axe, Knife	2 m × 1 m
IMP-2213	Lithic Workshop	60 m × 20 m
IMP-2214	Lithic Workshop and Tools	12 m × 3 m
IMP-2216	Lithic, Knife	1 m × 1 m
IMP-2217	Lithic, Knife	1 m × 1 m
IMP-2218	Lithic, Chopper	1 m × 1 m
IMP-2219	Lithic Workshop	2 m × 3 m
IMP-2223	Lithic	4 m × 2 m
IMP-2224	Lithic, Hammerstone and Knife	2 m × 1 m
IMP-2225	Lithic Workshop	3 m × 2 m
IMP-2226	Lithic (3 Cores)	3 m × 1 m
IMP-2231	Lithic Workshop	2 m × 2 m
IMP-2232	Lithic Workshop (Spokeshave and Flakes)	1 m × 2 m
IMP-2234	Lithic Workshop	1 m × 1 m
IMP-2235	Lithic Workshop (Core and Debitage)	2 m × 2 m
IMP-2236	Lithic Workshop	25 m × 10 m
IMP-2239	Lithic, 2 Choppers and 1 Scraper	1 m × 3 m
IMP-2241	Lithic	5 m × 2 m

Trinomial	Site Type	Dimensions
IMP-2247	Lithic, Knife Scraper Core	3 m × 1 m
IMP-2251	Lithic Workshop	1 m × 1 m
IMP-2302	Lithic Workshop	30 m × 30 m
IMP-2303	Lithic Workshop	50 m × 50 m
IMP-2304	Lithic Workshop	30 m × 100 m
IMP-2305	Lithic Workshop	100 m × 30 m
IMP-2306	Single Artifact	Multiple dimensions given
IMP-2315	Lithic Workshop	6 m × 3 m
IMP-2322	Lithic Workshop (Green Porphyry and Quartz)	60 m × 48 m
IMP-2332	Lithic Workshop with Core	3 m × 1.5 m
IMP-2333	Lithic Workshop	2.4 m × 2.4 m
IMP-2334	Lithic Workshop, 5 Tools	6 m × 4.5 m
IMP-2341	Circle With Artifacts in Center	1 m × 1 m
IMP-2351	3 Artifacts	Not on form
IMP-2353	Single Artifact	1 m × 1 m
IMP-2359	Lithic Workshop	1 m × 1 m
IMP-2360	Cairn	1 m × 1 m
IMP-2361	Lithic Workshop	9.12 m2
IMP-2362	Single Artifact	1 m × 1 m
IMP-2363	Lithic Workshop	30 m × 30 m
IMP-2364	Lithic Workshop	Multiple dimensions given
IMP-2371	Lithic Workshop	30 m × 30 m
IMP-2372	Lithic Workshop	15 m × 15 m
IMP-2373	Intersection of 2 Trails	300 m × 1 m
IMP-2438	Lithic Scatter	10 m × 10 m
IMP-2439	2 Cores and A Few Flakes	10 m × 10 m
IMP-2440	2 Cores and 20 Bone Fragments	5 m × 5 m
IMP-2441	2 Cores and Flakes	5 m × 5 m
IMP-2442	5 Fired Red Sandstone Deposits	100 m × 60 m
IMP-2443	Lithic Workshop, Green Porphyry	130 m × 10 m
IMP-2478	Possible Trail	100 m × 1 m
IMP-2479	Scraper, 2 Cores, and Flakes	1 m × 1 m
IMP-2764	Lithic Scatter with Tools	40 m × 15 m
IMP-3052	Ceramic Scatter	3 m × 3 m
IMP-3191-H	Ruins of the Dixieland School	Not on form
IMP-3192-H	Dixieland Cafe and Grocery Store	Not on form
IMP-3276-H	San Felipe Creek	8 ft × 6 in
IMP-3396-H	Crossed Express Trail	Not on form
IMP-3399-H	Crossed Wagon Road	Not on form
IMP-3400-H	Wagon Road (unable to relocate 1978)	Not on form
IMP-3401-H	Cross Wagon Road	Not on form
IMP-3402-H	Wagon Road (unable to relocate 1978)	Not on form

Trinomial	Site Type	Dimensions
IMP-3505-H	Military Occupation (Heavy) Mounts, Cairns, Trail	402.3 m (length)
IMP-3745	Lithic Scatter	5 m × 5 m
IMP-3747	Single Potsherd (Isolate)	Not on form
IMP-3748	Isolate (Hammerstone)	10 cm × 8 cm × 6 cm
IMP-3750	Chipping Station	3 m × 3 m
IMP-3751	Lithic Scatter	1 m × 1 m
IMP-3752	Lithic Scatter with 4 Loci	25 m × 30 m
IMP-3753	Isolate (Bifacial Scraper)	NA
IMP-3754	Lithic Scatter with 2 Loci	5 m × 10 m
IMP-3755	Lithic Scatter	3 m × 3 m
IMP-3756	Lithic Scatter	1 m × 1 m
IMP-3757	Lithic Scatter with Tools	11 m × 3 m
IMP-3758	Lithic Scatter with Tools	130 m × 60 m
IMP-3759	Lithic Scatter with Tools	50 m × 50 m
IMP-3760	Lithic Scatter with 4 Loci	60 m × 60 m
IMP-3761-H	Historic Trash Dump with 2 Loci	15 m × 20 m
IMP-3763	Lithic Scatter with Tools	30 m × 20 m
IMP-3764	Lithic Scatter with Tools	40 m × 15 m
IMP-3765	Lithic Scatter	20 m × 10 m
IMP-3766	Pottery Scatter with Lithics	10 m × 0.8 m
IMP-3767	Single Flake (Isolate)	NA
IMP-3768	Lithic Scatter with 2 Loci	25 m × 45 m
IMP-3769	Lithic Scatter with Tools	0.5 m × 0.5 m
IMP-3770	Single Flake (Isolate)	NA
IMP-3771	Lithic Scatter with Tools	60 m × 60 m
IMP-3772	Lithic Scatter with Tools	15 m × 15 m
IMP-3773	Lithic Scatter with Tools	20 m × 15 m
IMP-3774	Lithics, 2 Cores	1 m × 1 m
IMP-3775	Lithics, Flake and Scraper	1 m × 1 m
IMP-3776	Discoid Scraper (Isolate)	Not on form
IMP-3777	Core (Isolate)	Not on form
IMP-3778	Chopper (Isolate)	13 cm × 10 cm × 4.5 cm
IMP-3779	Lithics, Core and Flake	0.2 m × 0.2 m
IMP-3782	Ceramic Scatter and Trail Segment	Not on form
IMP-3783	Ceramic Scatter	3 m × 3 m
IMP-3784	Chopper (Isolate)	Not on form
IMP-3785	Lithic Scatter	2 m × 2 m
IMP-3786	Flake (Isolate)	0.5 m × 0.5 m
IMP-3788	Lithic Scatter	20 m × 60 m
IMP-3789	Lithic Scatter	3 m × 3 m
IMP-3790	Lithic Scatter	7 m × 2 m
IMP-3791	Lithic Scatter, Ceramic Scatter	1 m × 1 m

Trinomial	Site Type	Dimensions
IMP-4121	Lithic Scatter	1350 m × 350 m
IMP-4189	Temporary Campsite	100 m × 50 m
IMP-4190	Lithic Scatter	6 m × 8 m
IMP-4191	Lithic Scatter	0 to 10 sq m
IMP-4192	Lithic (Isolate)	0.5 m × 0.5 m
IMP-4193-H	Historic Trash Dump	2 m × 2 m
IMP-4237	Temporary Campsite	800 m × 800 m
IMP-4244	Lithic Scatter	100 m × 35 m
IMP-4245-H	Historic Trash Dump	10 m × 10 m
IMP-4246	Ceramic and Lithic Isolates	5 m × 15 m
IMP-4247	Lithic Workshop	200 m × 80 m
IMP-4248	Ceramic Scatter, Lithic Scatter	20 m × 5 m
IMP-4337	Lithic (Isolate)	0.5 m × 0.5 m
IMP-4338	Chipping Station	2 m × 1 m
IMP-4339	Isolated Locale	1 m × 1 m
IMP-4340	Lithic (Isolate)	0.5 m × 0.5 m
IMP-4341	Chipping Circle	1 m × 1 m
IMP-4342	Lithic (Isolate)	1 m × 1 m
IMP-4343	Temporary Campsite	80 m × 50 m
IMP-4344	Lithic Scatter; Possible Temporary Campsite	160 m × 340 m
IMP-4346	Temporary Campsite	30 m × 30 m
IMP-4347	Lithic Scatter	10 m × 55 m
IMP-4348	Temporary Campsite/Village	Multiple dimensions given
IMP-4349	Lithic Scatter, Ceramic Scatter, Temporary Campsite	500 m × 85 m
IMP-4350	Lithic Scatter, Ceramic Scatter	85 m × 135 m
IMP-4351	Lithic Scatter, Ceramic Scatter	25 m × 105 m
IMP-4352	Lithic Scatter, Temporary Campsite	40 m × 60 m
IMP-4354	Lithic Scatter	30 m × 30 m
IMP-4380	Trail and Lithic Workshop	91 m × 91 m
IMP-4381	Geoglyph and Hearths	30 m × 30 m
IMP-4390-H	Historic Trash Dump	5 m × 5 m
IMP-4469	Temporary Campsite, 2 Pot Drops, Lithic Scatter	20 m × 15 m
IMP-4470	Pot Drop	20 m × 10 m
IMP-4471	Pottery Scatter	Not on form
IMP-4515	Ceramic Scatter	10 m × 10 m
IMP-4517	16, Isolate: Chalcedony Flake	Not on form
IMP-4540	Temporary Campsite, Lithic Scatter	100 m × 400 m
IMP-4541	Lithic Scatter, Chipping Circle	0.5 m × 1 m
IMP-4544	3 Felsitic Flakes	1 m × 1 m
IMP-4546	3 Felsitic Flakes	5 m × 5 m
IMP-4548	Lithic Scatter, Flakes	70 m × 100 m
IMP-4573	Lithic Scatter	50 m × 30 m

Trinomial	Site Type	Dimensions
IMP-4575	Lithic Scatter	5 m × 5 m
IMP-4577	Lithic Scatter	60 m × 40 m
IMP-4578	Chipping Circle	2 m × 2 m
IMP-4581	Lithic Workshop	5 m × 5 m
IMP-4582	Lithic Scatter	80 m × 80 m
IMP-4583	Lithic Workshop	5 m × 5 m
IMP-4584	Chipping Circle	5 m × 5 m
IMP-4585	Temporary Campsite	30 m × 30 m
IMP-4602	Pottery Scatter	25 m × 25 m
IMP-4673	Isolate: Flake	Not on form
IMP-4677	Lithic and Pottery Scatter	2 acres (area)
IMP-4750	Lithic Scatter	1 m × 1 m
IMP-4752	Hearths, Lithic Scatter	120 m × 60 m
IMP-4838	Floor of Lake Cahuilla	Not on form
IMP-4875	Chipping Circle	0.5 m × 0.5 m
IMP-4954	Lithic Site with Cairn	220 m × 120 m
IMP-5042	Temporary Campsite	75 m × 75 m
IMP-5043	Ceramic Scatter, Lithic Scatter	24 m × 30 m
IMP-5044	Ceramic Scatter, Lithic Scatter	7 m × 5 m
IMP-5058	Ceramic Scatter	5 m × 2 m
IMP-5189	Lithic Scatter, Possible Shell Midden, Ceramics, and Trails	60 m × 80 m
IMP-5190	Trail, Porphyry Side Scraper, Porphyry Punctate	100 m × 6 m
IMP-5197	Scatter of Andesite Flakes, Sherds, and Burnt Bone	50 m × 25 m
IMP-5198	Low-Density Lithic Scatter	50 m × 25 m
IMP-5199	Chipping Circle	15 m × 25 m
IMP-5200	Chipping Circle	22 m × 2 m
IMP-5201	Pumice Cache and Low-Density Lithic Scatter	15 m × 15 m
IMP-5202	Temporary Campsite	29 m × 20 m
IMP-5203	Temporary Campsite	15 m × 10 m
IMP-5204	Temporary Campsite	170 m × 30 m
IMP-5205	Temporary Camp - Lithic Scatter	100 m × 100 m
IMP-5225	Geoglyph	5 m × 10 m
IMP-5277	Metate Fragment	Not on form
IMP-5700	Lithic Workshop	Not on form
IMP-5701	3 Primary Flakes, 1 Secondary Flake, 1 Hammerstone	Not on form
IMP-5704	Lithic Scatter	Not on form
IMP-5705	Lithic Scatter	Not on form
IMP-5707	Lithic Scatter	Not on form
IMP-5715	Ceramic Scatter	Not on form
IMP-5719	Lithic Scatter	Not on form
IMP-6680	Green Porphery Scraping Tool	Not on form

Trinomial	Site Type	Dimensions
IMP-6681	Green Porphery Flake	Not on form
IMP-6687	Lithic Workshop	1 m × 1 m
IMP-7816-H	Historic Railroad Stop	100 m × 40 m
IMP-7868-H	Historic Trash Scatter on Open Desert	8 m × 12 m
IMP-8509	Irrigation Canal, Concrete Culvers	0.31 mi length × 15.1 ft width
IMP-8654	Ceramic Scatter, Lithic Scatter	17 m × 17 m
IMP-8656	Lithic Scatter	58 m × 83 m
IMP-8667	Lithic Scatter	5 m × 5 m
IMP-8668	Lithic Scatter	11 m × 80 m
IMP-8669	Ceramic Scatter, Lithic Scatter	50 m × 60 m
IMP-8698	Ceramic Scatter, Lithic Scatter	15 m × 25 m
IMP-8720	Lithic Scatter	37 m × 140 m
IMP-8721	Lithic Scatter	35 m × 100 m
IMP-8738	Lithic Scatter	5 m × 5 m
IMP-8740	Lithic Scatter	5 m × 5 m
IMP-8743	Lithic Scatter	5 m × 20 m
IMP-8745	Lithic Scatter	6 m × 6 m
IMP-8749	Cairns, Lithic Scatter	16 m × 49 m

Source: SES 2008e.
Notes:
cm = centimeter
ft = feet
IMP = Imperial County
in = inches
m = meter
mi = mile
mm = millimeter
NA = not applicable
sq = square

Discussion of Previously Recorded Sites

With minimal updates and editorial contributions, the following subsection was adapted from URS (2008: Section 5). Most of these sites were recorded before the invention of Global Positioning Station (GPS) technology. The ability to adequately place the locations of small sites on a 1:24,000-scale USGS topographic map in an environment such as the project area was quite difficult without GPS equipment. With the state of technology at the time, surveying equipment would most likely have been required to achieve comparable results. The URS review of the original DPR forms reveals that most of the sites were shown only as a point on the 1:24,000 scale map, and intensive efforts to pinpoint locations do not appear to have been made. All of the forms show Universal Transverse Mercator (UTM) locations for these sites, and these UTM coordinates were used by the present survey to map previous site locations. However, the UTM coordinates appear to have been added later to the forms, based on the original points on the maps. These factors suggest that the location information for these sites is suspect. The site descriptions on these older forms are also usually quite general, which adds to the difficulty of relocating the sites. Finally, in many cases no sketch maps were made of the sites, another complicating factor in site relocations.

The proponent's consultant is confident that many of the previously recorded sites were re-located, but could not be matched on an individual basis to previously recorded DPR forms. Only two of these previously recorded cultural resources (CA-IMP-2083 [current temporary number JM-9, Locus B] and CA-IMP-3762 [current temporary number EBR-001]) were definitively re-located during the course of the field investigations carried out by the consultant. While the differences in reliability between the older techniques and the modern techniques are clearly understood, the inability to more closely correlate the results of the current cultural resources inventory with the previous inventories makes it impossible to arrive at a final determination of the number and density of the cultural resources in the project area.

Previously recorded sites that were re-located:

- CA-IMP-2083: chipping station with core, chopper, and debitage; 5 m × 5 m; and
- CA-IMP-3762: lithic scatter and trail segment; 30 m × 0.3 m.

These issues also plagued efforts to re-locate previously recorded sites associated with the Yuha District. A portion of Yuha Basin Discontiguous District is located within the records search boundary; the majority of the district is located south of the project area.

The SCIC searched all relevant previously recorded cultural resources site records and previous investigations completed within the project area and a 1-mile search radius around it. Information reviewed included location maps for all previously recorded prehistoric and historical archaeological sites and isolates; DPR forms and updates for all cultural resources previously identified; previous investigation boundaries; and National Archaeological Database citations for associated reports, historic maps, and historical addresses.

C.3.4.3 CONSULTATIONS

Native American Consultation

Native American Heritage Commission Sacred Lands File Search Results

A Sacred Lands File search request was submitted to the Native American Heritage Commission (NAHC) on January 4, 2008. The response letter dated January 7, 2008, established that the Sacred Lands File (SLF) search for the project area failed to indicate the presence of Native American cultural resources in the immediate project area. A second letter from the NAHC dated January 23, 2008, indicated that the original request and response had been misplaced. This letter established that the SLF search did indicate the presence of Native American cultural resources in the project area. The letter indicated consultation as the best way to avoid unanticipated discoveries. A list of contacts for adjacent tribes was enclosed. Specifically, the letter recommended contacting Carmen Lucas for insight regarding specific information about the cultural resource location in the project area.

With the filing of the Solar Two application for a ROW, the BLM, as the lead federal agency, initiated tribal consultation pursuant to the Executive Memorandum of April 29th, 1994, as well as other relevant laws and regulations, including Section 106 of the NHPA. To date, 12 tribes and 15 additional tribal contacts have been identified and invited to consult on this project. The BLM initiated formal government-to-government consultation by letter in January 2008 and has followed up with 3 additional letters since that time. With each letter, the BLM endeavored to provide updates on the status of the environmental review process including cultural resource inventories, invite the tribes into government-to-government consultation, and request their help in identifying any issues or concerns. The BLM also requested their assistance in identifying any sacred sites and places of traditional religious and cultural significance which might be affected by the proposed project.

Since January 2008, the BLM has responded to requests for both formal and informal meetings with tribal governments, tribal staff or tribal members. Additionally, several written comments from tribal contacts have been received to date. As the environmental review and Section 106 consultation processes move forward for this project, the BLM will continue to consult with tribes and interested tribal members on issues or concerns related to cultural resources and the PA or other resources and issues of concern. Information gathering through field visits to the project area and interviews with various tribal members began in early 2009. Tribal members including those from the Cocopah Indian Tribe, the Quechan Tribe, and the Kwaaymii have visited the project area and viewed cultural resources. Further field visits and tours are expected in the upcoming months as the cultural resources inventory report is finalized and Section 106 consultation continues.

Regarding the presence of human remains within the project area of analysis (APE), various tribal elders have spoken of the intense spiritual value that cremations have to Native Americans in the region at a December 4, 2009 meeting in El Centro the purpose of which was to initiate the development of the proposed PA.

Other Consultation

The ACHP, the CA SHPO, the National Trust for Historic Preservation, the Anza Society, the Army Corps of Engineers, the National Park Service, and Tessera Solar, are organizations or agencies that have been invited into consultation on the development of the Programmatic Agreement. Those consulations are ongoing.

New Inventory Investigations

Geoarchaeology Study

With minimal updates and editorial contributions, the following subsection was adapted from URS (SES 2009).

Introduction

The following discussion is largely focused on identifying those portions of the project area that have the potential for the presence of subsurface archaeological deposits even though there are no surface manifestations. It has been shown that some alluvial landforms, with desert pavements that have evolved through accretion of eolian silts and sands and the gradual bearing of larger clasts to the surface, have the potential for containing buried archaeology (Ahlstrom and Roberts 2001). However, a representative portion of this archaeological deposit would be incorporated into the surface pavement through the same accretionary process. Thus, these older surfaces are not likely to contain archaeological sites that are not at least partially evident on the surface.

Geomorphologic processes have played a major role in the differential preservation of archaeological sites in the Colorado Desert. Paleoindian/San Dieguito Culture sites (ca. 10,000–8,000 BP) and Early Archaic sites (ca. 8,000–4,000 BP) are extremely rare, especially at lower elevations within the region. These early sites are typified by sparse remains on desert pavements, often on mesas and terraces overlooking larger washes. Schaefer (1994:64) suggests that “these are zones where a variety of plant and animal resources could be located and where water would at least be seasonally available.” However, it is much more likely that this is simply a matter of landscape development since the Late Pleistocene; these mesas and terraces, with well developed desert pavements, represent the differential preservation of older land surfaces at higher elevations.

The project area, and lower elevations within the Colorado Desert in general, appear to have experienced climatic and vegetation regimes similar to today for most of the Holocene (Schaefer 1994:60–63). The creosote scrub habitat that typifies the project area was established at lower elevations by the Late Pleistocene, indicating that people inhabiting the area would have had access to similar natural resources throughout much of the prehistoric period. Numerous studies that have focused on lower areas have shown much less environmental change, likely due to the preponderance of precipitation in these low-lying areas within the rain shadow of large mountain ranges (Weide 1976). Within the project area, the major fluctuation in available resources through time and the concomitant placement of various site types on the landscape are directly related to the episodic filling and desiccation of Lake Cahuilla. These episodes in turn generated the push-pull effect on prehistoric populations, with immigrants being attracted during episodes of filling and emigrants being pushed out during episodes of desiccation.

One cannot use the record of Lake Cahuilla high and low stands as indicators of local environmental change. Lake fluctuations within the Salton Sea basin are primarily related to structural changes in the Lower Colorado delta, and the construction or breaching of a natural dike. These changes may or may not be environmentally dependent, and thus have little bearing on the timing of deposition-erosion cycles in the Yuha Desert. Instead, one must rely on environmental fluctuation data from nearby regions, such as the Mojave Desert, for the timing of these events. Two later episodes of fan deposition occurred around 3,000 years ago, likely associated with changes in the North American Monsoon and an increase in effective moisture at the onset of the Late Holocene, and again during the past 1,000 years, possibly due to climate changes associated with the Medieval Climatic Anomaly. These periods of punctuated fan deposition correspond with those observed elsewhere in the region, and are assumed to have affected the Solar Two project area as well.

Identification of Major Landforms within the Project Area

The Solar Two project area represents a microcosm of the geomorphic conditions that exist in the Yuha Desert. Pliocene and Pleistocene non-marine sedimentary rock outcrops are located along the southern boundary of the project area. These formations mantle the uplifted Pliocene marine outcrops, which form the Yuha Buttes, just south of the project area. The non-marine rock outcrops within the project area are heavily dissected (eroded) and mantled by Quaternary fan piedmonts. More recent fan aprons issue from the leading edge of these piedmonts and reach to the paleo-shoreline of Lake Cahuilla, where various beach deposits are also located. As with most large alluvial fans, these Quaternary landforms are actually composed of numerous remnants and more recent deposits of varying ages. By examining the relationship between these landform components, relative age estimates can be developed, conclusions can be drawn as to the depositional history of that landform, and the potential of each landform to harbor buried paleosols of appropriate age can be determined.

Dating Alluvial Desert Deposits in the Project Area

The major landforms within the Yuha/West Mesa region were largely constructed during Pleistocene time or earlier (California Department of Conservation 1984; Strand 1962). As suggested by Peterson (1981:4), by "mid-Pleistocene time … parts of these major landforms [began to be] cut away by periodic erosion or buried by periodic sedimentation … This resulted in a mosaic of old, remnant land surfaces and relatively young land surfaces." The age of alluvial deposits within the project area is of central concern because it is the single most important factor in constraining the possibility of buried archaeological deposits. Older land surfaces—those that were deposited prior to human occupation in the Americas (ca. 13,000 years ago) and which are still exposed on the surface—have very little possibility of containing buried archaeological deposits. On the other hand, younger land surfaces, if deposited in the right location, with low enough energy, may bury and preserve archaeological material previously deposited on an older surface. However, if these younger deposits unconformably overlie heavily eroded older formations, any archaeological sites that may originally have been deposited on the older surface would have been destroyed.

Unfortunately, dating of alluvial fan deposits is difficult and there is significant variation in the precision of various methods used in determining relative and numerical ages (McDonald et al. 2003:190). Two primary, non-chronometric methods are used for determining the age of desert alluvial landforms: soil development and desert pavement development. Both of these methods are heavily dependent on environmental factors such as temperature, precipitation, and parent material. As such, they are most effective within a confined relatively homogeneous area, such as the project area.

While desert pavement formation is dependent on factors of time and climate, parent material also plays a major role. In general, alluvium derived from plutonic (e.g., granitic) sources form much weaker pavement—with fewer interlocking stones and less evident varnish—than volcanic and limestone sources (McDonald et al. 2003:193). In the project area, granite is the dominant parent material within the older fan piedmont. Some portions of the fan piedmont are also derived from Pliocene marine formations (i.e., the Yuha Buttes)—as evidenced by reworked fragmentary fossilized marine shell—but are generally well mixed with granitic material. The younger inset fans and fan aprons consist primarily of reworked material from the older fan components. Given the predominance of granitic parent material, one can expect that desert pavements within the project area will be much weaker than in other areas of the Colorado Desert, where more resistant parent material may be present. Nonetheless, comparison of pavement surfaces within the project area should provide a reliable estimate of relative age. Unfortunately, due to heavy Off Highway Vehicle (OHV) use within the project area, some older pavement surfaces have been severely disturbed and may appear younger than the landform actually is.

As such, perhaps a more reliable estimate of landform age within the project area is soil horizon development. Due to the time-transgressive nature of soil development in arid environments, the stage of calcium-carbonate (k) illuviation and development and the degree of B horizon development are identifiable markers of age (McDonald et al. 2003). In this study of the Solar Two project area, the degree of desert pavement formation and calcic horizon formation were used in conjunction as indicators of landform age during field studies. In addition, more typical soil classifications were made on exposed profiles in order to assess pedogenic processes at play in the project area.

Master soil horizons were defined using standard United States Department of Agriculture soil taxonomy (Soil Survey Staff 2006). This organizational system uses uppercase letters (A, B, and C) to describe in-place weathering characteristics. Most horizons and layers are given a single capital letter symbol where “A” is the organic-rich upper horizon developed at or near the original ground surface, “B” is the horizon formed in the middle of a profile, with concentrations of illuviated clays, iron, etc., and general changes in soil structure, and “C” is the relatively unweathered parent material upon which the other soil horizons formed.

These master horizons are preceded by Arabic numerals (2, 3, etc.) when the horizon is associated with a different stratum; where number 1 is understood but not shown, and lower numbers indicate superposition over larger numbers. Lowercase letters are used to designate subordinate soil horizons (Table 4, Subordinate Distinctions within Master Soil Horizons). Combinations of these numbers and letters indicate the important characteristics of each major stratum and soil horizon, from which inferences about deposition and pedogenic history can be drawn.

Cultural Resources Table 4
Subordinate Distinctions among Master Soil Horizons

Subordinate Horizon	Description
c	Cementation or induration of the soil matrix
k	Accumulation of pedogenic carbonates, commonly calcium carbonate
ox	Oxidized iron and other minerals in parent material (C-horizon)
t	Accumulation of subsurface silicate clay (illuviation)
v	Vesicular soil development
w	Development of color or structure with little apparent illuvial accumulation

Methods and Results

Major landforms within the project area were initially identified using 1×1 m resolution black-and-white aerial photography. Given these designations, certain broad assumptions could be made about the age and depositional history of each portion of the project area. This mapping and related assumptions were verified and modified in the field, through on-the-ground examination of the landscape and key indicators such as relative slope, desert pavement development, and subsoil formation. The latter was largely examined in soil profiles exposed in active or recent stream channels, smaller erosional side slopes on the fan piedmont, and at least two older unfilled backhoe trenches that were discovered during the course of field investigations. The combined results of this study are summarized in Table 5, Summary of Geoarchaeological Sensitivity of Landforms within the Solar Two Project Area. The following is a discussion of these results.

Cultural Resources Table 5
Summary of Geoarchaeological Sensitivity of Landforms in the SES Solar Two Project Area

Landform	Age	Depositional Regime*	Sensitivity
Rock Outcrops	Pliocene	Erosional	None
Fan Piedmont (and remnants)	Pleistocene	Erosional	Very Low
Fan Apron/Skirt	Pleistocene to Holocene	Depositional	Low to Moderate
Lake Basin (Beach Zone)	Holocene	Depositional	Moderate
Lake Basin (Lower Lake Basin)	Holocene	Variable	Low to Moderate
Recent/Active Channels	Late Holocene	Erosional	Very Low

*Represents the dominant regime since the terminal Pleistocene

Sediments and Soils in the Project Area

During the Pleistocene, the Salton Trough was periodically inundated by the floodwaters of the Colorado River to form a number of unnamed lakes. Lake Cahuilla was formed in the late Holocene, which was one of the final episodes of sedimentation in the project area. The fine-grained silts and clays of lacustrine origin represent the Borrego and Brawley formations, which are exposed in the northern basin region. Continued deposition of coarser sediments of the Colorado River along the basin margin during the Pleistocene resulted in the Ocotillo Conglomerate Formation. The most recent sediments deposited in the basin, the Holocene Lake Cahuilla Beds, resulted from a series of fresh to brackish water lakes in the Salton Trough. The lakebed deposits consist of tan and gray fossiliferous clay, silt, sand, and some gravel. Young alluvial deposits overlie or interfinger with the Lake Cahuilla Beds around the margins of the ancient lake region that formed the present-day expression of the Ancient Lake Cahuilla shoreline.

Fan Piedmont

The fan piedmont, which makes up the majority of the project area, is actually a complex of component landforms dominated by erosional fan remnants, erosional side slopes and gullies, and inset fans, which themselves have been further eroded and redeposited downslope. In general, the landscape is heavily desiccated. Peterson (1981:22) suggests that the fan piedmont is generally made up of “contiguous or imbricated mantles deposited during the Pleistocene … [and] collectively the portion of the fan surface that they form are all so old that their soils have relict features reflecting past Pleistocene climates."

The majority of exposed surfaces within this area are very old fan surfaces with moderately well-developed pavement and overthickened calcic subsurface soil development. The subsurface exposures suggest a much older landscape than might be initially assumed from pavement development. The lack of well defined, late-stage interlocking desert pavement, which is often seen in other parts of the Basin and Range, is due to 2 primary factors: parent material and historic land use (see previous discussion). Material for the fan piedmont within the Solar Two project area appears to be largely derived from a granitic parent source. The granite is easily weathered and, when exposed on the surface, decomposes to fine grain material, as evidenced by the large amount of decomposing granite that makes up subsurface soils and fills the gullies between interfluves. Extensive OHV use of the project area further degrades these pavements and exposes the surface to further erosion.

The lack of very well-developed pavement on some older surfaces within the project area also has an effect on erosion and subsurface soil development. In some cases, this is the direct result of soil horizons typically found in the upper portions of the profile (e.g., an Av-horizon) having been eroded away. In others, it is simply that the calcic development is so advanced that the typically vesicular Av or BAv horizons have been infilled and incorporated and cemented by calcium carbonate.

The soils and land surfaces observed throughout the fan piedmont suggest an antiquity that precludes any significant buried archaeological deposits that are not at least partially evident on the surface. In general, the dissected fan piedmont consists of very old (Late Pleistocene or older) alluvium mantling uplifted non-marine formations. No buried paleosols were observed in the cuts and profiles examined within the fan piedmont. Soils and pavements developed at or near the surface are consistent with Late Pleistocene or older alluvial deposits dated by other studies in the region (e.g., McDonald et al. 2003; Harvey and Wells 2003).

The greatest—perhaps only—potential for buried archaeological deposits within the fan piedmont exists in the larger Holocene inset fan drainages, where recent fine grain alluvium *may* have been deposited as an inset pediment, prior to scouring of the surface by the actively incising drainage. In general, these inset fan portions are unlikely to contain buried archaeology because they were largely laid down unconformably on eroded Pleistocene deposits. The preservation of archaeological material is wholly dependent on the erosional history prior to deposition of the fine grain pediment. Given the highly erosive nature of the fan piedmont in general, this type of localized subsurface preservation seems unlikely. However, these isolated areas appear to represent the only possibility for preserved subsurface archaeology within the fan piedmont region of the project area. If cultural deposits are present under these isolated inset pediments, they would most likely be very similar, both in quality and quantity of artifacts, to those sites found on the surface in nearby remnant portions of the fan piedmont.

Fan Apron/Skirt

Often termed a fan skirt, this portion of the project area is defined by a broad area at the base of the fan piedmont, where the finer grain material eroded from the fan piedmont is deposited on the basin floor. In this case, the fan skirt actually consists of a number of fan “aprons” that do not individually fully cover the entire area, but interfinger and partially bury one another and the piedmont remnants.

The large fan aprons that dominate the central portion of the project area of analysis enter the basin floor up to 3 kilometers from the Lake Cahuilla high shoreline, and extend up to and, in some places, past that line. Where the aprons appear to extend past the shoreline, we can assume that these aprons were deposited after the last high stand (ca. AD 1700) as they have not been modified by lake actions (either erosional or depositional). Though erosive braided channels make up a portion of each successive fan apron, especially at the head of the aprons as they emerge from the piedmont, a significant portion of each apron also consists of thin alluvial mantles deposited to the side of each channel. Younger apron deposits may cover, or partially cover through the infilling of swales, older apron deposits.

Lake Basin

The lake basin portion of the project area consists of at least two distinct components: (1) the nearly flat lake basin itself (“lower lake basin”), which represents the abandoned Lake Cahuilla basin, and (2) the interface between that basin and the fan apron. The lake basin−fan apron interface consists of the Lake Cahuilla highstand shoreline, and a beach zone associated with that shoreline and its most recent recession.

Beach Zone

The typical undulating landscape of the beach zone near the Lake Cahuilla highstand (12 m above mean sea level [AMSL])consists of (generally from west to east) beach flats, sand berms and deflated beach sands that are consistent with the multiple formation and recessional events of the maximum Lake Cahuilla shoreline between at least AD 1200 and 1700 (750−250 B.P.; Laylander 2006). Although no buried soils were identified in this portion of the shoreline, the beach zone and the interface with the fan apron is considered the most likely area for site deposition and preservation within the project area. Given the dynamic, but generally low-energy depositional nature of geomorphic processes at the distal fan apron-beach-lake basin interface, the potential for site burial is heightened.

The most recent Lake Cahuilla highstand of 12 m AMSL was dictated by the elevation of natural levees formed by the Colorado River delta, which were over-topped when the lake reached that elevation. It may be reasonable to assume that these delta levees acted as the ultimate control of maximum lake height throughout the Late Pleistocene and Holocene. However, the elevation of the Colorado River delta system has almost certainly changed significantly over the last 20,000 years.

Lower Lake Basin

Very few exposures were available for examination within the low-lying lake basin portion of the project area. The land surface within the lake basin is generally very flat to very gently sloping, with a thin mantle of latest Holocene alluvium and eolian silts overlying lake silts and clays. Vegetation cover in this portion of the project area is slightly denser than adjacent areas, due to the termination of seasonal washes within the basin and the greater water holding capacity of the fine lake sediments.

Conclusions

Based on a combination of aerial imagery, GIS aided analyses, existing data and literature, and intensive field verification, the Solar Two project area has been divided into a series of geomorphic landforms. These landforms and their various subcomponents have been assessed for geoarchaeological sensitivity, the results of which are summarized in Tables 4a and 4b.

No evidence of buried cultural material was seen in any of the profiles examined during the field study. The most likely location for preservation of older buried archaeological sites within the project area appears to be within remnant nearshore beach deposits of Lake Cahuilla or under more recent Holocene alluvial deposits at the distal (eastern) end of the fan apron zone. Buried sites within this area are most likely to be younger than Middle Archaic.

Some evidence for preserved buried land surfaces was seen in profiles throughout the fan apron area, between the older erosional fan piedmont and the shoreline. Within these overlapping fan aprons, preservation will most likely be sporadic and areally confined, dependent on minimal erosion and surface scouring through time and low-energy deposition of overlying sediments. Given these factors and the sparse nature of most surface sites identified in the region—dominated by sparse lithic assemblages—identification of buried sites would likely be very difficult. Perhaps the most effective means of identifying potentially buried archaeological components within the fan apron area is through archaeological sites which appear to be isolated on older remnant surfaces and surrounded by younger alluvium. If the sites do not extend onto the younger surfaces, it is possible that they are old enough that they may have been partially buried by the more recent depositional event.

Given the age of land surfaces within the fan piedmont, and no indication of buried soils of appropriate age, the geoarchaeological sensitivity of the approximately western two-thirds of the Solar Two project area is considered very low. For both the fan piedmont area and the fan apron area, any potentially buried archaeological deposits are not likely to be significantly different than those exposed on the surface of remnant landforms.

Pedestrian Archaeological Surveys

Discussion of Sequence of Archaeological Surveys

Resources observed and recorded during field studies are first given temporary designations (Table 6 below). At a later date the requisite recordation forms will be submitted to the archaeological information center for permanent number designations.

The initial 100% Class III survey of the proposed project area, identified 337 total cultural resources (Cultural Resources Table 6), of which 232 are prehistoric, 38 are historic, 17 are multi-component, 36 are isolated finds, and 14 are objects. Five built environment sites were located and assessed (re-survey efforts are ongoing and these figures will be updated in the future).

RE-EVALUATION OF 20% OF THE PREVIOUSLY RECORDED SITES

LSA Associates, Inc. (LSA) was tasked by the BLM El Centro Field Office to conduct ground-truth visits at 60 randomly selected site locations (approximately 20% of the 337 sites recorded by the consultant for the proponent). Utilizing printed DPR forms and Trimble GPS units with Geographic Information Systems (GIS) digital data with each site's boundaries and internal features, LSA conducted the task of verifying the DPR forms, recorded boundaries, feature locations, and artifact classes.

RE-SURVEY OF 25% OF THE PREVIOUSLY RECORDED SITES

Based on the results of the original 20% site revisit, the BLM and Energy Commission staff tasked the proponent's consultant to conduct a further 25% stratified random sample of site visits. As requested by BLM-El Centro and Commission staff, the sites were stratified according to landform.

RE-SURVEY OF REMAINING PREVIOUSLY RECORDED SITES

Based on a Data Request from BLM and Energy Commission staff, approximately 302 additional sites will be revisited. The site revisit task is ongoing at the time of the preparation of this document.

Results of Pedestrian Survey – Project Area

Resources listed and described are previously unrecorded. The original Class III survey of the proposed project area identified 337 total cultural resources, of which 232 are prehistoric, 38 are historic, 17 are multi-component, 36 are isolated finds, and 14 are objects. Five built environment sites were located and assessed. (Re-survey efforts are ongoing and these figures will be updated in the future.)

CULTURAL RESOURCES TABLE 6
Initial Cultural Resources Inventory for the Project Area of Analysis
(SES 2008c, SES 2008e) (100**%** of archaeological resources)

Temporary Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location
DRK-001	Open Camp	Prehistoric	Medium to high	450-MW Area Phase II
DRK-009	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-012	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-013	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-015	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-016	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-017	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-019	Ceramic Scatter	Prehistoric	Low	300-MW Area Phase I

Temporary Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location
DRK-021	Object-Historic Survey Marker	Historic	Low	300-MW Area Phase I
DRK-022	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-024	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-025	Lithic Scatter	Prehistoric	Low	450-MW Area Phase II
DRK-026	Cairn	Prehistoric	Low	450-MW Area Phase II
DRK-028	Lithic Scatter	Prehistoric	Low	450-MW Area Phase II
DRK-030	Historic Refuse Deposits	Historic	Low	450-MW Area Phase II
DRK-031	Lithic Scatter	Prehistoric	Low	450-MW Area Phase II
DRK-033	Historic survey marker	Historic	Low	450-MW Area Phase II
DRK-034	Lithic Scatter	Prehistoric	Low	750-MW Substation
DRK-035	Lithic Scatter	Prehistoric	Low	750-MW Substation
DRK-036	Historic survey marker	Historic	Low	Access Road 100 ft Corridor
DRK-037	Lithic Scatter	Prehistoric	Low	450-MW Area Phase II
DRK-039-I	Isolate	Prehistoric	Low	450-MW Area Phase II
DRK-041	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-042	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-043	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-044	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-045	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-046	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-048	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-049	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-050	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-051	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-052	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
DRK-143	Lithic and ceramic scatter with groundstone	Prehistoric	Medium to high	Laydown Staging Area
DRK-144	Lithic Scatter	Prehistoric	Medium to high	Laydown Staging Area
DRK-147	Multi component	Historic and Prehistoric	Medium to high	Laydown Staging Area
DRK-148	Multi component, historic refuse deposit and open camp	Historic and Prehistoric	Medium to high	Laydown Area
DRK-149	Historic refuse deposit	Historic	Medium to high	Laydown Area

Temporary Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location
DRK-150	Multi component, Historic refuse deposit and Prehistoric open camp	Historic and Prehistoric	Medium to high	Laydown Area
DRK-188	Lithic scatter with single ceramic sherd	Prehistoric	Medium to high	Laydown Area
EBR-001	Lithic Scatter	Prehistoric	Medium to high	450-MW Area Phase II
EBR-002	Lithic Scatter	Prehistoric	Medium to high	450-MW Area Phase II
EBR-003	Lithic Scatter	Prehistoric	Medium to high	450-MW Area Phase II
EBR-004-I	Isolate	Prehistoric	Low	450-MW Area Phase II
EBR-005	Cairn	Unknown	Low	450-MW Area Phase II
EBR-006-I	Isolate	Prehistoric	Low	450-MW Area Phase II
EBR-009-I	Isolate	Prehistoric	Low	300-MW Area Phase I
EBR-011-I	Isolate	Prehistoric	Low	300-MW Area Phase I
EBR-015	Historic Refuse Deposit	Historic	Medium to high	Access Road 100 ft Corridor
EBR-016	Historic Refuse Deposit	Historic	Medium to high	Access Road 100 ft Corridor
EBR-019	Open Camp with 13 cremations	Prehistoric	Medium to high	Water Supply Line 100 ft Corridor
EBR-021	Lithic scatter – quartz smash	Prehistoric	Low	300-MW Area Phase I
EBR-022	Lithic scatter and cairns	Prehistoric	Low	300-MW Area Phase I
EBR-025	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
EBR-026	Lithic and ceramic scatter	Prehistoric	Low	300-MW Area Phase I
EBR-061	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
EBR-062	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
EBR-063-I	Isolate	Prehistoric	Medium to high	300-MW Area Phase I
EBR-064	Lithic Scatter	Prehistoric	Low	300-MW Area Phase I
EBR-066	Lithic Scatter	Prehistoric	Low	450-MW Area Phase II
EBR-067-I	Isolate	Prehistoric	Low	450-MW Area Phase II
EBR-068	Lithic Scatter	Prehistoric	Low	
EBR-069	Historic refuse deposit	Historic	Low	450-MW Area Phase II
EBR-071-I	Isolate	Prehistoric	Low	Transmission Line 300 ft Corridor
EBR-073	Lithic Scatter	Prehistoric	Low	450-MW Area Phase II
EBR-077	Lithic and ceramic scatter	Prehistoric	Low	450-MW Area Phase II

Temporary Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location
EBR-078-I	Isolate	Prehistoric	Low	450-MW Area Phase II
EBR-081	Lithic Scatter	Prehistoric	Low	Access Road 100 ft Corridor
EBR-082-I	Isolate	Prehistoric	Low	450-MW Area Phase II
EBR-084	Lithic scatter	Prehistoric	Low	Transmission Line 300 ft Corridor
EBR-085	Ceramics scatter	Prehistoric	Low	450-MW Area Phase II
EBR-086	Historic refuse deposit	Historic	Low	450-MW Area Phase II
EBR-087	Historic refuse deposit with one prehistoric artifact	Historic	Low	Transmission Line 300 ft Corridor
EBR-090-I	Isolate Historic glass insulator	Historic	Low	Transmission Line 300 ft Corridor
EBR-093	Lithic and ceramic scatter	Prehistoric	Medium	450-MW Area Phase II
EBR-097	Lithic and ceramic scatter	Prehistoric	Low	450-MW Area Phase II
EBR-098	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
EBR-099	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
EBR-101	Lithic scatter	Prehistoric	Medium	Waterline 100 ft Corridor
EBR-103	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
EBR-104	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
EBR-105-I	Isolate	Prehistoric	Low	450-MW Area Phase II
EBR-107	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
EBR-108	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
EBR-109	Multi component site, prehistoric lithic scatter with historic refuse deposit	Historic and Prehistoric	Low to Medium	Transmission Line 300 ft Corridor
EBR-201-I	Isolate	Prehistoric	Low	450-MW Area Phase II
EBR-202	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
EBR-203-I	Isolate	Prehistoric	Low	450-MW Area Phase II
EBR-204	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
EBR-205	Lithic scatter with sleeping circle	Prehistoric	Medium	450-MW Area Phase II
EBR-207	Historic refuse deposit	Historic	Medium to high	Access Road 100 ft Corridor
EBR-213	Lithic and ceramic scatter	Prehistoric	Medium to high	450-MW Area Phase II
EBR-219	Ceramic scatter	Prehistoric	Medium	Access Road 100 ft Corridor

Temporary Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location
EBR-220	Lithic scatter	Prehistoric	Medium to high	Access Road 100 ft Corridor
EBR-223	Historic refuse deposit	Historic	Medium	450-MW Area Phase II
EBR-300	Lithic and ceramic scatter	Prehistoric	Medium	450-MW Area Phase II
EBR-303	Lithic and ceramic scatter	Prehistoric	Medium to high	Waterline 150 ft Corridor
EBR-304	Lithic and ceramic scatter	Prehistoric	Medium to high	Water Supply Line 100 ft Corridor
EBR-305	Ceramics scatter with a hearth	Prehistoric	Medium to high	Water Supply Line 100 ft Corridor
EBR-C	Open camp with 2 cremations	Prehistoric	Medium to high	Project Boundary 200 ft Buffer
HR-02	Historic Road	Historic	Low	½ in 450 MW Area Phase II, ½ Outside of project area
HR-03	Historic Road	Historic	Low	450-MW Area Phase II
HR-04	Historic Road	Historic	Low	½ in 450 MW Area Phase II, ½ Outside of project area
HR-05	Historic Road	Historic	Low	¼ in 450 MW Area Phase II, ¾ Outside of project area
JF-001	Lithic scatter	Prehistoric	Low	Access Road 100 ft Corridor
JF-001-I	Isolate	Prehistoric	Low	300-MW Area Phase I
JF-002	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JF-003	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JF-003A	Cairn	Prehistoric	Low	300-MW Area Phase I
JF-004	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JF-007	Historic refuse deposit	Historic	Low	300-MW Area Phase I
JF-008	Historic refuse deposit	Historic	Low	Access Road 100 ft Corridor
JF-015	Historic survey marker	Historic	Low	Waterline 150 ft Corridor
JF-017-I	Isolate	Prehistoric	Low	450-MW Area Phase II
JF-018	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JF-019	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JF-026	Open Camp	Prehistoric	Medium	Water Supply Line 100 ft Corridor
JF-031	Historic refuse deposit	Historic	Medium to high	Laydown Staging Area

Temporary Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location
JF-042	Prayer circle	Prehistoric	Low	450-MW Area Phase II
JF-043	Historic refuse deposit	Historic	Medium	450-MW Area Phase II
JFB-002	Geoglyph	Prehistoric	Low	300-MW Area Phase I
JFB-006	Geoglyph	Prehistoric	Low	300-MW Area Phase I
JFB-009	Geoglyph	Prehistoric	Low	300-MW Area Phase I
JFB-009A	Historic survey marker	Historic	Low	300-MW Area Phase I
JFB-011	Historic refuse deposit	Historic	Low	Project Boundary 200 ft Buffer
JFB-012	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JM-002	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
JM-003	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
JM-004	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
JM-006	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
JM-007	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
JM-011	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
JM-012	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
JM-016	Lithic scatter	Prehistoric	Low	Water Supply Line 100 ft Corridor
JM-017	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JM-021	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
JM-023	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JM-024	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
JM-027	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
JM-028	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
JM-032	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JM-033	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JM-035	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JM-036	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JM-037	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JM-038	Lithic scatter	Prehistoric	Low	Access Road 100 ft Corridor
JM-039	Lithic scatter	Prehistoric	Low	Access Road 100 ft Corridor
JM-041	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
JM-043	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
JMK-010	Lithic and ceramic scatter	Prehistoric	Medium to high	Water Supply Line 100 ft Corridor
JMR-005	Multi-component	Prehistoric/ Historic	Low	450-MW Area Phase II

Temporary Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location
JMR-006	Historic cairn and refuse deposit	Prehistoric	Low	450-MW Area Phase II
JMR-007-I	Isolate	Prehistoric	Low	450-MW Area Phase II
JMR-009	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JMR-010-I		Prehistoric	Low	450-MW Area Phase II
JMR-011	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JMR-013	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JMR-014	Lithic scatter	Prehistoric	Medium to high	450-MW Area Phase II
JMR-015-I		Prehistoric	Low	Access Road 100 ft Corridor
JMR-016	Aerial photo marker	Historic	Low	450-MW Area Phase II
JMR-018	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
JMR-021	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
JMR-023-I		Prehistoric	Low	Waterline 150 ft Corridor
JMR-025	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
KRM-001	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
LL-002A	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
LL-003A	Hearth	Prehistoric	Medium	450-MW Area Phase II
LL-020	Lithic scatter	Prehistoric	Medium to high	450-MW Area Phase II
LL-022	Lithic and ceramic scatter	Prehistoric	Medium to high	450-MW Area Phase II
LL-022A	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
LL-023-I		Prehistoric		450-MW Area Phase II
LL-024	Lithic scatter with hearth	Prehistoric	Medium to high	450-MW Area Phase II
LL-026	Lithic scatter	Prehistoric	Medium to high	450-MW Area Phase II
LL-029-I	Mano	Prehistoric	Low	Project Boundary 200 ft Buffer
RAN-001	Historic survey marker	Historic	Low	300-MW Area Phase I
RAN-002	Lithic scatter	Prehistoric	Low	300-MW Area Phase I
RAN-003-I		Prehistoric	Low	450-MW Area Phase II
RAN-004	Multi-component	Historic and Prehistoric	Low	300-MW Area Phase I
RAN-007	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
RAN-009	Historic refuse deposit	Historic	Low	450-MW Area Phase II
RAN-010	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
RAN-011	Lithic scatter	Prehistoric	Low	450-MW Area Phase II

Temporary Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location
RAN-013	Historic refuse deposit	Historic	Low	450-MW Area Phase II
RAN-014	Historic refuse deposit	Historic	Low	Access Road 100 ft Corridor
RAN-016	Historic survey marker	Historic	Medium to high	Waterline 150 ft Corridor
RAN-017	Multi component	Historic and Prehistoric	Medium to high	450-MW Area Phase II
RAN-019	Historic refuse deposit	Historic	Low	450-MW Area Phase II
RAN-020	Historic refuse deposit	Historic	Low	Access Road 100 ft Corridor
RAN-021	Lithic scatter	Prehistoric	Low	300-MW Area Phase I
RAN-023	Historic refuse deposit	Historic	Low	300-MW Area Phase I
RAN-024	Lithic scatter	Prehistoric	Low	300-MW Area Phase I
RAN-026	Lithic scatter	Prehistoric	Low	300-MW Area Phase I
RAN-027	Historic refuse deposit	Historic	Low	300-MW Area Phase I
RAN-028	Lithic scatter	Prehistoric	Medium to high	Project Boundary 200 ft Buffer
RAN-029	Lithic scatter	Prehistoric	Low	Project Boundary 200 ft Buffer
RAN-030	Lithic scatter	Prehistoric	Low	750-MW Substation
RAN-035	Historic refuse deposit	Historic	Low	450-MW Area Phase II
RAN-036	Multi-component	Historic and Prehistoric	Low	300-MW Area Phase I
RAN-045-I		Prehistoric	Low	Transmission Line 300 ft Corridor
RAN-046	Historic refuse deposit	Historic	Medium to high	Waterline 150 ft Corridor
RAN-047-I		Prehistoric	Low	Waterline 150 ft Corridor
RAN-048	Lithic scatter	Prehistoric	Medium to high	Water Supply Line 100 ft Corridor
RAN-049	Historic refuse deposit	Historic	Medium to high	Waterline 150 ft Corridor
RAN-050	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
RAN-051	Lithic scatter	Prehistoric	Medium	Project Boundary 200 ft Buffer
RAN-052	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
RAN-053	Lithic scatter	Prehistoric	Medium to high	450-MW Area Phase II

Temporary Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location
RAN-054	Lithic scatter	Prehistoric	Medium to high	450-MW Area Phase II
RAN-055	Lithic scatter	Prehistoric	Medium to high	450-MW Area Phase II
RAN-058	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
RAN-060-I			Low	450-MW Area Phase II
RAN-062-I			Low	450-MW Area Phase II
RAN-063	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
RAN-064	Cairn		Low	450-MW Area Phase II
RAN-065	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
RAN-066	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
RAN-067	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
RAN-068	Lithic scatter, quartz smash	Prehistoric	Low	450-MW Area Phase II
RAN-069	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
RAN-071-I			Low	450-MW Area Phase II
RAN-072	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
RAN-073	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
RAN-074	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
RAN-075-I			Low	450-MW Area Phase II
RAN-078-I			Low	450-MW Area Phase II
RAN-080	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
RAN-084	Lithic scatter	Prehistoric	Medium	Project Boundary 200 ft Buffer
RAN-089-I			Low	Project Boundary 200 ft Buffer
RAN-092	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
RAN-093-I			Low	450-MW Area Phase II
RAN-095	Lithic scatter	Prehistoric	Medium	450-MW Area Phase II
RAN-409-I			Low	Transmission Line 300 ft Corridor
RAN-410-I			Low	Transmission Line 300 ft Corridor
RAN-411-I			Low	Transmission Line 300 ft Corridor
RAN-413	Lithic scatter	Prehistoric	Medium to high	Transmission Line 300 ft Corridor
RAN-416	Lithic scatter	Prehistoric	Low	Transmission Line 300 ft Corridor
RAN-417	Lithic scatter	Prehistoric	Medium to high	Transmission Line 300 ft Corridor
RAN-418	Lithic and ceramic scatter	Prehistoric	Medium to high	Transmission Line 300 ft Corridor

Temporary Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Area Location
RAN-419	Lithic and ceramic scatter	Prehistoric	Medium to high	Transmission Line 300 ft Corridor
RAN-420	Lithic and ceramic scatter	Prehistoric	Medium to high	Transmission Line 300 ft Corridor
RAN-425-I			Low	Transmission Line 300 ft Corridor
RAN-428	Lithic and ceramic scatter	Prehistoric	Medium to high	Transmission Line 300 ft Corridor
RAN-430	Lithic scatter	Prehistoric	Medium to high	Transmission Line 300 ft Corridor
RAN-431	Lithic scatter	Prehistoric	Medium to high	Transmission Line 300 ft Corridor
RAN-433	Multi-component	Historic and Prehistoric	Low	Transmission Line 300 ft Corridor
RAN-434	Lithic scatter	Prehistoric	Low	Transmission Line 300 ft Corridor
RANA-004	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
SM-001	Lithic scatter	Prehistoric	Low	300-MW Area Phase I
SM-002	Lithic scatter	Prehistoric	Low	300-MW Area Phase I
SM-004	Lithic scatter	Prehistoric	Low	300-MW Area Phase I
SM-005	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
SM-006	Lithic scatter	Prehistoric	Low	450-MW Area Phase II
T-06	Prehistoric Trail	Prehistoric	Low	Linear Resource
T-18	Prehistoric Trail	Prehistoric	Low	300-MW Area Phase I
T-21	Prehistoric Trail	Prehistoric	Low	300-MW Area Phase I
T-43	Prehistoric Trail	Prehistoric	Low	300-MW Area Phase I

Discussion of Results of Archaeological Surveys

The environment and soils in the western section of the project area differ from those in the eastern section. The two sections are approximately delineated by the existing transmission line. In the western portion, the ground surface is covered by developing and well developed desert pavement. This area has been affected by aeolian erosion forces and appears to have a low potential for buried deposits. The eastern portion contains unconsolidated sedimentary clay and silt with colluvial inclusions. This area appears to have a potential for subsurface cultural deposits, which is typical of an area of actively shifting soils.

Coincident with the environmental variations across the project area, a change in site types was also observed. In the western portion of the project area, site types consist of lithic reduction sites composed of local materials exhibiting basic flake and cobble technology. Unless otherwise noted, the lithic scatters did not include temporally diagnostic artifacts or features. These sites lacked features and diagnostic artifacts and ceramics were sparse. The western portion of the project area contained prehistoric trails and circular areas that had been cleared of the desert pavement.

While the field survey for cultural resources continues, the results from the record search and earlier stages of the field survey that are summarized here clearly demonstrate the quantity, quality, and density of the cultural resources in the project area. It is certain that some of these cultural resources will be determined to be significant and to be eligible for nomination to the National Register of Historic Places.

Cultural Resources Table 7
Cultural Resources Inventory for the Project Area of Analysis
(SES 2009X, SES 2009XX)
(25% sample of archaeological resources,
and 100% of ethnographic and built-environment resources)

Cultural Resource Classification and Designation(s)	Resource Type	Description[1]	Project Area Location	Landform Context[2]
Archaeological Resources				
Prehistoric Archaeological Resources				
Proposed Southwest Lake Cahuilla Shoreline Archaeological District	Prehistoric archaeological district		Phase II 450 MW Solar Field	Lake Basin, Beach Zone, Fan Aprons, Fan Piedmont
Yuha Basin Discontiguous District	Prehistoric archaeological district		Outside project area (E of Phase I 300 MW Solar Field, S of Phase II 450 MW Solar Field)	Fan Piedmont, Active/Recent Wash
DRK-002	Sparse chipped stone deposit	15 flakes,[3] 2 cores, hammerstone	Phase I 300 MW Solar Field	Fan Piedmont
DRK-005	Sparse chipped stone deposit	93 flakes, 4 cores	Phase I 300 MW Solar Field	Fan Piedmont
DRK-011	Sparse chipped stone deposit	176 flakes, 6 hammerstones, 5 cores, tested cobble	Phase I 300 MW Solar Field	Fan Piedmont
DRK-047	Sparse chipped and ground stone deposit	40 flakes, 2 tested cobbles, core, mano	Phase I 300 MW Solar Field	Fan Piedmont
EBR-010A	Ceramic deposit	10 ceramic sherds	Phase I 300 MW Solar Field	Fan Piedmont
EBR-020	Chipped stone deposit	34 flakes, 2 fragmentary tested cobbles, hammerstone	Phase I 300 MW Solar Field	Fan Piedmont
EBR-023	Sparse chipped stone deposit	18 flakes, core	Phase I 300 MW Solar Field	Fan Piedmont

Cultural Resource Classification and Designation(s)	Resource Type	Description[1]	Project Area Location	Landform Context[2]
EBR-065	Sparse chipped and ground stone deposit	53 flakes, 3 hammerstones, 2 cores, edge-modified flake, mano	Phase I 300 MW Solar Field	Fan Piedmont
RAN-025	Sparse chipped stone deposit	3 tested cobbles, 3 hammerstones, flake	Phase I 300 MW Solar Field	Fan Piedmont
SM-003	Sparse chipped stone deposit	150 flakes, 4 cores, 4 hammerstones, tested cobble	Phase I 300 MW Solar Field	Fan Piedmont
T-17	Trail segment	159 m long, 50-60 cm wide, < 5 cm deep, cobble free	Phase I 300 MW Solar Field	Fan Piedmont
T-42	Trail segment	839 m long, 3 subsegments, 40-50 cm wide, cobble free	Phase I 300 MW Solar Field	Fan Piedmont
DRK-027	Sparse chipped and ground stone deposit	290 flakes, 8 cores, 8 hammerstones, tested cobble, edge-modified flake, biface, mano	Phase II 450 MW Solar Field	Fan Piedmont
DRK-029	Sparse chipped stone deposit	7 flakes, hammerstone, core, tested cobble	Phase II 450 MW Solar Field	Fan Piedmont
DRK-032	Chipped stone deposit	106 flakes, 2 cores, hammerstone, tested cobble	Phase II 450 MW Solar Field	Fan Piedmont
EBR-019 [Element of Proposed Southwest Lake Cahuilla Shoreline Archaeological District, above]	FAR4 concentrations, human cremations, sparse ceramic and chipped and ground stone deposit	8,676 ceramic sherds, 4,969 flakes, 994 FARs, 378 cores, 304 chipped stone tools, 231 calcined human bone fragments, 42 unidentified bone fragments, 27 ground stone tools, 15 projectile points, 9 *Olivella* spp. shell beads	Phase II 450 MW Solar Field	Fan Aprons

Cultural Resource Classification and Designation(s)	Resource Type	Description[1]	Project Area Location	Landform Context[2]
EBR-070	Sparse chipped stone deposit	72 flakes, 3 hammerstones, 2 cores, bifacial core tool, unifacial core tool	Phase II 450 MW Solar Field	Fan Piedmont
EBR-072	Sparse chipped stone deposit	5 flakes	Phase II 450 MW Solar Field	Fan Piedmont
EBR-079	Sparse chipped stone and angular quartz deposit	53 flakes, 30 pieces of angular quartz shatter, 2 cores, 2 hammerstones, bifacial core tool	Phase II 450 MW Solar Field	Fan Piedmont
EBR-080	Sparse chipped stone deposit	2 flakes, core	Phase II 450 MW Solar Field	Fan Piedmont
EBR-095	Sparse chipped stone deposit	44 flakes, 3 cores, 3 tested cobbles, edge-modified flake	Phase II 450 MW Solar Field	Fan Aprons
EBR-096	Chipped stone deposit	35 flakes	Phase II 450 MW Solar Field	Fan Aprons
EBR-100	Chipped stone deposit	29 flakes, hammerstone, core	Phase II 450 MW Solar Field	Fan Aprons
EBR-102	Sparse chipped stone deposit	85 flakes, 7 cores, 3 tested cobbles, edge-modified flake	Phase II 450 MW Solar Field	Fan Aprons
EBR-106	Chipped stone deposit	8 flakes	Phase II 450 MW Solar Field	Fan Aprons
EBR-222 [Potential element of Proposed Southwest Lake Cahuilla Shoreline Archaeological District, above]	FAR concentration, sparse chipped stone and ceramic deposit	50 FARs, 4 ceramic sherds, flake, tested cobble	Phase II 450 MW Solar Field	Fan Aprons
JF-005	Sparse chipped stone deposit	71 flakes, 2 hammerstones, core	Phase II 450 MW Solar Field	Fan Piedmont
CA-IMP-3752, -3753, -8731 (JM-001) [Potential element of Proposed Southwest Lake Cahuilla Shoreline Archaeological District above]	Sparse chipped stone and ceramic deposit	20 flakes, 2 ceramic sherds, hammerstone, core	Phase II 450 MW Solar Field	Fan Aprons
JM-005	Sparse chipped and ground stone deposit	8 flakes, 2 cores, mano	Phase II 450 MW Solar Field	Fan Aprons

Cultural Resource Classification and Designation(s)	Resource Type	Description[1]	Project Area Location	Landform Context[2]
JM-008	Sparse chipped stone deposit	9 flakes	Phase II 450 MW Solar Field	Fan Aprons
CA-IMP-2083 (JM-009)	Sparse chipped stone deposit	49 flakes, core, tested cobble	Phase II 450 MW Solar Field	Fan Aprons
JM-020	Sparse chipped stone deposit	93 flakes, 2 cores, hammerstone, tested cobble	Phase II 450 MW Solar Field	Fan Aprons
JM-029	Sparse chipped stone deposit	22 flakes, 3 cores, 3 hammerstones	Phase II 450 MW Solar Field	Fan Piedmont Remnant
JM-030	Chipped stone deposit	26 flakes, core	Phase II 450 MW Solar Field	Fan Piedmont Remnant
JM-042	Sparse chipped stone deposit	192 flakes, 5 hammerstones, 2 cores, tested cobble	Phase II 450 MW Solar Field	Fan Piedmont
JMR-004	FAR concentration, isolate chipped stone artifact	40 FARs, core	Phase II 450 MW Solar Field	Fan Piedmont
JMR-008	Sparse chipped stone deposit	14 flakes, 2 cores	Phase II 450 MW Solar Field	Fan Piedmont Remnant
JMR-012	Sparse chipped stone deposit	41 flakes, unifacial edge-modified flake	Phase II 450 MW Solar Field	Fan Piedmont Remnant
LL-018	Sparse chipped stone deposit	23 flakes, 2 cores, “scraper”	Phase II 450 MW Solar Field	Fan Aprons, Active/Recent Wash
LL-019 [Potential element of Proposed Southwest Lake Cahuilla Shoreline Archaeological District, above]	“Angular rock” concentrations, sparse chipped stone deposit	182 flakes, 100 “angular rocks,” 14 cores, 3 tested cobbles, hammerstone	Phase II 450 MW Solar Field	Fan Piedmont Remnant
RAN-057 [Potential element of Proposed Southwest Lake Cahuilla Shoreline Archaeological District, above]	Sparse chipped stone and ceramic deposit	20 ceramic sherds, 3 flakes, core	Phase II 450 MW Solar Field	Fan Aprons
RAN-061	Sparse chipped stone deposit	314 flakes, 15 cores, 5 hammerstones, stone anvil	Phase II 450 MW Solar Field	Fan Piedmont Remnant

Cultural Resource Classification and Designation(s)	Resource Type	Description[1]	Project Area Location	Landform Context[2]
RAN-081	Sparse chipped stone deposit	605 flakes, 29 cores, 11 tested cobbles, 3 hammerstones	Phase II 450 MW Solar Field	Fan Piedmont Remnant
T-03	Trail segment	438 m long, 3 subsegments, 40 cm wide, cobble free	Phase II 450 MW Solar Field	Fan Aprons
T-52	Trail segment	660 m long, 0.4-1.0 m wide, < 5 cm deep, cobble free	Phase II 450 MW Solar Field	Fan Aprons
DRK-139	Sparse chipped stone deposit	92 flakes, 13 cores, 13 tested cobbles, 8 hammerstones	Laydown Area	Lake Basin
DRK-140	Sparse chipped stone deposit	19 flakes, combination core and hammerstone, edge-modified flake	Laydown Area	Lake Basin
DRK-141	FAR concentration, sparse chipped stone deposit	40 FARs, 19 flakes, 2 cores, edge-modified flake	Laydown Area	Lake Basin
EBR-218 [Potential element of Proposed Southwest Lake Cahuilla Shoreline Archaeological District, above]	Sparse chipped and ground stone and ceramic deposit, isolate historic artifact	31 flakes, 24 ceramic sherds, 2 hammerstones, biface, “core tool,” metate fragment, core, historic lard bucket	200-Foot Buffer	Fan Aprons, (Fan Piedmont)
RAN-024	Sparse chipped stone deposit	12 flakes, 3 hammerstones, core, tested cobble	200-Foot Buffer	Fan Piedmont
RAN-412C [Potential element of Proposed Southwest Lake Cahuilla Shoreline Archaeological District, above]	Ceramic and chipped stone deposit	301 ceramic sherds, 94 flakes, 10 cores, 6 tested cobbles, 5 utilized flakes, 1 FAR	Transmission Line	Lake Basin

Cultural Resource Classification and Designation(s)	Resource Type	Description[1]	Project Area Location	Landform Context[2]
CA-IMP-8745 (RAN-412F) [Potential element of Proposed Southwest Lake Cahuilla Shoreline Archaeological District, above]	Sparse chipped and ground stone and ceramic deposit	63 ceramic sherds (41 = 1 vessel), 51 flakes, 6 tested cobbles, 3 cores, 3 bifacial core tools, 2 hammerstones, edge-modified flake, “unifacial and bifacial core tool,” metate, mano	Transmission Line	Lake Basin
CA-IMP-4345 (RAN-419)	FAR concentration, sparse chipped stone deposit	37 flakes, 10 FARs, 7 cores, 2 hammerstones, 2 tested cobbles, “bi-directional core tool,” “quartzite cobble”	Transmission Line	Lake Basin
CA-IMP-4348 (RAN-424) [Potential element of Proposed Southwest Lake Cahuilla Shoreline Archaeological District, above]	FAR concentrations, sparse chipped and ground stone and ceramic deposit, and sandstone source	1,596 flakes, 333 FARs, 269 ceramic sherds, 57 cores, 24, tested cobbles, 23 “core tools,” 22 hammerstones, 13 edge-modified flakes, 3 metates, 2 manos, 2 bifaces, pestle	Transmission Line	(Fan Piedmont), Fan Aprons, (Beach Zone)
RAN-426	Sparse chipped stone deposit	28 flakes, 3 cores, edge-modified flake, tested cobble	Transmission Line	Lake Basin
Historical Archaeological Resources				
Proposed Early Twentieth Century Gravel Mining Landscape	Gravel mining area	Remnants of work camps and work areas, excavation pits, areas of scarified land surfaces	Phase I 300 MW Solar Field,	Fan Piedmont
Juan Bautista de Anza National Historic Trail	Spanish colonial era trail corridor			
DRK-020	Land surveying monument	Bronze survey monument cap, ammunition cartridge	Phase I 300 MW Solar Field	Fan Piedmont

Cultural Resource Classification and Designation(s)	Resource Type	Description[1]	Project Area Location	Landform Context[2]
JF-006	Rock concentrations, historic refuse	3 rock concentrations, 2 church-key opened beverage cans, metal socket wrench	Phase I 300 MW Solar Field	Fan Piedmont
RANA-003	Ordinance crater	Ordinance crater, 30 shrapnel fragments	Phase I 300 MW Solar Field	Fan Piedmont
EBR-092	Historic refuse deposit (ca. 1890–1920), rock cairns	Aqua and purple bottle glass, 4 whole and partial pre-sanitary can forms, large cut nail, bolt	Phase II 450 MW Solar Field	Fan Piedmont
RAN-005	Land surveying monument	Brass survey monument cap on metal pipe, bailing wire, wooden lathe fragments, tobacco tin	Phase II 450 MW Solar Field	Fan Piedmont
RAN-006	Historic refuse deposit (ca. mid-1950s)	113 historic artifacts	Phase II 450 MW Solar Field	Fan Piedmont
RAN-008	Land surveying monument	Brass survey monument cap on metal pipe	Phase II 450 MW Solar Field	Fan Piedmont
RAN-015	Historic refuse deposit (ca. 1940s–1950s)	170 historic artifacts	Phase II 450 MW Solar Field	Fan Piedmont
RAN-018	Aerial land surveying monument	Fragmentary wooden lathes, wire nails, white plastic material	Phase II 450 MW Solar Field	Fan Aprons
DRK-146	Historic refuse deposit (ca. late 1930s–1950s)	600 historic artifacts	Laydown Area	Lake Basin
JF-030	Historic refuse deposit (ca. 1940s–1960s), prehistoric isolate artifact	311 historic to modern artifacts, flake	Laydown Area	Lake Basin
EBR-083	Pebble and cobble concentration	18 pebbles and cobbles	200-Foot Buffer	Fan Piedmont

Cultural Resource Classification and Designation(s)	Resource Type	Description[1]	Project Area Location	Landform Context[2]
JFB-004	Land surveying monument	Brass survey monument cap, bailing wire fragments, wooden lathe fragments, small (3–4 rocks) rock cairns	200-Foot Buffer	Fan Piedmont
Multiple Component Archaeological Resources				
RAN-022 [Element of proposed Early Twentieth Century Gravel Mining Landscape, above]	Historic structural ruins, historic FAR concentrations, historic refuse deposit (ca. 1900-1920), Sparse prehistoric chipped stone deposit	2,390 historic artifacts, 1,300 flakes[5], 9 cores, edge-modified flake, edge-modified dark olive green glass bottle sherd	Phase I 300 MW Solar Field	Fan Piedmont
DRK-004	Sparse prehistoric chipped stone deposit, land surveying monument	30 flakes, 3 hammerstones, core, tested cobble, brass survey monument cap and rock cairn	Phase I 300 MW Solar Field	Fan Piedmont
DRK-010	Sparse prehistoric chipped stone deposit, land surveying monument, rock cairns	176 flakes, 12 cores, 5 tested cobbles, 6 hammerstones, brass survey monument cap, 4 rock cairns, 2 tobacco tins, 3 bailing wire fragments	Phase I 300 MW Solar Field	Fan Piedmont
JFB-010	Sparse prehistoric chipped stone deposit, land surveying monument	6 flakes, hammerstone, brass survey monument cap	Phase I 300 MW Solar Field	Fan Piedmont
DRK-023	Sparse prehistoric chipped stone deposit, rock cairns	58 flakes, 3 cores, 2 rock cairns	Phase II 450 MW Solar Field	Fan Piedmont

Cultural Resource Classification and Designation(s)	Resource Type	Description[1]	Project Area Location	Landform Context[2]
JM-026 [Potential element of Proposed Southwest Lake Cahuilla Shoreline Archaeological District above]	FAR and cobble concentrations, sparse chipped stone deposit, historic refuse deposits	2 FAR concentrations, cobble concentration, 1,201 flakes, 51 tested cobbles, 38 cores, 10 hammerstone s, 7 bifaces, 6 edge-modified flakes, 3 "choppers," 3 "core tools," wonderstone, 3 historic refuse concentrations (ca. late 1950s to early 1960s)	Phase II 450 MW Solar Field	Fan Aprons
RAN-012 [Historic component potential element of Proposed Early Twentieth Century Gravel Mining Landscape, below]	Sparse chipped stone and ceramic deposit, pebble and cobble concentrations, historic to modern refuse	194 flakes, 21 cores, 9 tested cobbles, 5 ceramic sherds, 7 historic to modern artifacts	Phase II 450 MW Solar Field	Fan Piedmont
RAN-034 [Potential Depression-era work camp adjacent to apparent gravel mining pits] [Historic component potential element of proposed Early Twentieth Century Gravel Mining Landscape, above]	FAR concentration, sparse chipped stone deposit, historic refuse deposits (ca. mid- to late 1930s)	387 historic artifacts, 7 historic marine shells, 4 FARs, 2 flakes	Phase II 450 MW Solar Field	Fan Piedmont
T-05	Trail segment	380 m long, 3 subsegments, 40 cm wide, cobble free	Access Road	Lake Basin
Ethnographic Resources				
Schneider Dance Circle (CA-IMP-2491)	Geoglyph or dance circle		One mile S of project area	Atop dissected terrace remnant

Cultural Resource Classification and Designation(s)	Resource Type	Description[1]	Project Area Location	Landform Context[2]
Built-Environment Resources				
Plaster City Historic District	Gypsum mining, processing, and manufacturing facility	Gypsum mine, narrow gauge railroad, and gypsum processing and manufacturing plant	Outside of project area (N of Phase II 450 MW Solar Field)	Fan Aprons, Modern Disturbance
Westside Main Canal (CA-IMP-7834H)	Irrigation canal		Seeley WWTP[6] waterline corridor	Lake Basin
San Diego and Arizona Railroad (37-025680)	Standard gauge railroad		Outside of project area (N of Phase II 450 MW Solar Field)	Multiple
US Route 80 (CA-IMP-7886H)	Remnant highway segments		Outside of project area (N of Phase II 450 MW Solar Field)	Multiple
US Gypsum Rail-line (Imperial Gypsum Company Railroad, ca. 1922) (CA-IMP-7739H) [Element of Plaster City Historic District, above]	Narrow gauge railroad		Outside of project area (N of Phase II 450 MW Solar Field)	Fan Aprons, Modern Disturbance
Plaster City Plant (P-13-009303) [Element of Plaster City Historic District, above]	Gypsum processing and manufacturing plant		Outside of project area (N of Phase II 450 MW Solar Field)	Modern Disturbance
Fig Canal	Irrigation canal		Seeley WWTP waterline corridor	Multiple
Forget-Me-Not Canal	Irrigation canal		Seeley WWTP waterline corridor	Multiple
Fern Canal	Irrigation canal		Seeley WWTP waterline corridor	Multiple
Foxglove Canal	Irrigation canal		Seeley WWTP waterline corridor	Multiple
Dixie Drain 3	Irrigation canal facility		Seeley WWTP waterline corridor	
Salt Creek Drain 2	Irrigation canal facility		Seeley WWTP waterline corridor	Multiple
Wixon Gravel Mine	Remnants of gravel mining operation		Phase I Emergency Access Road	Multiple

Cultural Resource Classification and Designation(s)	Resource Type	Description[1]	Project Area Location	Landform Context[2]
County Gravel Mine	Remnants of gravel mining operation		Phase I 300 MW Solar Field, Phase II 450 MW Solar Field	Multiple

1 - See Appendix CR-1 for complete archaeological site descriptions.
2 - Landform contexts are those developed in response to Data Requests 111 and 112 (pp. CUL-3–CUL-15, SES 2009h).
3 - Flake counts include whole and partial flakes and shatter.
4 - “FAR” stands for “fire-affected rock.”
5 - Flake count includes flakes that may be the result of historic commercial gravel processing.
6 - “WWTP” stands for “wastewater treatment plant.”

Historical Significance of the Cultural Resources Inventory

State and Federal regulatory programs require the BLM and the Energy Commission to consider the potential effects of the proposed action on historically significant cultural resources. Under the subject programs (CEQA, NEPA, and Section 106), formal evaluations of historical significance conclude the process of identifying which cultural resources in the inventory for the proposed action must be given further consideration. Cultural resources that can be avoided by construction may remain unevaluated. Unevaluated cultural resources that cannot be avoided are treated as eligible when determining effects. The early phases of the typical planning process often results in the development of a preliminary cultural resources inventory that includes more resources than a proposed action would ultimately affect, because the preliminary inventory cannot take into account the final design of the facility. Whereas efforts are on-going to design construction to avoid cultural resources, for the purpose of the present analysis, staff here assumes that the construction, operation, maintenance, and decommissioning of the proposed action may wholly or partially destroy all archaeological sites on the surface of the project area. As a result, staff recommends that all known cultural resource in the project area of analysis be subject to formal evaluations of historical significance.

The time required for formal evaluations of historical significance for the complete cultural resources inventory exceeds the one-year licensing process. Although the Energy Commission has been able to complete evaluations of the historic built environment resources, the formal evaluations of some ethnographic resources and all archaeological resources in the project area of analysis will occur subsequent to BLM and Energy Commission decisions on the proposed action pursuant to terms of a Programmatic Agreement. This subsection provides basic descriptions of the known ethnographic resources and the 25% inventory sample of archaeological resources, preliminary identifications of the archaeological landscapes and districts to which the archaeological resources may contribute, preliminary identifications of the archaeological site types that may be useful in evaluating the historical significance of whole groups of archaeological sites, and basic descriptions of the individual archaeological sites that do not appear to be elements of any archaeological landscape or district or do not conform to any identified site type. Each archaeological resource discussion will conclude, where appropriate, with a preliminary statement on the potential historical significance of each potential landscape, district, type, or particular resource. Discussions of probable effects to the full range of significant cultural resources will be made in the “Assessment of Impacts and Discussion of Mitigation” subsection below. As noted above, staff is participating in the development of a Programmatic Agreement. One of the purposes of the Programmatic Agreement (PA) is to identify the analytical processes that will be used to determine the significance of cultural resources and ensure appropriate mitigation for any impacts to those resources.

Archaeological Resources

Cultural Resources Table 8
Absolute and Relative Frequencies of the Landform Distribution of Whole Archaeological Resources and Components of Archaeological Resources in the Project Area for the Proposed Action

Resource or Resource Component Classification and Type	Resource or Resource Component by Landform Context				
Prehistoric Archaeological Resources[1]	**Fan Piedmont (N = 30)**	**Fan Piedmont Remnant (N = 7)**	**Fan Aprons (N = 19)**	**Beach Zone (N = 0)**	**Lake Basin (N = 7)**
Sparse[2] chipped stone deposit[3] [Includes components of DRK-004, DRK-010, DRK-023, JFB-010, and RAN-022]	60% (18)	71% (5)	32% (6)		43% (3)
Chipped stone deposit	7% (2)	14% (1)	16% (3)		
Sparse chipped stone and angular quartz deposit	3% (1)				
“Angular rock” concentrations, sparse chipped stone deposit		14% (1)			
Sparse chipped and ground stone deposit	10% (3)		5% (1)		
Sparse chipped and ground stone and ceramic deposit			5% (1)		14% (1)
Sparse chipped stone and ceramic deposit [Includes component of RAN-012]	3% (1)		5% (1)		
Sparse ceramic and chipped stone deposit			5% (1)		
Ceramic and chipped stone deposit					14% (1)
Ceramic deposit	3% (1)				

Resource or Resource Component Classification and Type	Resource or Resource Component by Landform Context				
FAR concentration and isolate chipped stone artifact	3% (1)				
FAR concentration and sparse chipped stone deposit [Includes component of RAN-034]	3% (1)				29% (2)
FAR and cobble concentrations, sparse chipped stone deposit [Includes component of JM-026]			5% (1)		
FAR concentration and sparse chipped stone and ceramic deposit			5% (1)		
FAR concentration, sparse chipped and ground stone and ceramic deposit, sandstone source			5% (1)		
FAR concentrations, human cremations, sparse ceramic and chipped and ground stone deposit			5% (1)		
Trail Segments	7% (2)		11% (2)		
Historical Archaeological Resources	**Fan Piedmont (N = 15)**	**Fan Piedmont Remnant (N = 0)**	**Fan Aprons (N = 2)**	**Beach Zone (N = 0)**	**Lake Basin (N = 2)**
Land surveying monument [Includes components of DRK-004, DRK-010, JFB-010, and RAN-022]	40% (6)				
Land surveying monument, rock cairns [Includes component of DRK-010]	7% (1)				
Aerial land surveying monument			50% (1)		
Ordinance crater	7% (1)				
Pebble and cobble concentrations, isolate historic artifacts [Includes component of RAN-012]	13% (2)				
Historic refuse deposit [Includes component of JM-026]	20% (3)		50% (1)		100% (2)

Resource or Resource Component Classification and Type	Resource or Resource Component by Landform Context				
Historic refuse deposit, rock cairns	7% (1)				
Historic structural ruins, historic FAR concentrations, historic refuse deposit [Includes component of RAN-022]	7% (1)				

1 - The order of artifacts in the site type designations indicates greater to lesser relative frequencies. For example, deposits with the designation “sparse chipped stone and ceramic deposit” have more chipped stone artifacts than ceramic artifacts. The designation “sparse ceramic and chipped stone deposit” indicates that the opposite is true.

2 - “Sparse” indicates a material culture surface frequency of less than 1 artifact per m2.

3 - “Deposit” is a broad term that encompasses both diffuse artifact scatters and diffuse scatters that include periodic artifact concentrations.

= Chipped stone artifacts

= Ground stone artifacts

= Ceramic artifacts

= Fire-affected rock

Prehistoric Archaeological Resources

This analysis takes into consideration a total of 65 prehistoric archaeological resources. The resources include 59 archaeological sites and 4 trail segments that are the result of the 25% sample of the cultural resources inventory for the project area of analysis, the proposed Southwest Lake Cahuilla Shoreline Archaeological District, and the Yuha Basin Discontiguous District (see Cultural Resources Table 7, above). The archaeological sites and trail segments have been sorted into archaeological resource or site types (see Cultural Resources Table 8, above), and then sorted below into 5 site type groups, chipped stone deposits (N = 40), chipped and ground stone deposits (N = 4), ceramic deposits (N = 7), archaeological deposits that include FAR concentrations (N = 8), and trail segments (N = 4). This subsection provides basic descriptions, interpretations, and, where appropriate, preliminary statements on the potential historical significance of each district and site type group.

Preliminary Comment on the Historical Significance of Prehistoric Archaeological Resources

Districts

Southwest Lake Cahuilla Shoreline Archaeological District. Staff is in the process of developing the concept of what is here referred to as the Southwest Lake Cahuilla Shoreline Archaeological District. This is a temporary designation and does not imply that the proposed district is part of or necessarily analogous to the Southwest Lake Cahuilla Recessional Shoreline Archaeological District, a cultural resource listed in the NRHP on December 30, 1999. On the basis of the 25% inventory sample of the archaeological resources in the project area of analysis, the site types that make up the major contributing elements to the district are the deposits above in Cultural Resources Table 8 that have fire-affected rock concentrations in association with variable combinations of cobble concentrations, human cremations, bedrock toolstone sources, chipped stone, ground stone, ceramic, and ornamental artifacts, and faunal remains. Known potential contributing elements of this site type group include CA-IMP-4345, CA-

IMP-4348, EBR-019, EBR-222, and the prehistoric components of JM-026 and RAN-034. Site types that are also contributing elements to the district include those that have combinations of chipped or ground stone artifacts and ceramic artifacts. Known sites in this type group include CA-IMP-3752, -3753, -8731, CA-IMP-8745, EBR-218, RAN-057, RAN-412C. A subset of sites of the "sparse chipped stone deposit" type may be additional contributing elements.

The site types of the proposed district, on the basis of the 25% sample, cluster principally on the distal portions of the Fan Aprons and out on the Lake Basin. Information on the distribution of archaeological sites to the east of the present project area clearly indicates that comparable site types are also present across the Beach Zone landform.

The development of the district concept is not far enough along to articulate the exact historic themes or the potential periods of significance to which the resource relates. The district concept can, however, be said to relate broadly to the later prehistoric use of the littoral resource zone along the former shorelines of Lake Cahuilla and the possibility exists, though no material evidence of it has been found to date, that the portions of the district that include human cremations may have been subject to active or passive use into the historic period.

The proposed district reflects a unique portion of the prehistory of the diverse Native American use of a dynamic ancient body of water which strongly influenced the history of and the interaction among diverse aboriginal cultures in the Colorado Desert. A formal evaluation of the district under the proposed PA would most likely conclude that it is historically significant, both for its information value and for its associative value.

The potential associative value of the district derives primarily from the Native American cremations that are particularly important components of the district. The archaeological sites of the district have human cremations as infrequent components. The cremations are Native American in origin and are presumed to largely date to later prehistory. The cremations appear to occur in a zone along and roughly straddling the 40-foot topographic contour, which trends approximately northwest-southeast along the distal reaches of the Fan Aprons landform just above its contact with the Beach Zone landform. The cremations embody both information value and associate value. The information value of the cremations derives mostly from the discrete material culture assemblages and the radiometric residues that are associated with many of them. Of perhaps greater importance to the Native American community, the cremations reflect intellectual, emotional, and spiritual connections of Native Americans to their respective familial and cultural heritages. If the Southwest Lake Cahuilla Shoreline Archaeological District were ultimately determined to be historically significant, the assessment of the proposed action's potential effects on the district, in relation to both its information and associative values, would need to taken into account.

Yuha Basin Discontiguous District. The Yuha Basin Discontiguous District is a prehistoric archaeological district listed in the NRHP on May 24, 1982. The four discontiguous portions of the district are adjacent to and south of the project area. The district nomination form ascribes the primary contributing elements of the district, surface scatters of chipped stone artifacts set into well-developed desert pavements, to the San Dieguito archaeological culture, a Paleoindian period variant. The associations of particular chipped stone artifact scatters with the San Dieguito culture were apparently made on the basis of the incorporation of a scatter into a well-developed desert pavement and a marked degree of artifact patination. Staff does not believe that these indices are a reliable basis to establish the association of archaeological deposits with the San Dieguito culture particularly or the Paleoindian period in general. Staff therefore does not believe that it would be meaningful to ascribe any of the chipped stone deposits in the project area to this district. Staff does not recognize the district as -being in the project area.

Site Types and Site Type Groups

Chipped Stone Deposits. The chipped stone deposit site type group includes chipped stone deposits, sparse chipped stone deposits, sparse chipped stone and angular quartz deposits, and “angular rock” concentrations in association with sparse chipped stone deposits. The absolute majority of the archaeological deposits in this site type group are found on the Fan Piedmont and Fan Piedmont Remnant landforms where they make up the relative majority of site types on those landforms, 70% and 100% respectively. The site type group largely appears to represent the procurement of stone suitable for the production of chipped stone artifacts and the early stages of production of expedient flake tools through hard hammer percussion techniques. Mitigation measures provided in the proposed PA would provide the opportunity to consider whether and how the relative ages of the archaeological deposits of this site type group may be determined, and whether and how behavioral associations may be made among these deposits and other prehistoric archaeological deposits in the project area. Determinations on the historical significance of the deposits in the site type group would rely on the outcomes of these considerations.

Chipped and Ground Stone Deposits. Only one site type is present in the 25% sample of the cultural resources inventory of the project area that would represent a chipped and ground stone deposit site type group. That site type is sparse chipped and ground stone deposits. These deposits (N = 4) are found on the Fan Piedmont and Fan Aprons landforms where they make up 10% and 5% respectively of the archaeological deposits on those landforms. The ground stone assemblage for the site type always includes a single mano. The chipped stone assemblage for the type typically includes flakes, cores, hammerstones, and includes chipped stone tools (edge-modified flakes and bifaces) on 2 of the 4 sites. The site type largely appears to represent the procurement of stone suitable for the production of chipped stone artifacts and the early stages of production of expedient flake tools through hard hammer percussion techniques. The edge-modified flakes and bifaces that have been found on some of these sites may represent manufacturing failures, or the intentional or inadvertent discard of the artifacts, perhaps subsequent to resource processing on the site. The presence of ground stone manos on these sites may represent on-site resource processing and subsequent intentional or inadvertent discard, or the manos may simply represent inadvertent discard of artifacts that were in the possession of people who were in transit to other locales when they stopped to procure toolstone. Refinements to the behavioral interpretation of the site type, and determinations on the historical significance of the deposits of the type would be made under provisions in the proposed PA and would rely on the outcomes of those refinements.

Ceramic Deposits. The ceramic deposit site type group includes ceramic deposits, ceramic and chipped stone deposits, sparse ceramic and chipped stone deposits, sparse chipped stone and ceramic deposits, and sparse chipped and ground stone and ceramic deposits. The absolute majority of the archaeological deposits in this site type group are found on the Fan Aprons and Beach Zone landforms, 15% and 28% respectively. Sites of this type group were also found on the Fan Piedmont (N = 2, or 6% of the sites on that landform). One appears to be a pot-drop (ceramic deposit) where a single ceramic vessel was inadvertently dropped on the ground and broken, and the other is a sparse chipped stone and ceramic deposit.

The site type group, excluding the ceramic deposit (pot-drop) type, can be divided into two basic subgroups, deposits that have more ceramic sherds than chipped stone flakes and deposits that have more chipped stone flakes than ceramic sherds. The ceramic and chipped stone deposits and sparse ceramic and chipped stone deposits (N = 2) may represent areas where the duration of area use was more than transitory. The higher frequency of ceramic sherds in these deposits would appear to indicate activity in the areas of the deposits that was of long enough duration, more than a few hours, to allow deposition of ceramic sherds as a result of inadvertent breakage. One of the sites in this subgroup (RAN-412C) was actually found to include a single FAR, which may indicate the nearby subsurface presence of fire features, the construction and use of which may indicate resource processing or food preparation, or temporary habitation.

The ceramic deposit site type subgroup that includes sparse chipped stone and ceramic deposits, and sparse chipped and ground stone and ceramic deposits appear to indicate more transitory behavior with a relatively strong emphasis on the procurement of stone suitable for the production of chipped stone artifacts and the early-stage production of expedient flake tools through hard hammer percussion techniques. The deposits include chipped stone flake to ceramic sherd ratios that vary from approximately 39:1 to 1:1 and average 11:1. The deposits also typically include hammerstones and cores, and may include relatively minor numbers of whole and fragmentary chipped and ground stone tools, and tested cobbles. Refinements to the behavioral interpretation of the site types in this subgroup and those of the subgroup above, and determinations on the historical significance of the deposits of both subgroups would be made under provisions in the proposed PA and would rely on the outcomes of those refinements.

Archaeological Deposits that Include FAR Concentrations. The majority of the different site types in the FAR concentration site type group are contributing elements to the proposed Southwest Lake Cahuilla Shoreline Archaeological District. The absolute majority of the archaeological deposits in this site type group are found on the Fan Aprons and Beach Zone landforms, 20% and 29% respectively. A number of the archaeological sites in this type group are materially diverse and spatially complex deposits that represent a relatively wide range of Native American activity. The behavioral interpretation of the site types in this group, and determinations on the historical significance of the deposits would be made under provisions in the proposed PA and would rely on the interpretations ultimately derived for them.

Trail Segments. The 25% sample of the cultural resources inventory for the proposed includes what are thought to be 4 prehistoric trail segments. The trail segments in the sample are found on the Fan Piedmont and Fan Aprons landforms, and account for 7% and 11% of the prehistoric archaeological resources on those landforms, respectively. The segments are parts of what appears to have been a relatively complex prehistoric trail system that facilitated pedestrian travel east and west across the project area between ancient Lake Cahuilla and the Coyote Mountains, and north and south along the former shorelines of the lake. Study to reconstruct the broader trail system and individual trails, interpretations of the purpose and use of the trails, and determinations on the historical significance of the preserved trail segments would be made under provisions in the proposed PA.

Historical Archaeological Resources

This analysis takes into consideration a total of 21 historical archaeological resources. The resources include 19 archaeological sites that are the result of the 25% sample of the cultural resources inventory for the project area of analysis, the Juan Bautista de Anza National Historic Trail (Anza Trail), and the proposed Early Twentieth Century Gravel Mining Landscape (see Cultural Resources Table X, above). The archaeological sites have been sorted into archaeological resource or site types (see Cultural Resources Table 8, above), and then sorted below into 3 site type groups, surveying monuments (N = 8), historic refuse deposits (N = 7), and pebble and cobble concentrations (N = 2). There are also 2 further archaeological sites that do not fit into any of the site type groups, the historical archaeological component of RAN-022 and RAN-003. This subsection provides basic descriptions, interpretations, and, where appropriate, preliminary statements on the potential historical significance of the portion of the Anza Trail in the project area of analysis, the gravel mining landscape, each site type group, and both of the stand-alone archaeological sites.

Preliminary Comment on the Historical Significance of Historical Archaeological Resources

Juan Bautista de Anza National Historic Trail

Congress established the Juan Bautista de Anza National Historic Trail under the National Trails Act (16 USC 1241) in 1990. The approximately 1,210-mile-long trail corridor runs from Nogales, Arizona through the project area for the proposed action to San Francisco. The Yuha Desert portion of the trail corridor makes up one of the least disturbed landscapes along the entire route, and, as a consequence, this portion of the corridor retains the ability to convey the historical significance of the route and facilitates the public interpretation of it.

The Juan Bautista de Anza National Historic Trail Comprehensive Management and Use Plan, prepared by the National Park Service in 1996 under the National Trails Act, shows portions of the project area to fall in a High Potential Route Segment between 2 historic expedition campsites. The trail corridor therefore has the potential to contain material evidence of the establishment and subsequent use of the trial in the mid-1770s, evidence which would potentially be eligible for inclusion in the NRHP. No such evidence has been found in the project area to date. Further verification of the lack of material remains of the use of the Anza Trail in the project area, further inventory of the character and extent of known or potential contributing elements of the Anza Trail in the project area of analysis, and appropriate determinations on the historical significance of any remains and elements found would be made under provisions in the proposed PA.

Landscapes

Early Twentieth Century Gravel Mining Landscape. Gravel mining appears to have been a relatively widespread form of land use in the project area from approximately 1900 through the early 1960s. Archival information has been found on the operation of two mid-twentieth century gravel mining operations, the Wixon Gravel Mine in the eastern portion of the project area and the County Gravel Mine in the north-central portion of the project area. Archaeological evidence also suggests the presence of an earlier gravel mining operation toward the south-central portion of the project area. This earlier operation, on the basis of the data presently in hand, appears to date from approximately 1900 to 1920 and further appears to have been operated using older, largely non-mechanical gravel mining techniques. These techniques appear to have involved the use of draft animals to pull rakes or scraping sleds across the relatively well-developed desert pavements of the Fan Piedmont landform to extract the gravel resource. This apparent form of mining has left the mined desert pavements with a distinctive pattern of scarification, linear swaths of the ground surface relatively devoid of gravel and punctuated at somewhat regular intervals with low gravel lag mounds. The scarification pattern permits one to readily delineate the area that was subject to this form of mining.

Staff recommends that this be classified as a historical archaeological landscape, an industrial landscape that represents the apparent early twentieth century gravel mining operation in the south-central portion of the project area. The landscape, on the basis of the results of the 25% sample of the cultural resources inventory for the proposed action, presently includes the area that exhibits the distinctive pattern of scarification that was the result of this operation and the historical archaeological component of RAN-022, an apparent early twentieth century work camp. The further inventory of potential contributing elements to the proposed landscape, refinements to the recordation of those elements, and determinations on the historical significance of the landscape as a whole and of the individual contributing elements, both as contributing elements and as stand-alone archaeological resources would be made under provisions in the proposed PA.

Site Types and Site Type Groups

Surveying Monuments. The surveying monument site type group includes land surveying monuments, land surveying monuments that include rock cairns, and aerial land surveying monuments. The archaeological deposits in this site type group are, with one exception, found on a single landform in the project area, the Fan Piedmont landform, where they make up 47% of the historical archaeological site types there. The one exception is the one aerial land surveying monument in the project area that was found on the Fan Aprons landform. That monument represents 50% of the historical archaeological deposits found on that landform. The site type group largely appears to represent the subdivision of the Fan Piedmont landform by the General Land Office (GLO) in the early twentieth century. The monuments remain valid and legal parcel corners and continue to be subject to restrictions that forbid disturbance. It is of interest that such monuments do not appear in the 25 inventory sample. The apparent absence or perhaps lower incidence of the monuments on the other landforms in the project area may indicate that the subdivision of the Fan Piedmont landform became a priority for the GLO, relative to the other landforms, perhaps to subdivide gravel mining leases, or it may indicate that such monuments on the other landforms have been subject to burial, erosion, or more disturbance. Although the proposed PA would provide for refinements to present draft determinations on the historical significance of the monuments in the site type group, staff believes that it is unlikely that they would ultimately recommend the resources as significant.

Historic Refuse Deposits. The historic refuse deposit site type group includes historic refuse deposits, and historic refuse deposits that include rock cairns. The archaeological deposits in this site type group are found on the Fan Piedmont, Fan Aprons, and Beach Zone landforms where they make up 27%, 50% and 100% of the historical archaeological site types, respectively. The behavioral interpretation of the site types in this group, and determinations on the historical significance of the deposits would be made under provisions in the proposed PA and would rely on the interpretations ultimately derived for them.

Pebble and Cobble Concentrations. The pebble and cobble concentration site type includes pebble and cobble concentrations in association with isolate historic artifacts. The archaeological deposits of this site type are found exclusively on the Fan Piedmont landform where they make up 13% of the historical archaeological site types there. The behavioral interpretation of the site type, and determinations on the historical significance of the deposits would be made under provisions in the proposed PA and would rely on the interpretations ultimately derived for them.

Individual Archaeological Sites

Historical Archaeological Component of RAN-022. The historical archaeological component of RAN-022 includes historic structural ruins, historic FAR concentrations, and historic refuse deposits. Refinements to the inventory-phase documentation of the component, the behavioral interpretation of the site, and determinations on the historical significance of the deposits would be made under provisions in the proposed PA and would rely on the interpretations ultimately derived for them.

RANA-003. RANA-003 is an ordnance crater found in association with a scatter of apparent shrapnel. Refinements to the inventory-phase documentation of the component, the behavioral interpretation of the site, and determinations on the historical significance of the deposits would be made under provisions in the proposed PA and would rely on the interpretations ultimately derived for them.

Ethnographic Resources

This analysis presently takes into consideration one ethnographic resource, the Schneider Dance Circle (CA-IMP-2491). It is not however the only apparent ethnographic resource in the vicinity of the project area. Coyote Mountain to the north of the project figures prominently in a Kwaaymii legend. Sparsely documented ethnographic resources along BLM Route 264 from the town of Ocotillo east to BLM Route 274 and along BLM Route 274 itself may also be in sight of the project area. Extant assessments of the potential for visual effects to these resources will have to be further refined under the proposed PA for the proposed action. Ethnographic resources noted by the applicant along BLM Route 264 include an apparent prehistoric trail, a number of coble piles that once appear to have been a spoked-wheel geoglyph, 2 cleared circles referred to by informants to the applicant as the “heavenly snake” (may be CA-IMP-4381, which has been described as a ground figure-snake and gravel berm, and 2 fire rings, one of which appears to have been recently used), and 6 sleeping circles. Further ethnographic resources along BLM Route 274, in addition to the Schneider Dance Circle, include the Yuha Geoglyph (CA-IMP-322), the Power Geoglyph (CA-IMP-4876), the Yuha Burial, another apparent prehistoric trail, a resource that the informants to the applicant referred to as a “spirit break,” and a large quartz smash.

Preliminary Discussion on the Historical Significance of Ethnographic Resources

Schneider Dance Circle

The Schneider Dance Circle (CA-IMP-2491), one of the Yuha Mesa geoglyphs along BLM Route 274, and Coyote Mountain to the north of the project may be in sight of the proposed project area. Reconsideration of the extant determinations on the historical significance of the resources would be made under provisions in the proposed PA

Built-Environment Resources

The proposed action appears to have the potential to affect each of the 14 built-environment resources in the project area of analysis (see Cultural Resources Table 7, above), none of which staff recommends as eligible for either the NRHP or the CRHR. The built-environment resources inventory includes 7 cultural resources that represent the theme of irrigation agriculture (Westside Main Canal, Fig Canal, Forge-Me-Not Canal, Fern Canal, Foxglove Canal, Dixie Drain 3, and Salt Creek Drain 2), 3 resources that represent the mining, processing, and manufacturing of gypsum-derived products (Plaster City Plant, US Gypsum Rail-line, and Plaster City Historic District), 2 resources that represent the theme of transportation (San Diego and Arizona Railroad, and US Route 80), and 2 resources that represent gravel mining (Wixon Gravel Mine, and County Gravel Mine).

Brief descriptions of the 14 built-environment resources and recommendations on their historical significance are presented below. The information for the descriptions and evaluations is drawn from the applicant’s cultural resource technical reports and the applicant’s responses to Energy Commission and BLM data requests (SES 2008e, 2009h, and 2009XXX).

Historical Significance Recommendations for Built-Environment Resources

Westside Main Canal (CA-IMP-7834H)

The Westside Main Canal is an approximately 20-mile-long water conveyance structure that presently runs from the area near the International Border north to the Brawley-Westmorland area. The canal, originally a wooden flume in Mexico known as the Encina Canal, was extended north into the United States by approximately 1906 and across the proposed alignment for the Seeley WWTP waterline by 1908. It was modified and incorporated into the All-American Canal System about 1941.

The present analysis focuses on a one-mile-long segment of the canal, one-half mile north and south of the location where the Seeley WWTP waterline would cross the canal, east of the project site. This particular segment has earthen banks and is roughly U-shaped in profile. The segment measures approximately 25 feet wide by 10 feet deep.

The Westside Main Canal, as a whole, may be historically significant, because it reflects agricultural development associated with the construction and operation of the All-American Canal from 1941 to 1950. More specifically, the canal may be significant under Criteria A and C of the NRHP and Criteria 1 and 3 of the CRHR for its association with the development of commercial irrigation agriculture in Imperial County to the west of the New River. The segment of the canal in the project area of analysis for the proposed action does not, however, retain enough integrity to convey the historic significance of the whole resource during its period of significance, due to the substantive effects that routine canal maintenance has had on the profile of the conveyance. The segment does not appear to possess sufficient integrity of workmanship, design, setting, feeling, or association. Staff therefore recommends that the segment of the Westside Main Canal in the project area of analysis would not contribute to either the NRHP or CRHR eligibility of the canal as whole, should it ever be determined to be so eligible.

Fig Canal

The Fig Canal is a water conveyance structure that runs approximately 4 miles from the Westside Main Canal on the south to Fern Canal on the north. The canal is part of the Westside Main Canal system, which was incorporated into the All-American Canal System in 1941. Although the construction date of the resource is presently unknown, it appears on local maps by 1912.

The present analysis focuses on the segment of the canal that intersects Evan Hewes Highway where the Seeley WWTP waterline would cross the canal, east of the project site. This particular segment is a concrete lined channel, roughly trapezoidal in profile with concrete and earthen banks. This segment measures approximately 15 feet wide by 8 feet deep.

The Fig Canal, as a whole, may be historically significant, because it reflects agricultural development associated with the construction and operation of the All-American Canal from 1941 to 1950. More specifically, the canal may be significant under Criteria A and C of the NRHP and Criteria 1 and 3 of the CRHR for its association with the development of commercial irrigation agriculture in Imperial County to the west of the New River. The segment of the canal in the project area of analysis for the proposed action does not, however, retain enough integrity to convey the historic significance of the whole resource during its period of significance, due to the substantive effects that routine canal maintenance has had on the profile of the conveyance. The segment does not appear to possess sufficient integrity of workmanship, design, setting, feeling, or association. Staff therefore recommends that the segment of the Fig Canal in the project area of analysis would not contribute to either the NRHP or CRHR eligibility of the canal as whole, should it ever be determined to be eligible.

Forget-Me-Not Canal

The Forget-Me-Not Canal is a water conveyance structure that runs approximately 3 miles from the Westside Main Canal on the south to Dixie Drain 5 on the north. The canal is part of the Westside Main Canal system which was incorporated into the All-American Canal System in 1941. Although the construction date of the resource is presently unknown, it appears on local maps by 1912.

The present analysis focuses on the segment of the canal that intersects Evan Hewes Highway where the Seeley WWTP waterline would cross the canal, east of the project site. The segment of the canal bisected by the Evan Hewes Highway is a concrete lined channel with concrete and earthen banks and measures approximately 20 feet wide by 10 feet deep.

The Forget-Me-Not Canal, as a whole, may be historically significant, because it reflects agricultural development associated with the construction and operation of the All-American Canal from 1941 to 1950. More specifically, the canal may be significant under Criteria A and C of the NRHP and Criteria 1 and 3 of the CRHR for its association with the development of commercial irrigation agriculture in Imperial County to the west of the New River. The segment of the canal in the project area of analysis for the proposed action does not, however, retain enough integrity to convey the historic significance of the whole resource during its period of significance, due to the substantive effects that routine canal maintenance has had on the profile of the conveyance. The segment does not appear to possess sufficient integrity of workmanship, design, setting, feeling, or association. Staff therefore recommends that the segment of the Forget-Me-Not Canal in the project area of analysis would not contribute to either the NRHP or CRHR eligibility of the canal as whole, should it ever be determined to be eligible.

Fern Canal and Drain

The Fern Canal is a water conveyance structure that runs approximately 8 miles in a north-south configuration. The Fern Drain, also a water conveyance structure, runs approximately one-and-one-half miles northeast from Fern Canal. The canal and drain are part of the Westside Main Canal system which was incorporated into the All-American Canal System in 1941. Although the construction dates of the resources are presently unknown, the canal appears on local maps in 1908 and the drain in 1940.

The present analysis focuses on the interrelated segments of the canal and drain that intersect Evan Hewes Highway where the Seeley WWTP waterline would cross the canal, east of the project site. The segment of the canal bisected by the Evan Hewes Highway is a trapezoidal, concrete lined channel and measures approximately 20 feet wide by 10 feet deep. The segment of the drain that intersects Evan Hewes Highway is an unlined earthen channel approximately 20 feet wide and 15 feet deep.

The Fern Canal, as a whole, may be historically significant, because it reflects agricultural development associated with the construction and operation of the All-American Canal from 1941 to 1950. More specifically, the canal may be significant under Criteria A and C of the NRHP and Criteria 1 and 3 of the CRHR for its association with the development of commercial irrigation agriculture in Imperial County to the west of the New River.

The Fern Drain does not appear to reflect the agricultural development associated with the construction and operation of the All-American Canal from 1941-1950, nor does it appear to be associated with the lives of significant persons or likely to yield information important to prehistory or history.

The segments of the canal and drain in the project area of analysis for the proposed action do not, however, retain enough integrity to convey the historic significance of the whole resource during its period of significance, due to the substantive effects that routine canal maintenance has had on the profile of the conveyance. These segments do not appear to possess sufficient integrity of workmanship, design, setting, feeling, or association. Staff therefore recommends that the segments of the Fern Canal and Drain in the project area of analysis would not contribute to either the NRHP or CRHR eligibility of the canal as whole, should it ever be determined to be eligible.

Foxglove Canal

The Foxglove Canal is a water conveyance structure that runs approximately 10 miles in a north-south configuration, adjacent to the Westside Main Canal. The canal is part of the Westside Main Canal system which was incorporated into the All-American Canal System in 1941. Although the construction date of the resource is presently unknown, it appears on local maps by 1912.

The present analysis focuses on the segment of the canal that intersects Evan Hewes Highway where the Seeley WWTP waterline would cross the canal, east of the project site. The segment of the canal bisected by the Evan Hewes Highway is a concrete lined channel with concrete levees and vegetated earthen banks, measuring approximately 20 feet wide by 10 feet deep.

The Foxglove Canal, as a whole, may be historically significant, because it reflects agricultural development associated with the construction and operation of the All-American Canal from 1941 to 1950. More specifically, the canal may be significant under Criteria A and C of the NRHP and Criteria 1 and 3 of the CRHR for its association with the development of commercial irrigation agriculture in Imperial County to the west of the New River. The segment of the canal in the project area of analysis for the proposed action does not, however, retain enough integrity to convey the historic significance of the whole resource during its period of significance, due to the substantive effects that routine canal maintenance has had on the profile of the conveyance. The segment does not appear to possess sufficient integrity of workmanship, design, setting, feeling, or association. Staff therefore recommends that the segment of the Foxglove Canal in the project area of analysis would not contribute to either the NRHP or CRHR eligibility of the canal as whole, should it ever be determined to be eligible.

Dixie Drain 3

Dixie Drain 3 is a water conveyance structure that runs approximately 8 miles from Dixie Drain 1 on the north to the Westside Main Canal on the south. The drain is part of the Westside Main Canal system which was incorporated into the All-American Canal

System in 1941. Although the construction date of the resource is presently unknown, it appears on local maps by 1940.

The present analysis focuses on the segment of the drain that intersects Evan Hewes Highway where the Seeley WWTP waterline would cross the canal, east of the project site. The segment of the drain bisected by the Evan Hewes Highway is an unlined earthen channel, approximately 10 feet wide and 8 feet deep, to the north of the highway and exposed corrugated metal pipe to the south.

Dixie Drain 3, as a whole, may be historically significant, because it reflects agricultural development associated with the construction and operation of the All-American Canal from 1941 to 1950. More specifically, the drain may be significant under Criteria A and C of the NRHP and Criteria 1 and 3 of the CRHR for its association with the development of commercial irrigation agriculture in Imperial County to the west of the New River. The segment of the drain in the project area of analysis for the proposed action does not, however, retain enough integrity to convey the historic significance of the whole resource during its period of significance, due to the substantive effects that routine drain maintenance has had on the profile of the conveyance. The segment does not appear to possess sufficient integrity of workmanship, design, setting, feeling, or association. Staff therefore recommends that the segment of the Dixie Drain 3 in the project area of analysis would not contribute to either the NRHP or CRHR eligibility of the drain as whole, should it ever be determined to be eligible.

Salt Creek Drain 2

Salt Creek Drain 2 is a water conveyance structure that runs approximately 3 miles in a north-south configuration. The drain is part of the Westside Main Canal system which was incorporated into the All-American Canal System in 1941. Although the construction date of the resource is presently unknown, it appears on local maps by 1957.

The present analysis focuses on the segment of the drain that intersects Evan Hewes Highway where the Seeley WWTP waterline would cross the canal, east of the project site. The segment of the drain bisected by the Evan Hewes Highway is a concrete-lined channel approximately 6 feet wide and 4 feet deep.

Salt Creek Drain 2, as a whole, may be historically significant, because it reflects agricultural development associated with the construction and operation of the All-American Canal from 1941 to 1950. More specifically, the drain may be significant under Criteria A and C of the NRHP and Criteria 1 and 3 of the CRHR for its association with the development of commercial irrigation agriculture in Imperial County to the west of the New River. The segment of the drain in the project area of analysis for the proposed action does not, however, retain enough integrity to convey the historic significance of the whole resource during its period of significance, due to the substantive effects that routine drain maintenance has had on the profile of the conveyance. The segment does not appear to possess sufficient integrity of workmanship, design, setting, feeling, or association. Staff therefore recommends that the segment of the Salt Creek Drain 2 in the project area of analysis would not contribute to either the NRHP or CRHR eligibility of the drain as whole, should it ever be determined to be eligible.

Plaster City Plant (P-13-009303)

The Plaster City Plant is a grouping of industrial buildings and structures on approximately 160 acres immediately north of the project area. The complex extends north and south of the Evan Hewes Highway. The original Plaster City Plant complex was built between 1920 and 1921 by the Imperial Gypsum and Oil Company to process the material from a 25-ton gypsum deposit at Split Mountain in the Fish Creek Mountains. The gypsum was brought to the plant via the US Gypsum Rail-Line (USGRL), which was constructed by Imperial Gypsum and Oil for this purpose. Imperial Gypsum and Oil suffered financial trouble shortly after opening the Plaster City Plant and sold the operation in 1924 to the Pacific Portland Cement Company. The area became known as “Plaster City” at this time. Pacific Portland replaced the original crusher facility with a new, larger facility shortly after acquiring the operation.

Plaster City, including the USGRL, was acquired in 1947 by the US Gypsum Company, and plans were made immediately to modernize the plant. The improvement project, including a new 900-foot belt, 3 separate DC drives and 2 kilns, was completed in 1948. During the 1940s through the 1960s, Plaster City’s products included plaster board, sacked lath, and plaster for agricultural uses. The plant went on to produce drywall and wallboard for residential construction and sent gypsum to a stucco plant in Los Angeles. By 1970 a new truck road had been constructed to the mine, rendering the USGRL obsolete and it went out of operation. The Plaster City Plant has undergone a complete remodel over the past 15 years, including the removal of a number of historic-period buildings, the addition of monumental-scale construction, and major changes to the plant’s circulation network and spatial relationships.

The existing Plaster City Plant north of the Evan Hewes Highway includes the plant’s administrative offices, parking/staging areas, and a non-historic period processing barn. The administration building is a two-story Contemporary-style structure flanked by two one-story wings. The main section of the administration building appears to date from the 1940s, and the wings appear to be additions dating from within the past 40 years. The building has been heavily altered, and currently has a non-historic coarse stucco exterior finish, and non-historic metal and plastic windows. The administrative building is surrounded by non-historic trailers and modular buildings, also housing administrative functions. To the east of the administrative buildings is a large non-historic 4-story processing barn, used to store raw materials.

The area south of the highway is where the majority of the plant’s industrial actions take place, and includes 2- to 4-story metal-framed prefabricated or tilt-up warehouses and storage containers, dating from the past 15 to 20 years. Most of these structures feature exposed superstructures, skeletal systems, exterior staircases and circulation networks, metal sheathing and cladding and exposed ventilation systems. Along the east end of the plant’s southern portion is a historic-period 2-story warehouse which appears to date from the late 1940s. The building is metal-framed and rectangular in form with multi-pane metal sash industrial style windows, and garage bays with non-historic roll-up doors.

The Plaster City Plant does not appear to meet the eligibility criteria as a historic resource for the NRHP or CRHR. More specifically, the plant does not appear to possess significance under Criteria A of the NRHP or Criteria 1 of the CRHR for association with events that have made a significant contribution to the broad patterns or our history. The plant does not illustrate the two-year history of the Imperial Gypsum and Oil Company, nor does it have a specific connection with the Pacific Portland Cement Company or the US Gypsum Company. The plant does not appear to be associated with significant events. The plant is related to Sam Dunaway, a founder of the Imperial Gypsum and Oil Company. Sam Dunaway is primarily known for being Imperial County's druggist and merchant, rather than a gypsum industrialist. It is also loosely associated with A.R. Rupp, a former US Gypsum executive, but the property does not illustrate his achievements within the gypsum industry. Therefore the plant does not appear to possess significance under Criteria B of the NRHP and Criteria 2 of the CRHR. Additionally, the plant does not embody distinctive characteristics of industrial design from the early 20th century. The majority of the buildings and structures are from outside the historic period and do not convey the historic feeling, setting, or visual appearance of the plant. The plant has been heavily altered and no long retains its original appearance and form and does not appear to meet Criteria C of the NRHP or Criterion 3 of the CRHR. Plaster City does not appear to be likely to yield important information in prehistory or history, and does not appear to be significant under Criteria D of the NRHP or Criteria 4 of the CRHR. Due to the loss of the original and historic-period structures, the Plaster City Plant does not appear to possess sufficient integrity of locations, setting, design, feeling, materials workmanship and association. Staff therefore recommends that the Plaster City Plant would not to be individually eligible for listing on the NRHP or the CRHR.

US Gypsum Rail-line (Imperial Gypsum Company Railroad) (CA-IMP-7739H)

The US Gypsum Rail-Line (USGRL) was constructed in 1921 by the Imperial Gypsum and Oil Company to carry gypsum from the mine at Split Mountain in the Fish Creek Mountain to the Plaster City Plant, a distance of 27 miles. Imperial Gypsum and Oil suffered financial trouble shortly after opening the Plaster City Plant and sold the operation in 1924 to the Pacific Portland Cement Company. The area became known as "Plaster City" at this time. Plaster City, including the USGRL, was acquired in 1947 by the US Gypsum Company, and plans were made immediately to modernize the plant. During the 1940s through the 1960s, Plaster City's products included plaster board, sacked lath, and plaster for agricultural uses. The plant went on to produce drywall and wallboard for residential construction and sent gypsum to a stucco plant in Los Angeles. By 1970 a new truck road had been constructed to the mine, rendering the USGRL obsolete and it went out of operation.

The present analysis focuses on the one-half mile segment of the USGRL within the project area of analysis, directly north of the project boundary. The USGRL travels north-south, and the portion within the project area of analysis is the southern terminus. The USGRL is a single-track narrow gauge railroad, which sits on a bed covered with small ballasts. This section of the rail is at grade, and the rail lines have been replaced several times to accommodate heavier loads. Toward the southern portion of the property the USGRL spurs into the San Diego-Arizona Railroad and travels eastward toward El Centro. The section of rail within the project area of analysis is surrounded by non-historic industrial buildings.

The US Gypsum Rail-Line does not appear to meet the eligibility criteria as a historic resource for the NRHP or CRHR. More specifically, the USGRL does not appear to possess significance under Criteria A of the NRHP or Criteria 1 of the CRHR for association with events that have made a significant contribution to the broad patterns or our history. The USGRL does not illustrate the two-year history of the Imperial Gypsum and Oil Company, nor does it have a specific connection with the Pacific Portland Cement Company or the US Gypsum Company. The USGRL does not appear to be associated with significant events. The USGRL is related to Sam Dunaway, a founder of the Imperial Gypsum and Oil Company. Sam Dunaway is primarily known for being Imperial County's druggist and merchant, rather than a gypsum industrialist. Therefore the USGRL does not appear to possess significance under Criteria B of the NRHP and Criteria 2 of the CRHR. Additionally, the plant does not embody distinctive characteristics of railroad design from the early 20th century. The railroad's historic character and features have been impacted by alterations and non-historic elements. It does is not representative of distinctive engineering qualities to be considered significant and does not appear to meet Criteria C of the NRHP or Criteria 3 of the CRHR. The portion of the USGRL within the project area of analysis does not appear to be likely to yield important information in prehistory or history, and does not appear to be significant under Criteria D of the NRHP or Criteria 4 of the CRHR. The portion of the USGRL in the project area of analysis does not appear to possess sufficient integrity of locations, setting, design, feeling, materials workmanship and association. Staff therefore recommends that the segment of the USGRL in the project area of analysis would not contribute to either the NRHP or CRHR eligibility of the railroad line as whole, should it ever be determined to be eligible

Plaster City Plant District

The Plaster City Plant District would include the grouping of industrial buildings and structures on approximately 160 acres immediately north of the project area; the USGRL railway; and the gypsum mine on the northern terminus of the railway. The original Plaster City Plant complex was built between 1920 and 1921 by the Imperial Gypsum and Oil Company to process the material from a 25-ton gypsum deposit at Split Mountain in the Fish Creek Mountains. The gypsum was brought to the plant via the 27-mile US Gypsum Rail-Line (USGRL), which was constructed by Imperial Gypsum and Oil for this purpose. Imperial Gypsum and Oil suffered financial trouble shortly after opening the Plaster City Plant and sold the operation in 1924 to the Pacific Portland Cement Company. The area became known as "Plaster City" at this time.

Plaster City, including the USGRL and the mine, was acquired in 1947 by the US Gypsum Company, and plans were made immediately to modernize the plant. During the 1940s through the 1960s, Plaster City's products included plaster board, sacked lath, and plaster for agricultural uses. The plant went on to produce drywall and wallboard for residential construction and sent gypsum to a stucco plant in Los Angeles. By 1970 a new truck road had been constructed to the mine, rendering the USGRL obsolete and it went out of operation. The Plaster City Plant has undergone a complete remodel over the past 15 years, including the removal of a number of historic-period buildings, the addition of monumental-scale construction, and major changes to the plant's circulation network and spatial relationships.

The Plaster City Plant District, as a whole, may be historically significant because it is an intact example of a continuously operating gypsum mining operation and representative of large-scale industrial development in Imperial County from 1920-1924, specifically under Criteria A and C of the NRHP and Criteria 1 and 3 of the CRHR. However, due to the loss of the original and historic-period structures at the plant site, which would be the core of the district, the Plaster City Plant does not retain enough integrity to convey the historic significance of the whole resource during its period of significance. Therefore the Plaster City Plant District does not appear to possess sufficient integrity of locations, setting, design, feeling, materials workmanship and association. Staff therefore recommends that the Plaster City Plant District would not be eligible for listing on the NRHP or the CRHR.

San Diego and Arizona Railroad (37-025680)

The San Diego and Arizona Railroad (SD-AZ RR) is a standard-gauge railroad, traveling east-west through the project area. The 10-mile section of the railroad within the project area of analysis is a small portion of the larger, 150-mile historic period railroad. The SD-AZ RR was one of the last railroads constructed in the United States, completed in 1919, and stretched eastward from San Diego to El Centro, California. The railroad was developed by John D. Spreckles and his brother, Adolph, sons of the San Francisco sugar millionaire Claus Spreckles, and Edward H. Harriman, who controlled the boards of the Southern Pacific and Central Pacific Railroads. Construction began in 1907, and the section of rail within project area of analysis was built between 1907 and 1915. Highway construction and increases in automotive transport brought strong competition for the railroad’s passenger service and the SD-AZ RR carried freight exclusively after 1951. Maintenance costs were deemed too expensive following landslides, flooding, and several fires on wooden trusses and in tunnels and the line was abandoned in 1977, with only a few segments remaining in operation. Portions of line within the project area were abandoned at this time.

The present analysis focuses on the approximately 10-mile portion of the SD-AZ RR located along the northern boundary of project area. The standard-gauge railroad sits on a bed of small to medium ballasts. The portion of rail east of Plaster City sits primarily at grade. It is still in active use and has been modernized in some areas. The portion of the rail west of Plaster City is primarily elevated above grade and no longer in use.

The San Diego and Arizona Railroad does not appear to meet the eligibility criteria as a historic resource for the NRHP or CRHR. More specifically, the SD-AZ RR does not appear to possess significance under Criteria A of the NRHP or Criteria 1 of the CRHR for association with events that have made a significant contribution to the broad patterns or our history. The railroad’s construction and operation is not considered an event which has made a significant contribution to the broad patterns of our history, and only made minor contributions to the development of San Diego and national defense by transporting military supplies to San Diego during World War II and the Korean War. Although the SD-AZ RR is associated with John and Adolph Spreckles and Edward H. Harriman, all significant people in the history of the United States and California, all three are generally better known for more significant accomplishments in railroading, business and other endeavors. Therefore the SD-AZ RR does not appear to possess significance under Criteria B of the NRHP and Criteria 2 of the CRHR. Additionally, the railroad does not embody distinctive characteristics of railroad design from the early 20th century. The railroad's historic character and features have been impacted by alterations and non-historic elements, and does not appear to meet Criteria C of the NRHP or Criteria 3 of the CRHR. The portion of the SD-AZ RR within the project area of analysis does not appear to be likely to yield important information in prehistory or history, and does not appear to be significant under Criteria D of the NRHP or Criteria 4 of the CRHR. The segment of the SD-AZ RR in the project area of analysis does not appear to possess sufficient integrity of setting, feeling, materials workmanship and association. Staff therefore recommends that the segment of the SD-AZ RR in the project area of analysis would not contribute to either the NRHP or CRHR eligibility of the railroad line as whole, should it ever be determined to be eligible.

US Route 80 (CA-IMP-7886H), Evan Hewes Highway

U.S Route 80, also known as Evan Hewes Highway, is a two-lane built-up asphalt highway that is part of a transcontinental 2,725-mile highway traveling from San Diego, California to Savannah, Georgia. Officially commissioned in 1926, it was an amalgamation of 2 of the original 9 transcontinental routes. Prior to its designation as part of Highway 80, the roadway existed as the major east-west linear route through southeast California. First developed in 1912, the portion of Highway 80 within the project area of analysis appears on maps in 1918.

The present analysis focuses on the approximately 10-mile-long segment of Highway 80 located along the northern boundary of the project site. The road has undergone routine maintenance and has been resurfaced on several occasions. The original, bypassed alignment of the road lies to the immediate south of the present roadway, and is concrete, single-lane and incomplete.

US Route 80 within the project area of analysis does not appear to meet the eligibility criteria as a historic resource for the NRHP or CRHR. The highway does not appear to be associated with events that made a significant contribution to the broad patterns of history either individually or as part of the whole history of Route 80, and does not appear to meet Criteria A of the NRHP or Criteria 1 of the CRHR. US Route 80 also does not appear to possess significance under Criteria B of the NRHP or Criteria 2 of the CRHR. It is associated with Col. Ed Fletcher, who is significant in the history of the United States and California, but is better known for more significant accomplishments in land and water development, local politics and civic leadership in San Diego County. Additionally, the highway does not embody distinctive characteristics of highway design from the early 20th century. The highway's historic character and features have been impacted by alterations and non-historic elements, and it does not appear to meet Criteria C of the NRHP or Criteria 3 of the CRHR. The portion of the highway within the project area of analysis does not appear to be likely to yield important information in prehistory or history, and does not appear to be significant under Criteria D of the NRHP or Criteria 4 of the CRHR. The segment of the highway in the project area of analysis does not appear to possess sufficient integrity of setting, feeling, materials workmanship and association. Staff therefore recommends that the segment of the US Route 80 in the project area of analysis would not contribute to either the NRHP or CRHR eligibility of the highway as whole, should it ever be determined to be eligible.

Wixon Gravel Mine

Wixon Gravel Mine is an open pit mine, which is an extraction of minerals at the surface of the earth through digging a shallow hole. It is likely associated with the local Wixon family, who farmed in the El Centro area and lived close to the site of the mine. The mine first appears on maps of the area in 1940.

The mine site consists of 3 open pit areas serviced by a packed dirt road. The site has several dirt roads that connect the site with the Evan Hewes Highway (US Route 80). It is likely due to the proximity to the highway that the gravel was probably taken by trucks to nearby road construction sites.

As open pit mining is a relatively simple process, the sand and gravel mining industry has a low data potential in the themes of technology, policy and economy. The Wixon Gravel Mine does not appear to be associated with any of these themes or with the lives of persons significant in our past, and does not meet any of the eligibility criteria set forth in the NRHP or CRHR. Staff therefore recommends that the Wixon Gravel Mine would not to be individually eligible for listing on the NRHP or the CRHR, nor would it be a contributor to an existing and/or proposed archaeological district or landscape.

County Gravel Mine

The County Gravel Mine is an open pit mine, which is an extraction of minerals at the surface of the earth through digging a shallow hole. The Bureau of Land Management's General Land Office plat map for this township recorded August 5, 1940 as the date of action and October 6, 1995 as the closing date for the mine.

The mine site consists of a complex of open pit areas serviced by a packed dirt road. The site has several dirt roads that connect the site with the Evan Hewes Highway (US Route 80). It is likely due to the proximity to the highway that the gravel was probably taken by trucks to nearby road construction sites.

As open pit mining is a relatively simple process, the sand and gravel mining industry has a low data potential in the themes of technology, policy and economy. The County Gravel Mine does not appear to be associated with any of these themes or with the lives of persons significant in our past, and does not meet any of the eligibility criteria set forth in the NRHP or CRHR. Staff therefore recommends that the County Gravel Mine would not to be individually eligible for listing on the NRHP or the CRHR, nor would it be a contributor to an existing and/or proposed archaeological district or landscape.

C.3.4.4 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Construction Impacts

Excavations

Brush trimming would be conducted between alternating rows of SunCatchers™. Brush trimming consists of cutting the top of the existing brush while leaving the existing native plant root system in place to minimize soil erosion. After brush has been trimmed, blading for roadways and foundations would be conducted between alternating rows of

SunCatchers™ to provide access to individual SunCatchers™. Blading would consist of removing terrain undulations and would be kept to a minimum. The blading operations would keep native soils within 100 feet of the pre-development location, with no hauling of soils across the site.

Foundations for Power Block and Auxiliary Equipment

The buildings and major structures such as yard tanks would be supported on shallow spread and continuous footings or mat-type foundations.

Solar Arrays

The majority of each SunCatcher™ would be supported by a single metal fin-pipe foundation that is hydraulically driven into the ground. These foundations are expected to be approximately 20 feet long and 24 inches in diameter, with 12-inch-wide fins extending from each side of the pipe pile. Shallow drilled pier concrete foundations of approximately 36 inches in diameter and an embedment depth with a minimum socketed depth into rock of 6 feet would be used for hard and rock-like ground conditions.

Supports for New Transmission Lines

See Cultural Resources Table 9.

Facilities including On-Site and Off-Site Borrow Areas

Deep foundations would be required for heavy items, such as the power transformers at the electrical substation. Two construction staging and laydown areas would be used for the project. A 100-acre construction laydown area that includes a 25-acre construction staging area would be provided east of Dunaway Road. An 11-acre construction laydown area would be provided adjacent to the Main Services Complex.

Both the 25-acre construction staging area east of Dunaway Road and the 11-acre construction laydown area adjacent to the Main Services Complex would contain temporary construction facilities, including site offices, restrooms, meal rooms, conference rooms, storage facilities, and parking and vehicle maintenance and storage areas.

The 11-acre construction laydown area adjacent to the Main Services Complex would also contain a temporary fueling station. An 8-foot-diameter by 13⅓-foot-long diesel fuel storage tank with secondary containment would be temporarily located on a paved surface in this laydown area.

The 100-acre laydown area east of Dunaway Road is nearly level and thus requires little grading. The 11-acre laydown area adjacent to the Main Services Complex is on a gently sloping, rocky area that would require minimum grading and fill operations to create a level area. Pads would be prepared for setting the trailers housing the temporary construction facilities.

Trenching for Buried Linear Facilities (Pipelines, Transmission Lines)

See Cultural Resources Table 9.

Demolition of Structures on the Project Site or Along Linear Facilities

None.

Alterations to Old Substations or Transmission Lines to Upgrade for More Capacity

None.

Addition of New and Incompatible Structures in an Old Neighborhood (even an Industrial One), or in the Rural Setting of an Old Agricultural Landscape, or in an Old Transmission Line Corridor, Affecting the Integrity of Setting and Feeling

The project area is currently an open, undeveloped landscape.

Cultural Resources Table 9
Estimated Disturbed Area Summary*

Project Component Item	Area		Proposed Length
	Construction Disturbance	Operations Permanent Disturbance	
Off-Site Development			
Off-site access road	4.5 acres	3.6 acres	1.3 miles
Off-site transmission line	91.6 acres	Included below	7.6 miles
Tower structures	Included above	1.2 to 1.4 acres	
Waterline and pumping station	8.0 acres	1 acre	3.4 miles
Off-site electrical and communications overhead service	0.3 acre	Included below	539 feet
Poles	Included above	26 square feet	
Subtotal	**104.4 acres**	**4.6 acres**	
On-Site Balance-of-Plant Development			
Construction staging and construction administration area east of Dunaway Road	25 acres	25 acres	
On-site construction laydown	11 acres	11 acres	
Site boundary fence line	29.9 acres	14.9 acres	20.5 miles
Site paved roadways	137.6 acres	137.6 acres	25.2 miles
Unpaved perimeter roadways	16.2 acres	16.2 acres	11.2 miles
Main Services Complex, parking and services	14.4 acres	14.4 acres	
Assembly buildings and storage	14 acres	14 acres	
On-Site Wet and Dry Utilities Access			
Water pipeline	8.7 acres	8.7 acres	3.8 miles
On-site electrical and communications overhead service	3.8 acres	3.8 acres	6,914 feet

Project Component Item	Area		Proposed Length
	Construction Disturbance	Operations Permanent Disturbance	
Solar Two Substation	7.7 acres	5.2 acres	
On-site transmission line	34.1 acres	34.1 acres	2.8 miles
Transmission access road	Included above	4.1 acres	2.8 miles
Transmission tower structures	Included above	0.5 to 0.7 acre	
34.5-kV overhead runs to Solar 2A Substation	4.0 acres	4.0 acres	
Poles	Included above	0.1 acre	
34.5-kV runs to overhead lines	5.2 acres	5.2 acres	
Subtotal	**271.31 acres**	**173.73 acres**	
Solar Field Development = 500 by 1.5-MW Solar Groups*			
North-south access routes	245 acres	245 acres	168 miles
East-west access routes	148.3 acres	148.3 acres	102 miles
Electrical Collection System			
600 V underground	35 acres	35 acres	576 miles
34.5-kV underground	20 acres	20 acres	45 miles
SunCatcher™ Installation			
North-south access/ SunCatcher™	440 acres	440 acres	
East-west access/ SunCatcher™	1,735 acres	1,735 acres	
Subtotal	**2,623.4 acres**	**2,568.4 acres**	
Total Area	**3,000.1 acres**	**2,746.6 acres**	

Source: SES 2008a.

Notes:

*Assumes 750-MW net development of 30,000 SunCatchers™.

During installation of the SunCatchers™, only 50% of the total land would be disturbed. The modularity of the SunCatcher™ design and off-site manufacturing would enable a phased deployment, thereby minimizing the proportion of the overall site that is disturbed at any given time during construction.

The plan site layout minimizes traffic road operations of the project.

kV = kilovolt
MW = megawatt
V = volts

Identification and Assessment of Direct Impacts on Archaeological Resources and Recommended Mitigation

The construction of the proposed solar thermal power facility may wholly or partially destroy the majority of the surface archaeological resources in the proposed project area and may wholly or partially destroy other buried archaeological deposits that may be components of project area landforms. The complete cultural resources inventory to date includes approximately 330 individual archaeological sites on the surface of the project area. Efforts are being made to avoid impacts/effects to archaeological resources. The surface sites include both stand-alone resources, groups of resources that fall into the archaeological site types described in the “Historical Significance and the Cultural Resources Inventory” subsection above, and resources that are contributing elements to the archaeological landscapes and districts that are also described in that subsection. Although staff is presently unable to identify precisely which of the different cultural resources are historically significant and is therefore presently unable to articulate the exact character of the effects that the construction of the proposed facility would have on such resources, staff does foresee that the construction of the proposed facility would, under both NEPA and CEQA, have a significant effect on the environment and would, under Section 106, have an adverse effect on historic properties. The proposed PA will set out procedures whereby staff, the State Historic Preservation Officer, the Advisory Council on Historic Preservation, the applicant, Native American groups, and other interested parties will identify programs and protocols that ensure that significant effects will be mitigated. Although the specific programs and protocols do not presently exist, it is possible to describe the performance standards that will be used to ensure that the resolution of significant effects to historically significant cultural resources is adequate, as well as the types of measures that can be used to resolve such effects.

As noted above, the analytical process involves five steps: 1) determination of the geographic extent of the project area of analysis; 2) creation of an inventory of the known resources within that area; 3) assessing the historical significance of those known resources; 4) assessing the effects of the project on significant historical resources; and 5) resolving significant effects on significant historical resources, and ensuring that all significant impacts/effects are mitigated. Energy Commission licensing decisions and BLM right-of-way grant decisions also typically identify the likelihood of encountering previously unknown resources and contain provisions that require specific procedures that ensure that any effects to these resources can be resolved. Due to the fact that the high number of cultural resources for this project renders the evaluation of all known resources infeasible, staff is recommending that that type of approach be extended to those known resources that it is infeasible to evaluate prior to agency decisions.

The PA provides a valuable vehicle for this approach. As noted above, the first step of the analytical process is complete. To complete the second step and acquire the data necessary to complete the third step, the PA will require that the project owner conduct fieldwork to collect the balance of the requisite primary data on the cultural resources in the project area of analysis with which to evaluate their historical significance. This fieldwork will consist of, as appropriate, the collection of further surface and subsurface data on each resource sufficient to develop formal recommendations of historical significance. The fieldwork will consist of a sequence of surface and subsurface phases of investigation. Criteria set out in the PA will guide decisions on the number and extent of the phases needed to investigate each subject cultural resource. The conclusion of the third step will be accomplished by applying the thresholds of resource integrity identified above in section C.3.3.3 for newly-discovered resources. Similarly, the fourth step will involve identification of any of the types of effects identified in Section C.3.3.4 above to significant historical resources. The fifth and final step -- implementing treatment measures that meet standards for the resolution of significant effects on significant historical resources and historic properties under CEQA, NEPA, and Section 106 -- will occur through the joint efforts of the Energy Commission and BLM, and will be reflected in the PA. Common types of measures can include avoidance (requiring that physical structures be located only in certain areas), monitoring by cultural resources specialists and Native American monitors, recordation, recovery, and curation.

The methods that the PA will employ to resolve potentially significant effects to significant cultural resources will vary relative to the values for which the resources are found to be significant. For example, cultural resources that are found to be significant on the basis of their information value, principally archaeological deposits, will be subject to suites of treatments the purposes of which will variably be to actively avoid all or part of subject deposits, to record and preserve representative samples of the unique spatial or associative information that is intrinsic to the depositional history of each deposit, to collect and curate representative samples of material culture assemblages, to provide for the preparation and dissemination of professional technical publications and public interpretative materials, and to develop and implement plans to foster the long-term historic preservation of subject deposits. Archaeological resources in the project area of analysis that may be subject to unique treatment plans may include archaeological landscapes and districts and archaeological site types in addition to individual archaeological sites.

The resolution of potentially significant effects on cultural resources that derive historical significance from values other than information potential is not as straightforward. Mitigation options for cultural resources that are significant for different associative values such as association with important events or patterns in prehistory or history, with important persons, or with distinctive construction and design techniques may range widely and are usually derived in consultation among agency and public stakeholders. Staff does however wish to make agency decisionmakers and the public aware at this point. In fact there are several cultural resources in the project area of analysis that are likely to be the focus of further discussion as the BLM and Energy Commission regulatory processes for the proposed action unfold.

Behavioral interpretation and determinations on the historical significance of the deposits would be made under provisions in the proposed PA and would rely on the interpretations ultimately derived for them. The further inventory of potential contributing elements to the proposed cultural landscapes, refinements to the recordation of those elements, and determinations on the historical significance of the landscape as a whole and of the individual contributing elements, both as contributing elements and as stand-alone archaeological resources would be made under provisions in the proposed PA. The PA would stipulate treatment measures based on consultation with consulting parties.

If NRHP listed or eligible properties will be adversely affected by the project, a cultural resources treatment plan will be developed in consultation with the consulting parties to the PA. This plan would stipulate specific measures that will be implemented during final design, prior to and during construction, and during project operations. Treatment measures may include but are not limited to the following:

- Avoidance of resources wherever possible, including establishment of environmentally sensitive areas to be off-limits to construction;
- Make good faith effort to take into account comments and input from interested parties;

- If resources cannot be avoided, devise strategies to minimize impacts, including construction monitoring;
- Conducting data recovery excavations for significant resources that cannot be avoided; and
- Recovery and repatriation of human remains per the Native American Graves Protection and Repatriation Act (NAGPRA).

The Juan Bautista de Anza National Historic Trail is a cultural resource of national significance for its association with important events in our history and its associations with important persons in our early history, as well as for its information potential. Staff believes that the associative values of the resource require Federal and State agencies to more broadly consider the degree of integrity the resource must have in order to convey its significance. This means that, in addition to considering how the proposed action would affect the physical integrity of the spatial relationships among any material remains of the use of the trail, the agencies need to consider whether and how the action would visually degrade the integrity of the setting, feeling, and association of the resource, formal aspects of integrity under both the NRHP and CRHR programs. The National Park Service (NPS), the administrators of the Anza Trail, share this perspective. In a recent letter (NPS 2009a), NPS expresses the belief that the installation of project SunCatchers™ and ancillary facilities would significantly alter the visual landscape around the project area, particularly the views from the Anza Trail corridor and from the nearby accompanying recreational trail. NPS concludes that the proposed action therefore has the potential to degrade the integrity of the historic character of the trail and its related resources in the vicinity of the proposed action. As a consequence, the proposed action has the potential to diminish the ability of the public to experience and understand the historic expedition and the cultural landscape of that period.

The proposed PA could provide for a number of measures to verify the presence of any material remains of the trail, and to address potential degradation to any such remains found and to the visual integrity of the resource. As the proposed action may affect presently unfound or unrecognized material remnants of the use of the trail corridor, the PA could propose measures such as further close-quarter pedestrian survey to ensure that no material remains of the use of the trail are in the project area. The PA could also provide for the analysis of the project area isolate data to see whether any potential Spanish Colonial era materials have been found. While there would not appear to be any way to completely negate the potential loss of integrity to the historic viewshed of the trail, the PA could propose a number of different off-site measures that would resolve effects and mitigate that loss to a less than significant level. The consulting parties to the PA would derive the off-site measures in consultation with one another and refer to the “Juan Bautista de Anza National Historic Trail Comprehensive Management and Use Plan” for guidance.

Archaeological resources that are found to be significant on the basis of values other than or in addition to their information value will be subject to treatment measures that more appropriately reflect the character of those other values. One resource type in the project area of analysis that falls into this category is Native American cremations (see “Southwest Lake Cahuilla Shoreline Archaeological District” subsection, above). The cremations are likely to be found eligible for the NRHP both their information and associative values. Additionally, discovery and treatment of Native American remains is subject to compliance with the requirements of the Native American Graves Protection and Repatriation Act (NAGPRA). Although only one cremation is presently known to occur in the project area and would potentially be subject to direct physical disturbance, the balance of the known cremations just to the east of the present project area boundary would be subject to the direct visual intrusion of project SunCatchers™. The visual intrusion of the project on the actual cremations and on the lands among them, which the Quechan appear to conceive of together as the cultural resource type, would critically degrade the ability of that resource type to convey its significance. This visual intrusion may, therefore, be a significant effect that requires resolution. Stakeholders in the PA process will discuss a requirement that the known cremation zone be re-surveyed to more firmly establish a zone boundary, to reach stakeholder consensus on the width of a visual buffer for the zone, and to set aside the area that encompasses the zone and the buffer as a no-build zone, perhaps as a part of a formal BLM special designation area that would continue to the north and south of the project area along the lateral contact between the Fan Aprons and Beach Zone landforms. The actual resolution of effects to resources in this category will be determined in consultation with all the consulting parties and incorporated into the Programmatic Agreement.

Staff has been involved in the implementation of contingency plans adopted in past siting cases, as well as in the implementation of PAs and finds that if they include the types of specific standards identified above, they can be effective in identifying and evaluating cultural resources and mitigating potential impacts to those resources. Staff anticipates that the PA will be complete prior to the decision on this application. Even without a final PA, staff is confident that a condition of certification that requires the process and standards identified above will ensure that all significant effects to cultural resources can be resolved or mitigated to a level that is less than significant.

Identification and Assessment of Direct Impacts on Ethnographic Resources and Recommended Mitigation

No NRHP- or CRHR-eligible ethnographic resources are presently known to be in the project area of analysis. Further refinements to determinations of the historical significance and to the extant assessments of the potential for visual effects to occur to other ethnographic resources known to be in the vicinity of the project area would help evaluate whether construction-related ground disturbance of the project would directly impact ethnographic resources that would qualify as historically significant cultural resources.

Identification and Assessment of Direct Impacts on Built-environment Resources and Recommended Mitigation

Whereas determinations regarding NRHP- or CRHR-eligibility of built-environment resources within the project area of analysis have not been completed, identification and assessment of impacts cannot be assessed at this time. Given the relatively complete investigation of that area and the dearth of historically significant built-environment resources found, it appears to be unlikely that the construction-related ground disturbance of the project area would directly impact built-environment resources that would qualify as historical resources under CEQA.

Identification and Assessment of Indirect Impacts and Recommended Mitigation

There is potential for indirect effects to sites in the exclusion area especially due to increased traffic during construction and/or visual effects as described above for cremation sites. It is also possible that project area grading could increase the amount of sheet washing and water runoff during heavy rainfall and indirectly cause damage to sites outside the project area. Consideration of a monitoring plan for those sites would be the foundation for mitigation, and additional measures could be developed through the PA consultation process.

Operation Impacts

Many impacts described above as part of construction also apply to the operation phase. During operation of the proposed power plant, repair of a buried utility or other buried infrastructure could require the excavation of a large hole. So such repairs have the potential to impact previously unknown subsurface archaeological resources in areas unaffected by any original trench excavation. The measures proposed under **CUL-1** for mitigating impacts to previously unknown archaeological resources during the construction of the plant and linear facilities would also serve to mitigate impacts from repairs occurring during operation of the plant.

Project Closure and Decommissioning

Re-excavation and removal of SunCatchers™ and ancillary facilities could impact cultural resources. Resolution of effects to resources will be determined in consultation with all the consulting parties and incorporated into the Programmatic Agreement.

C.3.5 300 MW ALTERNATIVE

C.3.5.1 SETTING AND EXISTING CONDITIONS

The setting and existing condition of the 300 MW alternative are the same as Phase 1 of the proposed project. Please refer to subsection C.3.4.1 in discussion of the proposed action.

Regional Setting

The regional setting of the 300 MW alternative is the same as Phase 1 of the proposed project Please refer to subsection C.3.4.1 in discussion of the proposed action.

Project, Site, and Vicinity Description

Please refer to the 300 MW Phase description described previously as part of the overall proposed action in subsection C.3.4.1. The project area lands are currently administered by the BLM on behalf of the public. Twelve thousand (12,000) SunCatchers™ would be configured into 200 1.5-MW solar groups of 60 SunCatchers™ per group that would have a net capacity of 300 MW. The 300 MW solar field would be constructed on 2,577 acres. An 11-acre lay-down area within this area is proposed. Additionally, a 25-acre main services complex and a 6-acre substation would be constructed in association.

Environmental Setting

Please refer to "Environmental Setting" subsection C.3.4.1 for proposed action.

Cultural Setting

Please refer to "Cultural Setting" subsection C.3.4.1 for proposed action.

Cultural Resources Inventory

A records search was performed by URS. Please refer to the Cultural Resources Inventory for the proposed action. 30 sites have been identified as part of the 25% re-survey and recorded in the project area of analysis for the alternative and are presented in Cultural Resources Table 10 below.

Cultural Resources Table 10
Cultural Resources Sites in 300 MW Alternative
(25**%** Sample)

Temporary Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Feature
DRK-002	Lithic Scatter	Prehistoric	Low	300 MW Alternative
DRK-004	Lithic Scatter Historic Survey Marker	Prehistoric Historic	Low	300 MW Alternative
DRK-005	Lithic Scatter	Prehistoric	Low	300 MW Alternative
DRK-010	Lithic Scatter Historic Survey Marker Historic Refuse	Prehistoric Historic	Low	300 MW Alternative
DRK-011	Lithic Scatter	Prehistoric	Low	300 MW Alternative
DRK-020	Historic Survey Marker Historic Bullet	Historic	Low	300 MW Alternative
DRK-047	Lithic Scatter	Prehistoric	Low	300 MW Alternative
DRK-139	Lithic Scatter	Prehistoric	Medium to High	300 MW Alternative
DRK-140	Lithic Scatter	Prehistoric	Medium to High	300 MW Alternative
DRK-141	Lithic Scatter Fire-Affected Rock / Hearth	Prehistoric	Medium to High	300 MW Alternative
DRK-146	Historic Refuse	Historic	Medium to High	300 MW Alternative
EBR-010A	Ceramic Scatter	Prehistoric	Low	300 MW Alternative
EBR-020	Lithic Scatter	Prehistoric	Low	300 MW Alternative
EBR-023	Lithic Scatter	Prehistoric	Low	300 MW Alternative

Temporary Site No.	Site Type	Cultural Context	Potential for Buried Deposits Based on Geomorphologic Information	Project Feature
EBR-065	Lithic Scatter	Prehistoric	Low	300 MW Alternative
JF-006	Historic Refuse Rock Cluster	Historic	Low	300 MW Alternative
JF-030	Historic Refuse	Historic	Medium to High	300 MW Alternative
JFB-010	Historic Survey Marker	Historic	Low	300 MW Alternative
RAN-022	Lithic Scatter Historic Refuse Gravel Mining	Prehistoric Historic	Low	300 MW Alternative
RAN-025	Lithic Scatter	Prehistoric	Low	300 MW Alternative
RAN-412C	Lithic Scatter Ceramic Scatter Fire-Affected Rock / Hearth Animal Bone	Prehistoric	Medium to High	300 MW Alternative
RAN-412F	Lithic and Ceramic Scatter Groundstone	Prehistoric	Medium to High	300 MW Alternative
RAN-419	Lithic Scatter Fire-Affected Rock	Prehistoric	Medium to High	300 MW Alternative
RAN-424	Lithic and Ceramic Scatter Fire-Affected Rock / Hearth Groundstone	Prehistoric	Medium	300 MW Alternative
RAN-426	Lithic Scatter	Prehistoric	Medium	300 MW Alternative
RANA-003	Historic Bomb Crater	Historic	Low	300 MW Alternative
SM-003	Lithic Scatter	Prehistoric	Low	300 MW Alternative
T-05	Historic Trail	Historic	Low	300 MW Alternative
T-17	Prehistoric Trail	Prehistoric	Low	300 MW Alternative
T-42	Prehistoric Trail	Prehistoric	Low	300 MW Alternative

C.3.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

A. Identification analysis is based on the three following observations:

1. Whereas testing has not been completed, a subset of sites will qualify for the NRHP and CRHR.

2. Given the high quantity and density of cultural resources present, cultural resources cannot be completely avoided by project construction.
3. The potential exists for buried archaeological deposits.

B. The alternative is anticipated to have the following effects/impacts:

1. Significant effect per NEPA.
2. Significant impact per CEQA.
3. Adverse effect per Section 106 of the NHPA.

When resource evaluations have been completed, impacts will be assessed. The observation and identification of 30 cultural resources thus far, including prehistoric trails, as part of the 25% re-survey suggests extensive use of the project landform in the past. If impacts are deemed significant, mitigation measures would be stipulated and refined in a Programmatic Agreement negotiated among all consulting parties and executed by the BLM.

Laws, Ordinances, Regulations, and Standards Applicable to the 300 MW Alternative

Please refer to subsection C.3.3.6 for proposed action.

C.3.5.3 CUMULATIVE IMPACTS

This alternative would result in the conversion of 2,602 acres of undeveloped open space with an industrial utility use. When compared to the proposed action, this alternative would result in approximately 60% less land conversion to industrial uses. However, the cumulative effects of this amount of land conversion along with all other existing, planned, and proposed projects would result in adverse cumulative land conversion.

C.3.6 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives developed to reduce impacts to the waters of the U.S. would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative would have the same outer project boundaries as the proposed action, but it would include prohibition of installing permanent structures within drainages, thereby reducing the available acreage for development to 4,690 acres.

C.3.6.1 SETTING AND EXISTING CONDITIONS

This alternative would exclude primary drainages located throughout the proposed project site, which would decrease the amount of land converted to an industrial use. Nonetheless, as this alternative would have the same outer project boundaries as the proposed action, the environmental setting would be the same as the proposed action.

Environmental Setting

Please refer to “Environmental Setting” subsection for proposed action.

Cultural Setting

Please refer to "Cultural Setting" subsection for proposed action.

Cultural Resources Inventory

A records search was performed by URS. Please refer to the Cultural Resources Inventory for the proposed action. Seventy-four sites have been identified as part of the 25% re-survey and recorded in the project area of analysis for the alternative and are presented in Table 11. Site descriptions are provided in Table 7.

Cultural Resources Table 11
Cultural Resources in Project Area of Analysis for Alternative 2
(25**%** Sample)

Archaeological Sites					
DRK-002	DRK-140	EBR-092	JFB-010	JMR-012	RAN-061
DRK-004	DRK-141	EBR-095	JM-001	LL-018	RAN-081
DRK-005	DRK-146	EBR-096	JM-005	LL-019	RAN-412C
DRK-010	EBR-010A	EBR-100	JM-008	RAN-006	RAN-412F
DRK-011	EBR-020	EBR-102	JM-009	RAN-008	RAN-419
DRK-020	EBR-023	EBR-106	JM-020	RAN-012	RAN-424
DRK-023	EBR-065	EBR-218	JM-026	RAN-015	RAN-426
DRK-027	EBR-070	EBR-222	JM-029	RAN-018	RANA-003
DRK-029	EBR-072	JF-005	JM-030	RAN-024	SM-003
DRK-032	EBR-079	JF-006	JM-042	RAN-025	T-03
DRK-047	EBR-080	JF-030	JMR-004	RAN-034H	T-05
DRK-139	EBR-083	JFB-004	JMR-008	RAN-057	T-17
T-42	T-42				

C.3.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

A. Identification analysis is based on the three following observations:

1. Whereas testing has not been completed, a subset of sites will qualify for the NRHP and CRHR.
2. Given the high quantity and density of cultural resources present, cultural resources cannot be completely avoided by project construction.
3. The potential exists for buried archaeological deposits.

B. The alternative is anticipated to have the following effects/impacts:

1. Significant effect per NEPA.
2. Significant impact per CEQA.
3. Adverse effect per Section 106 of the NHPA.

A PA would be drafted and negotiated among all consulting parties, including interested Tribes. The agreement would stipulate the development of treatment plans, including the refinement and definition of mitigation measures.

Laws, Ordinances, Regulations, and Standards Applicable to Drainage Avoidance #1 Alternative

Please refer to appropriate subsection for proposed action.

C.3.6.3 CUMULATIVE IMPACTS

This alternative would result in the conversion of 4,690 acres of undeveloped open space with an industrial utility use. When compared to the proposed action, this alternative would result in approximately 28% less land conversion to industrial uses. However, the cumulative effects of this amount of land conversion along with all other existing, planned, and proposed projects would result in adverse cumulative land conversion.

C.3.7 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative would eliminate both the eastern and western-most portions of the proposed action, where the largest drainage complexes are located. It would reduce the overall size of the project site by 3,347 acres (from 6,500 acres to 3,153 acres). In this alternative, permanent structures would be allowed within all drainages inside the revised project boundaries.

C.3.7.1 SETTING AND EXISTING CONDITIONS

This alternative would exclude segments of land located throughout the proposed project site, which would decrease the amount of land converted to an industrial use. Please see the discussion of existing conditions within affected BLM lands under Section C.8.4.1.

Environmental Setting

Please refer to “Environmental Setting” subsection C.3.4.1 for proposed action.

Cultural Setting

Please refer to “Cultural Setting” subsection C.3.4.1 for proposed action.

Cultural Resources Inventory

A records search was performed by URS. Please refer to the Cultural Resources Inventory for the proposed action. Thirty-seven sites have been identified as part of the 25% re-survey and recorded in the project area of analysis for the alternative and are presented in Table 12. Site descriptions are provided in Table 7.

Cultural Resources Table 12
Cultural Resources in Project Area of Analysis for Alternative 3
(25**%** Sample)

Archaeological Sites		
RAN-005	EBR-023	RAN-015
DRK-032	EBR-065	RAN-022
RAN-018	EBR-100	DRK-010
RAN-034H	RAN-025	DRK-027
EBR-096	RAN-006	DRK-029
DRK-020	RAN-012	SM-003
DRK-002	JF-006	EBR-095
DRK-004	RAN-024	EBR-102
DRK-011	JF-005	JFB-010
DRK-023	DRK-005	T-17
DRK-047	RAN-008	T-42
EBR-010A	JFB-004	T-03
EBR-020		

C.3.7.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

A. Identification analysis is based on the three following observations:

1. Whereas testing has not been completed, a subset of sites will qualify for the NRHP and CRHR.
2. Although the quantity of cultural resources present is reduced in comparison to the specific area for Drainage Avoidance #1 Alternative, cultural resources cannot be completely avoided by project construction as part of consideration and implementation of this alternative.
3. The potential exists for buried archaeological deposits.

B. The alternative is anticipated to have the following effects/impacts:

1. Significant effect per NEPA.
2. Significant impact per CEQA.
3. Adverse effect per Section 106 of the NHPA

A PA would be drafted and negotiated among all consulting parties, including interested Tribes. The agreement would stipulate the development of treatment plans, including the refinement and definition of mitigation measures.

Laws, Ordinances, Regulations, and Standards Applicable to Drainage Avoidance #2 Alternative

Please refer to subsection C.3.3.6 for proposed action.

C.3.7.3 CUMULATIVE IMPACTS

This alternative would result in the conversion of 3,153 acres of undeveloped open space with an industrial utility use. When compared to the proposed action, this alternative would result in approximately 51% less land conversion to industrial uses, and the cumulative effects of this amount of land conversion along with all other existing, planned, and proposed projects would result in adverse effects resulting from cumulative land conversion. The potential combined development of approximately 1 million acres of land in the southern California desert would all combine to result in adverse effects on cultural resources.

C.3.8 NO ACTION ALTERNATIVE

There are three No Project/No Action Alternatives evaluated in this section, as follows:

NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on SES Solar Two Project Application and on CDCA Land Use Plan Amendment

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

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

NO PROJECT/NO ACTION ALTERNATIVE #2:

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

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

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

NO PROJECT/NO ACTION ALTERNATIVE #3:

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

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

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

C.3.9 CUMULATIVE IMPACTS

Section B.3, Cumulative Scenario, provides detailed information on the potential cumulative solar and other development projects in the project area. Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis for the proposed project. In summary, these projects are:

- Renewable energy projects on BLM, State, and private lands, as shown on **Cumulative Figures 1 and 2** and in **Cumulative Tables 1A and 1B.** Although not all of those projects are expected to complete the environmental review processes, or be funded and constructed, the list is indicative of the large number of renewable projects currently proposed in California.
- Future development projects in the immediate Plaster City area are shown on **Cumulative Impacts Figure 3, Plaster City Existing and Future/Foreseeable Projects, and Cumulative Tables 2 and 3**. Table 2 presents existing projects in this area and Table 3 presents future foreseeable projects in the Plaster City Area. Both tables provide the project names, types, locations and statuses

These projects are defined within a geographic area that has been identified by the Energy Commission and BLM as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all resource elements or environmental parameters. Most of these projects have, are, or will be required to undergo their own independent environmental review under CEQA and/or NEPA. Even if the cumulative projects described in Section B.3 have not yet completed the required environmental processes, they were considered in the cumulative impacts analyses in this PSA/Draft EIS.

Geographic Scope of Analysis

The geographic area considered for cumulative impacts on cultural resources is the Solar Two Project area (Plaster City area).

Effects of Past and Present Projects

For this analysis, the following projects or developments are considered most relevant to effects on cultural resources (refer also to Section B.3, Table 2):

- United States Naval Air Facility El Centro – West Mesa
- Recreation Activities – BLM West Mesa FTHL Management Area
- Recreation Activities – BLM Yuha Basin ACEC
- U.S. Gypsum Mining – Plaster City
- California State Prison, Centinela – 2302 Brown Road, Imperial, CA
- Recreation Activities – BLM, Superstition Mountain and Plaster City Open Area

Cultural resources in the geographic area have been impacted by past and currently approved projects as follows:

1. Because cultural resources are non-renewable, the removal or destruction of any resource results in a net loss of resources

2. Existing development in the Plaster City area and the surrounding areas has resulted in the removal or destruction of cultural resources, which has resulted in a net loss of resources in these areas

Effects of Reasonably Foreseeable Future Projects

Cultural resources are also expected to be affected by the following reasonably foreseeable future projects as follows (refer also to Section B.3, Table 3):

Mount Signal Solar Power Station
Green Path
Wind Zero – Training Facility
Atlas Storage Facility
Mixed-use Development
Mixed-use Development
Mixed-use Development
Update General Plan
Update Park Master Plant
Mixed-use Development
Mixed-use Development
Mixed-use Development
Mixed-use Development
Sunrise Powerlink Project
Ocotillo Express Wind Facility
Pedestrian Fence 225 and Pedestrian Fence 70
Mixed Use -Recreation
West-wide Energy Corridor
Seeley Waste Water Treatment Facility Upgrade

Contribution of the SES Solar Two Project to Cumulative Impacts

Construction. The construction of the SES Solar Two Project is expected to result in permanent adverse impacts related to the removal and/or destruction of cultural resources on the project site during ground disturbance and other construction activities. It is also expected that the construction of some or all of the foreseeable cumulative projects which are not yet built may also result in the permanent adverse impacts as a result of the removal and/or destruction of cultural resources on the sites for those projects. As a result, the construction of the Solar Two project and other foreseeable cumulative projects will contribute to permanent long term adverse impacts as a result of the removal and/or destruction of resources on those sites and an overall net reduction in cultural resources in the area.

Operation. During operation of the SES Solar Two Project, cultural resources on and in the immediate vicinity of the project site may experience increased vandalism as a result of improved access to the project site, illegal collection of artifacts, and/or destruction of resources by vehicles traveling on the site. Similar impacts may also occur as a result of some or all of the cumulative projects, as more people come into this area associated with those new land uses. As a result, the Solar Two project and the other cumulative projects may contribute to a cumulative adverse impact on cultural resources as a result in increased access to the area and the potential for increased vandalism, illegal collection of artifacts, and/or destruction of resources during operation related activities.

Decommissioning. The decommissioning of the SES Solar Two Project may result in adverse impacts to cultural resources as a result of ground disturbance, increased vandalism, illegal collection of artifacts, and/or destruction of resources by vehicles traveling on the site or during demolition and removal of the project facilities. Similar impacts are not anticipated as a result of most of the other cumulative projects as the removal of those land uses may not result in increased vandalism, illegal collection of artifacts, and/or destruction of resources by vehicles traveling on those sites or during demolition and removal of those land uses. As a result, decommissioning the Solar Two project is not anticipated to contribute to a cumulative adverse impact on cultural resources beyond the contribution of the project that would occur as a result of the construction and operation of the project.

C.3.10 COMPLIANCE WITH LORS

If the Condition of Certification (**CUL-1**) is properly implemented, the proposed SES Solar Two project would result in a less than significant impact under CEQA and resolve effects under Section 106 of the NHPA on known and newly found cultural resources. The project would therefore be in compliance with the applicable state laws, ordinances, regulations, and standards listed in Cultural Resources Table 1.

The County of Imperial's General Plan has general language promoting the county-wide preservation of cultural resources. The Condition of Certification requires specific actions not just to promote but to effect historic preservation and mitigate impacts to all cultural resources in order to ensure CEQA compliance. Consequently, if SES Solar Two, LLC implements these conditions, its actions would be consistent with the general historic preservation goals of the County of Imperial.

C.3.11 NOTEWORTHY PUBLIC BENEFITS

Staff does not discern any public benefits in relation to cultural resources that would occur from the construction, operation, maintenance, or decommissioning of the proposed action that would reasonably be found to be noteworthy.

C.3.12 PROPOSED CONDITION OF CERTIFICATION

CUL-1 The applicant shall be bound to abide, in total, to the terms of the programmatic agreement that the BLM is to execute under 36 CFR § 800.14(b)(3) for the proposed action. If for any reason, any party to the programmatic agreement were to terminate that document and it were to have no further force or effect for the purpose of compliance with Section 106 of the National Historic Preservation Act, the applicant would continue to be bound to the terms of that original agreement for the purpose of compliance with CEQA until such time as a successor agreement had been negotiated and executed with the participation and approval of Energy Commission staff.

Verification: Under the terms of the programmatic agreement, the applicant shall submit all documentation required by the agreement to the Compliance Project Manager (CPM) for review and approval.

C.3.13 CONCLUSIONS AND RECOMMENDATIONS

This cultural resources analysis concludes, on the basis of a 25% sample of the cultural resources inventory of the project area of analysis, that the SES Solar Two project would have significant effects on a presently unknown subset of approximately 328 known prehistoric and historical surface archaeological resources and may have significant effects on an unknown number of buried archaeological deposits, many of which may be determined historically significant under the provisions of a proposed programmatic agreement currently under development as part of the BLM's Section 106 consultation process. The adoption and implementation of Condition of Certification **CUL-1** would reduce the potential impacts of the proposed action on these resources to less than significant under CEQA and would resolve effects under Section 106 of the NHPA, and would further ensure that the proposed action would be in conformity with all applicable LORS.

C.3.14 REFERENCES

The “(tn: 00000)” in a reference below indicates the transaction number under which the item is catalogued in the Energy Commission’s Docket Unit. The transaction number allows for quicker location and retrieval of individual items docketed for a case or is used for ease of reference and retrieval of exhibits cited in briefs and used at Evidentiary Hearings.

Apple 1997—Apple, R. “Southwest Lake Cahuilla Recessional Shoreline Archaeological District,” *National Register of Historic Places Nomination Form*, 1997.

Barker 1976 – Barker, J.P. “Ethnographic Sketch of the Yuha Desert Region,” In *Background to Prehistory of the Yuha Desert Region*, P. J. Wilke, ed., pp. 21–41. Ramona, California: Ballena Press, 1976.

Becker and Altschul 2008 – Becker, K., and J. Altschul. “Path Finding: The Archaeology of Trails and Trail Systems,” In *Fragile Patterns: The Archaeology of the Western Papagueria*, J.H. Altschul and A. Rankin, eds., pp. 419–446. Tucson: SRI Press, 2008.

Bee 1983 – Bee, R. L. “Quechan,” In *Handbook of North American Indians*, Vol. 10, W.C. Sturtevant, General Ed., pp. 86-98. Washington, D.C.: Smithsonian Institution, 1983.

Birdsall 2007 – Birdsall, S. *Imperial County Annual Agricultural and Livestock Reports*. El Centro, California: Imperial County Agricultural Commissioner. Electronic document, http://www.imperialcounty.net/ag/clreports.htm, accessed September 7, 2008.

Campbell 1999 – Campbell, P.D. *Southern California Pottery*. Electronic document, http://www.primitiveways.com/pottery1.html, accessed on February 2, 2009.

Energy Commission 2008h – BLM and Energy Commission staff’s Data Requests Set 1 Part 2 (53-127), December 2, 2008 (tn 49233).

Energy Commission 2009X – BLM and Energy Commission staff’s Data Requests Set 2 Part 2 (142-155), June 18, 2009 (tn 52077).

Chartkoff and Chartkoff 1984 – Chartkoff, J.L., and K.K. Chartkoff. *The Archaeology of California*. Stanford, California: Stanford University Press, 1984.

Cooper 2005 – Cooper, C. U.S. *80 Tours: Millers to Plaster City*. Historic California Highways. Electronic document, http://www.gbcnet.com/ushighways/US80/US80e.html, accessed September 8, 2008.

Dibblee 1954 – Dibblee, T.W. “Geology of Southern California,” *California Division of Mines and Geology*, Bulletin 170, pp. 21–28.

Fagan 2003 – Fagan, B. *Before California: An Archaeologist Looks at Our Earliest Inhabitants*. Walnut Creek, California: Altamira Press, 2003.

Fuis and Kohler 1984 – Fuis, G.S., and W.M. Kohler. “Crustal Structure and Tectonics of the Imperial Valley Region, California.” In *The Imperial Basin – Tectonics, Sedimentation, and Thermal Aspects: Pacific Section*, Vol. 40, pp. 1–13. C. A. Rigsby, ed. Society of Economic Paleontologists and Mineralogists, 1984.

Garnholz 1991 – Garnholz, D.B. *The Salton Sea: A Narrative and Political History*. Unpublished Master’s thesis, San Diego State University, 1991.

Gifford 1931 – Gifford, E.W. “The Kamia of Imperial Valley,” *Bureau of American Ethnology*, Bulletin 97. Washington, D.C.: Smithsonian Institute.

Hayden and Schulting 1997 – Hayden, B., and R. Schulting. “The Plateau Interaction Sphere and Late Prehistoric Cultural Complexity,” *American Antiquity* 62(1): 51–85.

Hayes and Blom 2006 – Hayes, C. and J. Blom. *The Desert Southwest: Four Thousand Years of Life and Art*. California: Ten Speed Press, 2006.

Heizer 1966 – Heizer, R.F. *Languages, Territories, and Names of California Indian Tribes*. Berkeley: University of California Press, 1966.

Hildebrand, et al. 2002 – Hildebrand, J.A., G.T. Gross, J. Schaefer, and H. Neff. “Patayan Ceramic Variability: Using Trace Elements and Petrographic Analysis to Study Brown and Buff Wares in Southern California,” In *Ceramic Production and Circulation in the Greater Southwest*, D. M. Glowacki and H. Neff, eds. The Cotsen Institute of Archaeology, University of California, Los Angeles, 2002.

Kaijnkoski 2008 – Kaijnkoski, P. *Overview of Geoarchaeological Research Issues for Joshua Tree National Park*. Report submitted to U.S. Department of the Interior, Joshua Tree National Park, TwentyNine Palms. By Anthropological Studies Center, Sonoma State University, Rohnert Park, 2008.

Love and Dahdul 2002 – Love, B., and M. Dahdul. “Desert Chronologies and the Archaic Period in the Coachella Valley,” *Pacific Coast Archaeological Society Quarterly*, Volume 38 (2 and 3):6586.

LSA 2009a – LSA Associates. *Cultural Resources Site Location and Cultural Content Ground-truth Task: Levels I and II Evaluations and Recommendations* (BLM contractor), June 4, 2009 (tn 51882).

LSA 2009b – LSA Associates. *Memorandum to Mike McGuirt, California Energy Commission, and Carrie Simmons, Bureau of Land Management on Solar Two 25 Percent Stratified Random Sample for Follow-up Site Visits* (LSA Project No. SSQ0802-T002) (BLM contractor), August 21, 2009 (tn 53111).

Luomala 1978 – Luomala, K. “Tipai-Ipai,” In *Handbook of North American Indians*, Vol. 8. R.F. Heizer, ed., pp. 592–609. Washington, DC: Smithsonian Institution, 1978.

Moratto 1984 – Moratto, M. *California Archaeology*. San Diego: Academic Press, 1984.

NPS 2009a – *Response to Invitation to Participate in the Section 106 Consultation for the SES Solar Two Project (08-AFC-5)*, Imperial County, CA. December 18, 2009, letter from Rory D. Westberg of the US Department of the Interior, National Park Service to Vicki L. Wood of the US Department of the Interior, Bureau of Land Management (tn 54615).

NPS 2009b – *Response to Inquiry Regarding NPS Status as Cooperating Agency for the SES Solar Two Project (08-AFC-5)*, Imperial County, CA. December 18, 2009 letter from Rory D. Westberg of the US Department of the Interior, National Park Service to Jim Stobaugh of the US Department of the Interior, Bureau of Land Management (tn 54616).

Peterson 1981 – Peterson, F.F. *Landforms of the Basin and Range Province: Defined for Soil Survey*, Technical Bulletin 28. Nevada Agricultural Experiments Station, University of Nevada Reno.

Reisner 1986 – Reisner, M. *Cadillac Desert: The American West and Its Disappearing Water*. New York: Penguin Books, 1986.

SES 2008a – Stirling Energy Systems. *Application for Certification for the Stirling Energy Systems (SES) Solar Two Project*, Volumes 1 and 2. Submitted to the California Energy Commission, June 30, 2008.

SES 2008c – Stirling Energy Systems. *Cultural Resource Technical Report for SES Solar Two Project*. Submitted to the California Energy Commission under confidential cover, June 2008.

SES 2008d – Stirling Energy Systems. *Supplement to the Application for Certification for the SES Solar Two Project*. Submitted to the California Energy Commission, September 28, 2008.

SES 2008e – Stirling Energy Systems. *Class III Confidential Cultural Resources Technical Report* - Revised Draft Application for Certification (08-AFC-5). Submitted to the California Energy Commission under confidential cover, September 29, 2008.

SES 2009h – Stirling Energy Systems. *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 (tn 50625).

SES 2009q – Stirling Energy Systems. *Supplement to the Application for Certification for the SES Solar Two Project*. Submitted to the California Energy Commission, June 12, 2009.

SES 2009X – Stirling Energy Systems. *Response to Energy Commission and BLM Data Requests 142–150*, in Volume 1: Data Responses, Application for Certification (08-AFC-5), October 2009.

SES 2009XX – Stirling Energy Systems. *Response to Energy Commission and BLM Data Requests 142–150*, in Volume 2: Site Descriptions, Application for Certification (08-AFC-5), October 2009.

SES 2009XXX – Stirling Energy Systems. *Revised Class III Confidential Cultural Resources Technical Report*, Application for Certification (08-AFC-5). Submitted to the California Energy Commission, December 23, 2009.

Schaefer and Laylander 2007 – Schaefer, J., and D. Laylander. "The Colorado Desert: Ancient Adaptations to Wetlands and Wastelands," In *California Prehistory: Colonization, Culture and Complexity*, T.L. Jones and K. Klar, eds. Lanham, Maryland: Alta Mira Press, 2007.

Shlemon and Begg 1975 – Shlemon, R.J., and E.L. Begg. “Late Quaternary Evolution of the Sacramento-San Joaquin Delta, California,” *Quaternary Studies*. Bulletin 13, The Royal Society of New Zealand. pp. 259–266.

Stott 1950 – Stott, K.W. *Stage Coach Operation in San Diego and Imperial Counties, 1857–1874*. Bachelor of Arts thesis, San Diego State College.

Texas State Historical Association 2001 http://www.tsha.utexas.edu/handbook/online/articles/CC/fcr26.html, accessed on April 27, 2007.

Tout 1932 – Tout, O.B. *The First Thirty Years – 1901–1931: History of Imperial Valley, Southern California, U.S.A.* San Diego: Otis B. Tout Publisher, 1932.

von Werlhof and von Werlhof 1977 – von Werlhof, J., and S. von Werlhof. *Archaeological Survey of the Yuha Basin, Imperial County*. Imperial Valley College, El Centro, California.

Vurtinus 1979 – Vurtinus, J.F. “The Mormon Volunteers: The Recruitment and Service of a Unique Military Company,” *The Journal of San Diego History* 25(3). Electronic document, http://www.sandiegohistory.org/journal/79summer/mormon.htm, accessed on April 27, 2007.

Weide 1976 – Weide, D.L. “Regional Environmental History of the Yuha Desert,” In *Background to Prehistory of the Yuha Desert Region*, Philip J. Wilke, ed. Ramona: Ballena Press.

Welch 1983 – Welch, P. *Cultural Resources Inventory for Thirty Proposed Asset Management Parcels in Imperial Valley California*. Bureau of Land Management, 1983.

Wilke 1978 – Wilke, P.J. “Late prehistoric human ecology at Lake Cahuilla, Coachella Valley, California,” *Contributions of the University of California Archaeological Research Facility*, Number 38, Berkeley.

C.3.15 CULTURAL RESOURCES GLOSSARY

AFC	Application for Certification
ARMR	Archaeological Resource Management Report
CCS	Cryptocrystalline silicate (Cryptocrystalline silicates are rocks such as flint, chert, chalcedony, or jasper that contain a high percentage of silica (SiO^2), the primary compound that composes quartz.)
CEQA	California Environmental Quality Act
CHRIS	California Historical Resources Information System
Conditions	Conditions of Certification
CPM	Compliance Project Manager
CRHR	California Register of Historical Resources
CRM	Cultural Resources Monitor
CRR	Cultural Resource Report
CRS	Cultural Resources Specialist
DPR 523	Department of Parks and Recreation cultural resources inventory form
FAR	Fire-affected rock
FSA	Final Staff Assessment
Historical resource	A cultural resource, for the purpose of CEQA, listed in, or determined to be eligible for listing in, the California Register of Historical Resources (PRC § 21084.1). Subsumed in present analysis under "important historic and cultural aspects of our national heritage."
Historic property	A cultural resource, for the purpose of Section 106, included in, or eligible for inclusion in the National Register of Historic Places (36 CFR § 800.16(l)(1). Subsumed in present analysis under "important historic and cultural aspects of our national heritage."
HRMP	Historical Resources Management Plan
Important historic and cultural aspects of our national heritage	A broadly inclusive term for historically significant cultural resources that encompasses the concepts of "historical resource" and "historic property."
LORS	Laws, ordinances, regulations, and standards
MCR	Monthly Compliance Report

MLD	Most Likely Descendent
NAHC	Native American Heritage Commission
NRHP	National Register of Historic Places
OHP	California Office of Historic Preservation
Programmatic agreement	An agreement document negotiated and drafted under Section 106 of the National Historic Preservation Act of 1969
Project area	The project site, the rights-of-way of all linear and other ancillary power facility features, construction laydown areas, and non-commercial borrow sites
Project area of analysis	The project area and all further areas in which the proposed project has the potential to directly or indirectly affect cultural resources
Project site	The principal proposed plant site parcel or main plant site of which the power block area and the solar thermal field would occupy the majority of that area
Proposed action	Equivalent in present analysis to “proposed project” and “undertaking.” The “proposed action” and other “alternative actions” are developed under NEPA to meet a specified purpose and need.
Proposed project	Equivalent in present analysis to “proposed action” and “undertaking.” A “project,” pursuant to 14 CCR § 15378, “means the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment.”
PSA	Preliminary Staff Assessment
SHPO	State Historic Preservation Officer
Staff	Energy Commission cultural resources technical staff
Undertaking	Equivalent in present analysis to “proposed action” and “proposed project.” An undertaking, pursuant to 36 CFR § 800.16(y), “means a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval.”
WEAP	Worker Environmental Awareness Program

Appendix CR-1

SITE DESCRIPTIONS FOR THE 25% SAMPLE OF CULTURAL RESOURCES INVENTORY FOR THE SES SOLAR TWO PROJECT

THE RECOMMENDATIONS PRESENTED IN THIS SECTION REGARDING ELIGIBILITY ARE ONLY THOSE OF THE CONTRACTOR, URS, AND DO NOT REFLECT OFFICIAL DETERMINATIONS

DRK-002

DRK-002 is an oblong-shaped prehistoric site that covers a total surface area of 289.5 square meters. The site is located within the western portion of the 300 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site includes creosote, burroweed, ocotillo, and cholla.

This lithic scatter site measures 37 meters north to south by 10 meters east to west, and contains a total of 18 prehistoric artifacts. It consists of 1 concentration interpreted to be a single reduction locus. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at DRK-002 is low, with a calculated distribution of 1 artifact per 16.08 square meters. The overall condition of this site is fair to good, with some alterations caused by off highway vehicle activity as evidenced by the presence of 2 parallel, single off-road vehicle tracks running through the northern portion of the site in an east to west direction.

This site contains 1 lithic reduction locus and a total of 18 artifacts, which include: 15 green porphyritic metavolcanic flakes (5 primary, 2 secondary and 8 tertiary), 2 green metavolcanic bi-directional cores, and 1 green metavolcanic hammerstone.

Locus 1 is at the northwestern site boundary and measures 3 meters northeast to southwest by 1 meter northwest to southeast. Artifacts observed within Locus 1 include 14 green porphyritic metavolcanic flakes (4 primary, 2 secondary and 8 tertiary) and 2 green metavolcanic bi-directional cores.

Those artifacts observed within 30 meters and outside of the loci consist of 1 green metavolcanic hammerstone with 2 battered edges and 1 green metavolcanic primary flake. The further character of artifacts found within DRK-002 is unreported.

The more particular physical context for DRK-002, extrapolating information from Data Response 112 Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature; debitage consists primarily of primary, secondary, and tertiary flakes, bi-directional cores, and a single hammerstone. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone material (metavolcanic) that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 1 single reduction locality or episode, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. DRK-002 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area there is very low likelihood for subsurface archaeological deposits. Therefore, data potential is considered exhausted through recordation of DRK-002.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, DRK-002 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

DRK-004

DRK-004 is an oblong-shaped archaeological deposit that includes both prehistoric and historic components and covers a total surface area of 207 square meters. The site is located within the western portion of the 300 MW area of the Proposed Solar Two Project. The site is situated atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site is covered by intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles. A large north-south trending, active (ephemeral) wash bounds the site to the east, and another wash that is east-west trending bounds the site to the north; a third active ephemeral east-west trending gully bisects the site. Vegetation species on the site include creosote, burroweed, salt bush, and ocotillo.

This archaeological deposit measures 31 meters north to south by 6 meters east to west, and contains a total of 35 prehistoric artifacts. The prehistoric component consists of 2 concentrations of lithic artifacts, interpreted to be 1 single reduction locus and 1 lithic scatter, with 34 artifacts. The historic component consists of 1 feature. One additional artifact was observed outside the loci and feature. The prevailing cultural constituents within this site consist of prehistoric lithic reduction debitage. Artifact density at DRK-004 is low, with a calculated distribution of 1 artifact per 5.91 square meters. The overall condition of the site is good with no visible alterations noted.

This site contains 1 historic feature, 2 single reduction loci and a total of 35 prehistoric artifacts, which include: 29 green metavolcanic flakes (9 primary, 18 secondary and 2 tertiary), 1 black metavolcanic primary flake, 1 black basalt tested cobble with 2 flake scars, 1 green metavolcanic multi-directional core and 3 green metavolcanic hammerstones.

Feature 1 is located 15 meters north of Locus 1 and consists of a historic “brass cap” State of California Division of Highways benchmark stamped, “IMP 1 2B” and “MON BO.”, with an associated guy-wire cairn. The survey cairn is located adjacent to, and immediately north of, the brass cap marker. The historic survey cairn rises 3 courses high, measuring 54 inches north to south by 42 inches east to west by 49 inches tall, and is constructed of 40 rocks of various source materials (green porphyritic metavolcanic, quartz, granitic, black metavolcanic and quartzite); the diameter of rocks used range from 1 inch to 16 inches and several boulders have visible calcification on the surface. Several pieces of lath are scattered around Feature 1.

Locus 1 is located 3 meters north of the site datum and measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 1 include 17 green metavolcanic flakes (4 primary, 12 secondary and 1 tertiary).

Locus 2 is located 15 meters southeast of Locus 1 and measures 4 meters north to south by 4 meters east to west. Artifacts observed within Locus 2 include: 12 green metavolcanic flakes (5 primary, 6 secondary and 1 tertiary), 1 black metavolcanic primary flake, 1 basalt tested cobble, 1 green metavolcanic core and 2 green metavolcanic hammerstones.

Those artifacts observed within 30 meters and outside of the loci consist of a single black and gray metavolcanic hammerstone. The further character of artifacts found within DRK-004 is unreported.

The more particular physical context for DRK-004, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009).

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret the prehistoric component of this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists primarily of primary and secondary flakes, a multi-directional core, and hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of 2 primary stone materials (metavolcanic and basalt) that are constituents of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 2 single reduction localities or episodes. It should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

The historic component of this site represents a highway survey marker associated with the Division of Highways activity and could possibly represent one of the California Right of Way Markers, or “C” Block cement markers, used between 1914 and 1934 to delineate the right of way boundary lines along state routes (Windmiller 1999). The rock cairn appears to be associated with the historic highway survey marker and shows evidence of purposeful construction. The presence of wooden laths around the rock cairn indicate possible guy-wire anchor points, likewise indicating use during survey activities. The rock cairn has characteristics similar to other survey markers in the area. No temporally diagnostic historic artifacts were found and it seems unlikely that the feature contains cultural materials, given the structure of the cairn (size-sorted stones that have become tightly packed and evidence of sand accumulation/deposition amongst stones).

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. However, benchmarks such as the one present at this site may be protected by law, therefore it is recommended that the benchmark present at DRK-004 be left undisturbed during construction activities.

DRK-005

DRK-005 is an oblong-shaped prehistoric site that covers a total surface area of 187.3 square meters. The site is located within the western portion of the 450 MW area of the Proposed Solar Two Project. The site is situated atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote.

This lithic scatter site measures 72 meters north to south by 22 meters east to west, and contains a total of 97 prehistoric artifacts. It consists of 6 concentrations, interpreted to be loci, with 96 artifacts plus 1 additional artifact observed outside the loci. The prevailing cultural constituents within this site consist of lithic reduction debitage. Artifact density at DRK-005 is low, with a calculated distribution of 1 artifact per 1.95 square meters. The overall condition of the site is good; however, the site is partially eroded and sloping into an ephemeral gully that runs along the western edge of the site.

The artifact types and materials present at the site include: 61 gray metavolcanic flakes (17 primary, 22 secondary, 16 tertiary and 6 shatter), 31 light purple rhyolite flakes (4 primary, 5 secondary, 11 tertiary and 11 shatter), 1 heavily patinated basalt secondary flake, 3 gray metavolcanic multi-directional cores and 1 gray metavolcanic fragmented uni-directional core.

Locus 1 is located at the northern end of the site and measures 7 meters northwest to southeast by 2 meters northeast to southwest. Artifacts observed within Locus 1 include: 26 gray metavolcanic flakes (9 primary, 9 secondary, 5 tertiary and 3 shatter), 1 multi-directional gray metavolcanic core and 1 uni-directional gray metavolcanic core fragment.

Locus 2 is located 26 meters southwest of Locus 1 and measures 5 meters northwest to southeast by 2 meters northeast to southwest. Artifacts observed within Locus 2 include: 14 gray metavolcanic flakes (2 primary, 3 secondary, 6 tertiary and 3 shatter).

Locus 3 is located 22 meters northeast of Locus 2 and measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 3 include: 12 gray metavolcanic flakes (2 primary, 9 secondary and 1 tertiary) and 1 metavolcanic multi-directional core.

Locus 4 is located 24 meters southeast of Locus 3 and measures 6 meters northeast to southwest by 3 meters northwest to southeast. Locus 4 includes 26 purple rhyolite flakes (3 primary, 3 secondary, 9 tertiary and 11 shatter).

Locus 5 is located 6 meters southwest of Locus 4 and measures 4 meters northeast to southwest by 3 meters northwest to southeast. Locus 5 includes: 9 gray metavolcanic (4 primary, 1 secondary and 4 tertiary), 5 purple rhyolite (1 primary, 2 secondary and 2 tertiary) and 1 metavolcanic multi-directional core.

One artifact, heavily patinated basalt secondary flake, is observed within 30 meters and outside the loci. The further character of artifacts found within DRK-005 is unreported.

The more particular physical context for DRK-005, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists primarily secondary and tertiary flakes and multi-directional cores. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone material (metavolcanic) that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 5 single reduction localities or episodes, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, DRK-005 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

DRK-010

DRK-010 is an amorphous-shaped archaeological deposit that includes both prehistoric and historic components that cover a total surface of 3,770 square meters. The site is located within the western portion of the 300 MW area of the Proposed Solar Two Project. The site is atop an elevated, very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. There are surfaces, absent of rock where sand has built up around past vegetation. Vegetation species on the site include creosote, desert trumpet, salt bush, ocotillo, indigo bush and cholla.

This site measures 109 meters north to south by 53 meters east to west, and contains a total of 199 prehistoric and 5 historic artifacts. The prehistoric component consists of 11 concentrations interpreted to be 8 single reduction loci and 3 lithic scatters, with 186 artifacts plus 13 prehistoric artifacts observed outside the loci. The historic component consists of 4 historic rock cluster features, 1 US General Land Office (GLO) benchmark feature, with 5 additional historic artifacts observed outside the features and loci. The prevailing cultural constituents within this site are prehistoric lithic reduction debitage, historic refuse artifacts, and historic features. Artifact density at DRK-010 is low, with a calculated distribution of 1 artifact per 18.48 square meters. The overall condition of the site is good with some alterations due to off-highway vehicles.

Artifact types and materials represented at the site include: 118 metavolcanic flakes (37 primary, 46 secondary, 22 tertiary and 13 shatter), 47 quartz flakes (14 primary, 12 secondary and 21 shatter), 7 cryptocrystalline silicate chalcedony flakes (1 primary and 6 shatter), 2 cryptocrystalline silicate chert flakes (1 primary and 1 secondary), 2 petrified wood flakes (1 primary and 1 tertiary), 7 metavolcanic cores (1 uni-directional, 3 bi-directional, 3 multi-directional), 2 quartz cores (1 bi-directional, 1 multi-directional), 2 cryptocrystalline silicate chert cores (1 bi-directional, 1 multi-directional), 1 petrified wood multi-directional core, 5 metavolcanic tested cobbles, 5 metavolcanic hammerstones, and 1 quartzite hammerstone. Historic artifacts found outside of loci and features include 2 tobacco tins and 3 bailing wire fragments.

Feature 1 is a historic US General Land Office brass cap benchmark located in the central portion of the site that reads: "US GENERAL LAND OFFICE SURVEY/PENALTY $250 REMOVAL/T16S R10E (with 1/4 section info)/191__." Surrounding the benchmark are 4 small to large sub-rounded metavolcanic and granite cobbles and a fallen stake with a 1.75-inch-wide lath nailed to it with 3 round head finishing nails. The length of the stake is 7.5 feet and it is laying on the ground in a north to south direction. Also associated with this feature is bailing wire which was used to attach the stake to the benchmark.

Feature 2 is a potentially historic rock cluster that measures 18 inches north to south by 19 inches east to west by 7 inches in height and is located 27 feet southwest of Feature 1. It is constructed of approximately 12 sub-rounded to sub-angular granite, metavolcanic and basalt cobbles and 2 courses high. No artifacts were found associated with Feature 2.

Feature 3 is a potentially historic rock cluster that measures 19 inches northwest to southeast by 30 inches northeast to southwest by 7 inches in height and is located 49 feet north of Feature 2. It is constructed of 12 small to large sub-rounded to sub-angular metavolcanic, granite and basalt cobbles. The rock cluster appears to have been disarticulated to a single level with rocks lightly scattered. No artifacts were found associated with Feature 3.

Feature 4 is a potentially historic rock cluster that measures 18 inches north to south by 27 inches east to west by 4 inches in height and is located 35.9 feet east of Feature 3. It is constructed of 24 small to large sub-rounded quartz, metavolcanic, basalt and granite cobbles. The rock cluster appears to have been disarticulated to a single level with rocks lightly scattered. No artifacts were found associated with Feature 4.

Feature 5 is a potentially historic rock cluster that measures 24 inches north to south by 27 inches east to west by 10 inches in height located 33.6 feet south southwest of Feature 4. It is constructed of 19 small to large sub-rounded to sub-angular petrified wood, metavolcanic and granite cobbles and rises 2 courses high. No artifacts were found associated with Feature 5.

Locus 1 measures 4.40 meters northeast to southwest by 2 meters northwest to southeast and is located in the central portion of the site. Artifacts observed within Locus 1 include: 25 metavolcanic flakes (9 primary, 6 secondary, 5 tertiary and 5 shatter), 2 metavolcanic cores (1 uni-directional and 1 multi-directional) and 1 tested metavolcanic cobble.

Locus 2 is located 21.3 meters northeast from Locus 1 and measures 2.10 meters northwest to southeast by 1.50 meters northeast to southwest. Artifacts observed within Locus 2 include: 14 metavolcanic flakes (2 primary, 7 secondary, 4 tertiary and 1 shatter) and 1 metavolcanic multi-directional core.

Locus 3 is located 7.90 meters north from Locus 2 and measures 2.20 meters east to west by 1.10 meters north to south. Artifacts observed within Locus 3 include: 8 metavolcanic flakes (2 primary, 4 secondary, 1 tertiary and 1 shatter) and 1 metavolcanic bi-directional core.

Locus 4 is located 18.1 meters northwest from Locus 3 and measures 1.30 meters northeast to southwest by 0.70 meters northwest to southeast. Artifacts observed within Locus 4 include: 11 metavolcanic flakes (5 primary, 1 secondary, 4 tertiary and 1 shatter) and 1 metavolcanic bi-directional core.

Locus 5 is located 3.5 meters north northwest from Locus 4 and measures 1.80 meters northeast to southwest by 1.10 meters northwest to southeast. Artifacts observed within Locus 5 include: 18 metavolcanic flakes (4 primary, 7 secondary, 6 tertiary and 1 shatter), 1 metavolcanic multi-directional core, 2 metavolcanic tested cobbles and 2 metavolcanic hammerstones.

Locus 6 is located 81 meters east from Locus 5 and measures 2 meters northwest to southeast by 1.20 meters northeast to southwest. Artifacts observed within Locus 6 include: 9 metavolcanic flakes (2 primary, 6 secondary and 1 shatter) and 1 metavolcanic tested cobble.

Locus 7 is located 21.8 meters northwest from Locus 6 and measures 3 meters north to south by 1.90 meters east to west. Artifacts observed within Locus 7 include: 30 quartz flakes (10 primary, 6 tertiary and 14 shatter) and 1 quartz multi-directional core.

Locus 8 is located 11.7 meters northwest from Locus 7 and measures 2.70 meters northwest to southeast by 1.70 meters northeast to southwest. Artifacts observed within Locus 8 include: 18 metavolcanic flakes (8 primary, 8 secondary and 2 shatter).

Locus 9 is located 39.1 meters northeast from Locus 8 and measures 2.80 meters southwest to northeast by 1.60 meters northwest to southeast. Artifacts observed within Locus 9 include: 7 metavolcanic flakes (1 primary, 4 secondary and 2 shatter), 1 metavolcanic bi-directional core and 1 metavolcanic hammerstone.

Locus 10 is located 16.5 meters south from Locus 9 and measures 3 meters north to south by 3 meters east to west. Artifacts observed within Locus 10 include: 8 quartz flakes (3 primary, 3 tertiary and 2 shatter), 5 metavolcanic flakes (2 primary and 3 secondary) and 4 cryptocrystalline silicate chalcedony flakes (1 primary and 3 shatter).

Locus 11 is located 8.10 meters southeast from Locus 10 and measures 3.50 meters east to west by 1.60 meters north to south. Artifacts observed within Locus 11 include: 9

quartz flakes (1 primary, 3 tertiary and 5 shatter), 3 cryptocrystalline silicate chalcedony shatter, 1 quartz bi-directional core and 1 quartzite hammerstone.

Those artifacts observed within 30 meters and outside of the loci and features consist of: 2 cryptocrystalline silicate chert flakes (1 primary, 1 secondary), 2 cryptocrystalline silicate chert cores (1 bi-directional, 1 multi-directional), 3 metavolcanic flakes (2 primary, 1 shatter), 1 metavolcanic tested cobble, 2 metavolcanic hammerstones, 2 petrified wood flakes (1 primary, 1 tertiary), 1 petrified wood multi-directional core, 2 historic Prince Albert tobacco tins, and 3 historic bailing wire fragments.

The further character of artifacts associated with DRK-010 is unreported.

The more particular physical context for DRK-010, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007); therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret the prehistoric component of this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature; debitage consists of primary, secondary, and tertiary flakes, cores, angular waste/shatter, and hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this multicomponent site are of the same primary stone materials (metavolcanic, quartz, and cryptocrystalline silicate) that are constituents of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 11 reduction localities or episodes; but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Archaeologists for the applicant interpret that historic General Land Office (GLO) cadastral benchmarks such as the one found in DRK-010 were placed by surveyors as a part of the Public Lands Survey System (PLSS). That system divided public lands into sections of 1 square mile (640 acres) and into quarter sections of 160 acres. The PLSS was created by the Land Ordinance of 1785, which declared that lands outside the then-existing states could not be sold, otherwise distributed, or opened for settlement prior to being surveyed (Stewart 1935). Along with the Homestead Act of 1862 and the Desert Land Act of 1877, the PLSS helped facilitate the U.S. expansion westward in the late 19th and early 20th centuries. For unknown reasons the date stamp on this particular brass cap was left incomplete so the date it was placed cannot be definitively known. However, the style and construction of this benchmark is similar to others observed in the area that are marked with the date 1912, so it seems likely that this benchmark was placed during the same survey effort.

Archaeologists for the applicant interpret that the rock clusters present at DRK-0 10 are likely contemporaneous with the GLO Survey benchmark (Feature 1), and somehow associated with it, but the purpose of that association is not readily apparent. Features 2 through 5 are all placed roughly equidistant (approximately 27 feet) from Feature 1 (GLO bench mark), which would seem to be an intentional arrangement likely designed by the surveyors. Curiously, they are aligned off-axis from cardinal directions at inexact angles, making it seem unlikely that they are directional benchmarks.

An alternative explanation might be that the clusters once were expediently constructed stone markers of mining claims or homestead boundaries. Mining claim markers sometimes contain tobacco tins to hold copies of official records substantiating the claim. A tobacco tin was found at the site but it contained no deed or note and was located near, but not within, Feature 1; so its association with that feature could be spurious. The straight sided tobacco tin found at this site is of a type that was common from about 1907 until 1988 when R.J. Reynolds Company changed from metal tobacco tins to paper and plastic pouches (Rock 1988:75). That date range may coincide with the speculative 1912 date of the survey effort that placed the GLO benchmark, so it is possible that the GLO surveyors discarded the tobacco tin during their work at this location.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. This geomorphic landform indicates a Pleistocene (or older) period of formation, and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits. Therefore, data potential is considered exhausted through recordation of DRK-010.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, DRK-010 is not considered a contributor to an existing and/or proposed archaeological district or landscape. Destruction is still prohibited under federal law; therefore, it is recommended that the US GLO benchmark be left undisturbed during construction activities.

DRK-011

DRK-011 is an oblong-shaped prehistoric lithic scatter site that covers a total surface of 1,416 square meters. The site is located in the western portion of the 300 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, chalcedony, quartz, quartzite and granitic gravels and cobbles. Soils contain alluvial sands originating from decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site includes creosote, salt bush, burroweed, ocotillo, cholla, desert trumpet, smoke tree and bunch grass.

This lithic scatter site measures 141 meters northeast to southwest by 39 meters northwest to southeast and contains a total of 187 prehistoric artifacts. It consists of 6 concentrations interpreted to be 6 single reduction loci with 172 artifacts and 15 additional artifacts were observed outside the loci. The prevailing cultural constituents within this site consist of prehistoric lithic reduction debitage. Artifact density at DRK--011 is low, with a calculated distribution of 1 artifact per 7.57 square meters. The overall condition of the site is good with the exception of 2 off-highway vehicle tracks through the site.

The site contains 6 lithic reduction loci and a total of 187 artifacts (172 associated with the loci), which include: 158 metavolcanic flakes (49 primary, 39 secondary and 70 tertiary), 17 metavolcanic shatter, 1 chalcedony primary flake, 3 multi-directional cores (2 metavolcanic and 1 basalt), 2 metavolcanic uni-directional cores and 6 point provenience metavolcanic hammerstones. The areas between the loci and within 30 meters contain a sparse distribution of individual artifacts throughout the site.

Locus 1, within the north end of the site, is located 38 meters southeast of the center of the natural occurring sand circle or datum and measures 6.6 meters northeast to southwest by 1.6 meters northwest to southeast. Artifacts observed within Locus 1 include: 26 gray metavolcanic flakes (10 primary, 4 secondary and 12 tertiary), 2 gray metavolcanic shatter, 1 gray metavolcanic multi-directional core and 1 gray metavolcanic hammerstone.

Locus 2 is located 24 meters west of Locus 1 and measures 2 meters northwest to southeast by 1 meter northeast to southwest. Artifacts observed within Locus 2 include 6 gray metavolcanic flakes (2 primary, 2 secondary and 2 tertiary).

Locus 3 is located 30 meters north of Locus 2 and measures 1 meter east to west by 1 meter north to south. Artifacts observed within Locus 3 include: 11 green metavolcanic flakes (4 primary, 2 secondary and 5 tertiary) and 1 gray metavolcanic hammerstone.

Locus 4 is located 42 meters southwest of Locus 3 and measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 4 include: 11 green metavolcanic flakes (4 primary, 3 secondary and 4 tertiary), 1 green metavolcanic shatter and 1 metavolcanic uni-directional core.

Locus 5 is located 42 meters southwest of Locus 4 and measures 13 meters northeast to southwest by 3 meters northwest to southeast. Artifacts observed within Locus 5 include 92 green metavolcanic flakes (26 primary, 23 secondary and 43 tertiary) and 13 green metavolcanic shatter.

Locus 6 is located 32 meters north of Locus 5 and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 6 include: 4 green/gray metavolcanic flakes (2 secondary and 2 tertiary), 1 green/gray metavolcanic shatter and 1 metavolcanic multi-directional core.

A sparse distribution of artifacts observed within 30 meters and outside of the loci consists of 7 metavolcanic flakes (2 primary, 3 secondary and 2 tertiary), 1 primary chalcedony flake, 1 basalt multi-directional core, 1 uni-directional metavolcanic core, 1 metavolcanic tested cobble and 4 metavolcanic hammerstones. The further character of artifacts associated with DRK-011 is unreported.

The more particular physical context for DRK-011, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007); therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature: debitage consists predominantly of primary and tertiary flakes, 3 multi-directional cores, 2 uni-directional cores, angular waste/shatter, and hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter site are of the same 3 primary stone (metavolcanic, basalt, and chalcedony) materials that are typical constituents of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 6 single reduction localities or episodes, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction and analysis of artifact distribution has been accounted for during the recordation process. The fan piedmont geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area there is very low likelihood for subsurface archaeological deposits, therefore data potential is considered exhausted through recordation of DRK-011.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National

Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, DRK-011 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

DRK-020

DRK-020 is a bronze cap benchmark stamped with the following: "U.S. General Land Office/1912", corner sections, "13, 18, 24, 19", as well as the township and range information, "T1 6S, R1 0E, R1 1 E." A piece of modern wooden lath is staked in the ground at the benchmark. The site is located within the western portion of the 300 MW area of the Proposed Solar Two Project. The site is situated atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site is covered by heavily disturbed desert pavement with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote and ocotillo.

A single historic bullet casing artifact was observed adjacent to the historic benchmark. The bullet is from a 38 special and reads "REM UMC/38 SPL." The overall condition of the site is good, but the surrounding area has been heavily disturbed due to its proximity to what appear to be recent borrow pits to the east and south of the site.

The more particular physical context for DRK-020, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009).

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret that General Land Office cadastral markers such as the one found in DRK-020 were placed by surveyors as a part of the Public Lands Survey System (PLSS). That system divided public lands into sections of 1 square mile (640 acres) and into quarter sections of 160 acres. The PLSS was created by the Land Ordinance of 1785, which declared that lands outside the then-existing states could not be sold, otherwise distributed, or opened for settlement prior to being surveyed (Stewart 1935). Along with the Homestead Act of 1862 and the Desert Land Act of 1877, the PLSS helped facilitate the U.S. expansion westward in the late 19th and early 20th centuries. The General Land Office survey marker present at DRK-020 is stamped "1912," indicating the date that it was placed.

Also found at DRK-020 is a single bullet cartridge with "REM UMC" stamped on the base, indicating that it was manufactured by the merged companies of Remington and Union Metallic Cartridge. Cartridges with that stamp were manufactured between 1911 and present (Goodman 2002).

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history.

Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. Due to the absence of artifacts other than the single bullet, and geomorphic location of this historic feature, there is very low likelihood for subsurface archaeological deposits.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. However, destruction of General Land Office survey markers is prohibited under federal law; therefore, it is recommended that the US GLO benchmark be left undisturbed during construction activities.

DRK-047

DRK-047 is an oblong L-shaped prehistoric lithic reduction site that covers a total surface of 104 square meters. The site is located within the western portion of the 300 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of a very old fan surface covered by intact desert pavement that is well developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote and burroweed.

This lithic reduction site measures 35 meters northwest to southeast by 19 meters northeast to southwest, and contains a total of 44 prehistoric artifacts. It consists of 2 concentrations of lithic artifacts, interpreted to be a single reduction locus and a lithic scatter. The prevailing cultural constituents within this site consist of prehistoric lithic reduction debitage. Artifact density at DRK-047 is low, with a calculated distribution of 1 artifact per 2.36 square meters. The site is bound by a medium sized ephemeral gully to the west and 2 small ephemeral gullies to the north, east and south. The overall condition of the site is good with no visible alterations except for a faint off-highway vehicle 2-track located on the eastern portion of the site.

The site contains 2 loci and a total of 44 artifacts, which include: 32 basalt flakes (16 primary, 8 secondary, 1 tertiary and 7 shatter), 3 porphrytic metavolcanic primary flakes, 5 translucent quartz flakes (3 primary and 2 shatter), 1 basalt bi-directional core, 2 tested cobbles (1 basalt and 1 quartz) and 1 granitic mano.

Locus 1 is located at the southeast end of the site and measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 1 include: 32 fine grained basalt flakes (16 primary, 8 secondary, 1 tertiary and 7 shatter), 1 basalt tested cobble, 3 heavily weathered porphrytic metavolcanic primary flakes and 1 bi-directional fine grained basalt core.

Locus 2 is located 32 meters northwest of Locus 1 and measures 2 meters northwest to southeast by 1 meter northeast to southwest. Artifacts observed within Locus 2 include 5 semi-translucent white quartz flakes (3 primary and 2 shatter) and 1 tested cobble.

Those artifacts observed within 30 meters and outside of the loci consist of 1 granitic bifacial mano with a moderately repatinated surface and evidence of heavy use wear; that measures 15.5 centimeters by 8 centimeters by 5 centimeters. The further character of artifacts associated with DRK-047 is unreported.

The more particular physical context for DRK-047, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007); therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont. The desert pavement consists of small to large, sub-rounded to sub-angular metavolcanic, basalt, quartz, quartzite and granite gravels and cobbles. Alluvial sand soils consisting of decomposed metavolcanic and granitic gravels and cobbles are also present.

The flaked stone assemblage at this site represents an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists primarily of primary and secondary flakes and a bi-directional core. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone material (fine grained basalt, translucent quartz, porphyritic metavolcanic) that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent multiple reduction localities or episodes, but it should not be discounted that artifacts within this localities may have been collected and/or used at a later point in time.

The ground stone tool assemblage at this site represents subsistence resource procurement and/or processing. Ground stone tools were made by grinding, abrading, pecking, pounding, and polishing rather than chipping and flaking. Ground stone tools found in the area surrounding DRK-047 include one mano. Manos, metates, and pestles were primarily constructed from coarse-grained stone such as sandstone or granite, and are associated with subsistence procurement and/or processing (Chartkoff and Chartkoff 1984). However, the particular mano present at DRK-047 has no distinguishing characteristics that would provide data pertinent to any meaningful period in prehistory.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. DRK-047 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area there is very low likelihood for subsurface archaeological deposits, therefore data potential is considered exhausted through recordation of DRK-047.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, DRK-047 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

EBR-010A

EBR-010A is an oval-shaped prehistoric site that covers a total surface area of 1 square meter. The site is located within the western portion of the 300 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote, ocotillo and cholla.

This site measures 3 meters northeast to southwest by 1 meter northwest to southeast, and contains a total of 10 prehistoric artifacts distributed throughout the site. The prevailing cultural constituents within this site consist of ceramic sherds interpreted to be a single vessel. Artifact density at EBR-010A is low, with a calculated distribution of 1 artifact per 0.13 square meters. The overall condition of the site is fair to good, with some alterations caused by off-highway vehicle activity to the east and west of the site.

Specifically the artifact types and materials present at this site include 10 very weathered ceramic buffware sherds, which include 2 direct rims and 8 body sherds. The further character of artifacts associated with site EBR-010A is unreported.

The more particular physical context for EBR-010A, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret sites like EBR-010A containing only ceramic sherds as the result from the loss or discard of one or more vessels or other ceramic object. Ceramic scatters such as this can also result when ceramic sherds have been displaced from their original context by erosion and/or mechanical processes. Based on the 2 of the direct rim sherds, the vessel appears to have been a small mouth olla.

Characteristics of ceramic sherds such as those present at EBR-010A can provide data pertinent to questions regarding prehistoric ceramic production technologies and the ethnic origin of the vessels from which they came. Currently, the primary ethnic groups known to have occupied region surrounding EBR-010A include the Diegueño and Tipai (Kamia). Other groups known to have used/traveled/inhabited the area include the Cocopa, Kumeyaay, Ipai, Quechan, Paipai and Cahuilla (Luomala 1978; Schaefer and Laylander 2007, URS 2009). In approximately AD 1200, the course of the Colorado River changed, refilling Lake Cahuilla and providing a stable water source that drew people from surrounding regions to repopulate the Colorado Desert. Ceramic wares which were introduced centuries before in other areas were brought into this region at that time (URS 2009). However, it has been argued that stable populations around the lake developed their own distinctive pottery formulas that became regional expressions of their families and locales (May ND). Although these groups each had specific approaches to the creation of ceramics, ceramic vessels were also traded along with subsistence resources and other items, infusing some uncertainty into the use of data from ceramics to associate one particular area with a particular tribal group or family (May ND). Therefore, it is unlikely that surface data could directly relate EBR-010A or the area surrounding it to a particular tribe.

Data gathered on ceramics in the area surrounding EBR-010A show evidence of a variety of ceramic types and techniques. Though paddle-and-anvil construction techniques were common among groups using this area, the tempers employed, vessel types manufactured, and decoration did vary between groups. The Diegueño used ground clay and did not add temper when manufacturing ceramics. They created a variety of vessels including ollas; bowls, cooking pots and pipes (Rogers 1973:18, URS 2009). The Kamia sometimes added rose quartz as temper and produced the greatest variety of ceramics among the Yuman bands, including ollas, jars, canteens, bowls, rattles, plates, scoops, cups and parchers. Kamia ceramics were painted after firing with red and/or black designs (Gifford 1931, Rogers 1973, URS 2009, Van Camp 1979:57). The Cocopah used ground and winnowed clay tempered with ground sherds to create a variety of vessels used for storage and cooking (Alvarez de Williams 1983:99, URS 2009). Quechan vessel types include bowls, parchers, cooking pots, small figurines, and large storage vessels that were used to float goods across rivers (Bee 1983:10, McGuire 1982, URS 2009).

The analysis necessary to derive all possible data from ceramic sherds such as those present at EBR-010A is typically beyond the scope of field survey archaeology. Therefore, it is recommended that these artifacts be analyzed by a ceramics specialist before a final determination of eligibility can be made.

Based on currently available data, the material remains cannot be definitively associated with a meaningful portion of prehistory. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. In addition, this geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area there is very low likelihood for subsurface archaeological deposits; therefore, data potential is considered exhausted through recordation of EBR-010A.

Due to the presence of temporally diagnostic artifacts (ceramics), further data is necessary to determine if this site, as a stand-alone or individual resource, should be recommended as eligible or not eligible for the National Register, and if it is or is not a historic property pursuant to the National Register or a historical resource per the California Register under the criteria for eligibility. In addition, EBR-010A is not considered a contributor to an existing and/or proposed archaeological district or landscape.

EBR-020

EBR-020 is an amorphous-shaped prehistoric site that covers a total surface area of 6.65 square meters. The site is located within the western portion of the 300 MW area of the Proposed Solar Two Project. The site is situated atop a very old fan surface that is covered by intact desert pavement within an interface area between the fan piedmont and fan piedmont remnant geomorphic landforms. This indicates a Pleistocene (or older) period of formation (URS 2009). The desert pavement is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposing metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote, burroweed, ocotillo and cholla.

This lithic scatter site measures 4 meters northeast to southwest by 3 meters northwest to southeast, and contains a total of 37 prehistoric artifacts. The prevailing cultural constituents within this site consist of lithic reduction debitage. Artifact density at EBR--020 is moderate, with a calculated distribution of 1 artifact per 0.17 square meters. The overall condition of the site is fair with some alterations caused by off-highway vehicles in the eastern portion of the site.

This lithic scatter consists of 36 pieces of quartz lithic debitage, including 8 flakes, 26 pieces of angular waste/shatter and 2 tested cobble fragments. The site also includes 1 quartzite hammerstone. The further character of artifacts within EBR-020 is unreported.

The more particular physical context for EBR-020, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within an interface area of the fan piedmont and fan piedmont remnant geomorphic landforms. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for Early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007); therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists of primary flakes, angular waste/shatter, tested cobbles, and a single hammerstone. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter and tools are of the same primary stone material (quartz and quartzite), are constituents of the surrounding area, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent a single reduction locality or episode. It should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. EBR-020 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles in the interface between the fan piedmont and fan piedmont remnant geomorphic landforms. These geomorphic landforms indicate a Pleistocene (or older) period of formation, and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits. Therefore, data potential is considered exhausted through recordation of EBR-020.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, EBR-020 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

EBR-023

EBR-023 is an oval-shaped prehistoric lithic scatter that covers a total surface area of 27 square meters. The site is located within the western portion of the 300 MW area of the Proposed Solar Two Project. The site is situated atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface of the site consists of heavily disturbed eroded desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles. The primary vegetation species observed on the site is creosote.

This lithic scatter site measures 9 meters north northeast to south southwest by 5 meters north northwest by south southeast, and contains a total of 19 prehistoric artifacts. The prevailing cultural constituents within this site consist of prehistoric lithic reduction debitage. Artifact density at EBR-023 is low, with a calculated distribution of 1 artifact per 1.42 square meters. The overall condition of the site is poor due to several off highway vehicle tracks observed on and around the site.

The site consists of a total of 19 artifacts widely distributed throughout the site; which include 18 cryptocrystalline silicate flakes: 12 chalcedony (6 primary, 3 secondary, 1 tertiary and 2 angular waste/shatter) and 6 chert (2 primary, 2 secondary and 2 tertiary) and 1 cryptocrystalline silicate chalcedony multi-directional core. The further character of artifacts within EBR-023 is unreported.

The more particular physical context for EBR-023, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007) therefore there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature; debitage consists primarily of primary and secondary flakes, a single multi-directional core and angular waste/shatter. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone cryptocrystalline material that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent a single reduction locality or episode; but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. EBR-023 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation. Because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits; therefore, data potential is considered exhausted through recordation of EBR-023.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria. In addition, EBR-023 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

EBR-065

EBR-065 is an oblong-shaped prehistoric lithic scatter site that covers a total surface area of 538 square meters. The site is located within the eastern portion of the 300 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of highly disturbed desert pavement that is eroding but moderately stabilized in parts, namely the southwestern portion of the site, with poorly sorted small to large, sub-rounded to sub-angular metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial silts and sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote.

This lithic scatter site measures 58 meters north to south by 15 meters east to west, and contains a total of 61 artifacts (1 historic and 60 prehistoric). It consists of 2 concentrations interpreted to be 2 single lithic reduction loci with 54 artifacts. Seven additional artifacts were observed outside the loci. The prevailing cultural constituents within this site consist of prehistoric lithic reduction debitage. Artifact density at EBR-065 is low, with a calculated distribution of 1 artifact per 8.8 square meters. The overall condition of the site is poor.

The site contains 2 lithic reduction loci and a total of 61 artifacts (54 associated with the loci), which include: 25 metavolcanic flakes (19 primary and 6 secondary), 11 metavolcanic shatter, 8 quartz flakes (3 primary and 5 secondary), 9 quartz shatter, 2 metavolcanic multi-directional cores, 3 metavolcanic hammerstones, 1 quartz mano, 1 metavolcanic edge-modified flake, and 1 historic church key-opened beverage can.

Locus 1 is located at the north end of the site, 22 meters north-northeast of the small boulder sandstone datum and measures 8.7 meters east to west by 7.3 meters north to south. Artifacts observed within Locus 1 include: 22 green metavolcanic flakes (16 primary and 6 secondary), 10 green metavolcanic shatter, 2 green metavolcanic multi-directional cores, 1 green metavolcanic unifacial edge-modified flake, 1 green metavolcanic hammerstone, and 1 heavily weathered quartz mano. All artifacts within Locus 1 exhibit substantial weathering or patination.

Locus 2 is located 52 meters south of Locus 1 and measures 1 meter east to west by 1 meter north to south. Artifacts observed within Locus 2 include: 8 semi-translucent quartz flakes (3 primary and 5 secondary) and 9 semi-translucent quartz shatter.

Those artifacts observed within 30 meters and outside of the loci consist of: 3 green metavolcanic primary flakes, 1 green metavolcanic shatter, 2 green metavolcanic heavily battered hammerstones, and 1 historic church key-opened can that measures 2.75 inches diameter by 4.75 inches high. Also present outside the loci is a single modern 1970s-era can that was not included in the artifact counts.

The further character of artifacts associated with EBR-065 is unreported.

The more particular physical context for EBR-065, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007); therefore there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature characterized as: debitage dominated by primary and secondary flakes, 2 multi-directional cores with little cortex, angular waste/shatter, 1 edge-modified flake, and 3 hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same 2 primary stone materials (metavolcanic and quartz) that are typical constituents of the surrounding area lithology and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 2 single reduction localities or episodes, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Additionally, archaeologists for the applicant interpret ground stone tools such as the single mano present at EBR-065 to be evidence of resource processing. Ground stone tools were made by grinding, abrading, pecking, pounding, and polishing rather than chipping and flaking. Ground stone tools found in the area surrounding EBR-065 include manos, metates (sometimes referred to as milling stones) and pestles. Metates in this area are typically flattish slabs, manos were smaller, soap and loaf-shaped stones that were moved in a circular motion against the metate, in order to grind small seeds and other food resources; pestles were elongated, club-shaped stones used for pounding and grinding in a mortar. Manos, metates, and pestles were primarily constructed from coarse-grained stone such as sandstone or granite. Less frequent groundstone material sources, but still common in the area, are quartzite and quartz (mano located in Locus 1), which are more durable and can still be rejuvenated. Mortars in desert environments absent of large coarse bedrock outcrops were made from cottonwood. Manos, metates, and pestles are associated with subsistence procurement and/or processing (Chartkoff and Chartkoff 1984).

The presence of flaked stone tools such as the single edge-modified flake found within EBR-065 represents resource procurement and/or processing of faunal or floral resources. The creation of flaked stone tools requires additional lithic technologies, possible including bifacial thinning and pressure flaking to shape and refine cutting edges. The presence of tertiary flakes and angular waste/shatter of metavolcanic material, like the edge-modified flake, may account for such activities.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. EBR-065 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation. Because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits. Therefore data potential is considered exhausted through recordation of EBR-065. Furthermore, the poor condition of the site due to disturbances associated with off-highway vehicle activity has greatly reduced its integrity.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, EBR-065 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

JF-006

JF-006 is an amorphous-shaped historic refuse and historic/modern rock cluster site that covers a total surface of 567 square meters. The site is located within the western portion of the 300 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of disturbed desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. The site has been disturbed from off-highway vehicle (OHV) usage and is within an area that has been mechanically cleared (surface/gravel mining area that has been graded). Small piles of gravel are noted north and south of the site. A 2-track OHV track goes through the northwest portion of the site. Vegetation species on the site include creosote and bunch grass.

This historic/modern rock cluster and historic refuse deposit site measures 49 meters north to south by 54 meters east to west, and contains a total of 3 historic artifacts. The prevailing cultural constituents within this site consist of historic artifacts and 3 rock cluster features. Artifact density at JF-006 is low, with a calculated distribution of 1 artifact per 189 square meters. The overall condition of the site is fair.

This site contains 3 historic artifacts consisting of 1 church key opened half quart beer can labeled "Pale Ale Brew," ==1 church key opened beverage can, and a metal socket wrench. Also present are 3 potentially modern rock clusters (one with a survey stake and wire nail). The further character of artifacts associated with JF-006 is unreported.

Feature 1 consists of a potentially modern rock cluster measuring 56 inches in diameter by 8 inches high and is located eastern side of the central portion of the site. The rock cluster is constructed from 60 metavolcanic cobbles; the diameter of rocks used range from 3 inches to 10 inches. The rock cluster is in fair condition.

Feature 2 consists of a potentially modern rock cluster measuring 34 inches in diameter by 4 inches high and is located 45 feet southeast of Feature 1. The rock cluster is constructed from 28 sub-rounded to sub-angular metavolcanic cobbles; the diameter of rocks used range from 2 inches to 9 inches. This rock cluster is in fair condition and has an associated wooden stake with a wire nail embedded in it.

Feature 3 consists of a potentially modern rock cluster measuring 40 inches in diameter by 8 inches high and is located 106.5 feet east of Feature 2. The rock cluster is constructed from 40 sub-rounded metavolcanic cobbles; the diameter of rocks used range from 2.5 inches to 10 inches. The rock cluster is in fair condition and is filled with compacted sand.

The more particular physical context for JF-006, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007) therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret that although the rock clusters present at JF-006 have characteristics similar to survey markers in the area, they cannot be conclusively identified as such. The size of the clusters and of the stones that comprise them conform approximately to those surrounding General Land Office survey bench markers found in the surrounding region; however, the feature is not located on a current section or quarter section corner point. Additionally, expediently constructed stone clusters can also be markers of mining claims or homestead boundaries. Mining claim markers sometimes contain tobacco tins to hold copies of official records substantiating the claim. Such a tin was not evident at this stone cluster. The site is situated within a large recreational area which is frequently used by off-highway vehicles. It is possible that the stone cluster is modern in age and perhaps was expediently placed to provide a visible landmark to facilitate navigation.

Temporally diagnostic artifacts present at the site include 2 church key opened beverage cans. These cans were opened with a large (3/4") church key which was a style popular between 1935 and 1952 (Goodman 2002). The third artifact, a socket wrench, had no observed diagnostic characteristics.

Archaeologists for the applicant interpret that deposits of historic artifacts such as the ones found at JF-006 typically represent episodes of refuse disposal after initial discard in another location (dumping) or discard and/or loss of individual articles in-situ. In the case of JF-006, the small number of artifacts and artifact types present would more likely have resulted from in-situ disposal rather than dumping of wide range of artifact types that would be expected in an assemblage of common household refuse. Though approximate dates of consumption can be determined for 2 of the artifacts present at JF-006, the time between the initial use/consumption of the artifacts and their ultimate disposal cannot be known so the specific date of their disposal cannot be reliably determined.

This site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. JF-006 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits, therefore, data potential is considered exhausted through recordation of JF-006.

As a result, JF-006 is recommended not eligible for the National Register and is not a historical resource pursuant to National Register and California Register under any of the criteria for eligibility.

JFB-010

JFB-010 is a circular-shaped archaeological deposit that includes both prehistoric and historic components and covers a total surface area of 44 square meters. The site is located within the western portion of the 300 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of heavily disturbed desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote.

This archaeological deposit measures 16 meters northwest to southeast by 4 meters northeast to southwest, and contains a total of 7 prehistoric artifacts. The prehistoric component consists of 1 concentration interpreted to be a single reduction lithic locus with 7 artifacts. The historic component consists of 1 concentration interpreted to be 1 feature, a brass cap survey benchmark. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at JFB-010 is low, with a calculated distribution of 1 artifact per 6.3 square meters. The overall condition of the site is poor due to gravel mining disturbance.

This site contains 1 single reduction locus, an historic feature and a total of 7 artifacts, which include: 1 quartzite hammerstone, 6 metavolcanic flakes (4 primary and 2 secondary) and a historic feature consisting of an undated brass survey benchmark.

Feature 1 is located in the northwest portion of the site. Feature 1 consists of an undated historic brass survey benchmark. The benchmark is stamped "SURVEY POINT DO NOT DISTURB/PT/C."

Locus 1 is located 12.4 meters southeast of Feature 1 and measures 1.5 meters east to west by 1 meter north to south. Artifacts observed within Locus 1 include 1 quartzite hammerstone and 6 green metavolcanic flakes (4 primary and 2 secondary).The area within 30 meters and outside the locus and feature is void of artifacts. The further character of artifacts found within JFB-010 is unreported.

The more particular physical context for JFB-010, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for Early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007); therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

This prehistoric component of this site represents an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature; debitage consists primarily metavolcanic flakes and a quartzite hammerstone. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic reduction site are of the same primary stone (metavolcanic) material that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent a single reduction locality or episode. It should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

General Land Office (GLO) cadastral benchmarks such as the one found in JFB-010 were placed by surveyors as a part of the Public Lands Survey System (PLSS). That system divided public lands into sections of 1 square mile (640 acres) and into quarter sections of 160 acres. The PLSS was created by the Land Ordinance of 1785, which declared that lands outside the then-existing states could not be sold, otherwise distributed, or opened for settlement prior to being surveyed (Stewart 1935). Along with the Homestead Act of 1862 and the Desert Land Act of 1877, the PLSS helped facilitate the U.S. expansion westward in the late 19th and early 20th centuries.

The specific markings stamped into the brass cap of this particular benchmark do not include the date that the benchmark was placed nor are they consistent with section corner markers or quarter section markers observed within the Project area. Other GLO benchmarks in the area are dated 1912. According to the GLO's 1902 instruction manual for surveyors, the stamped inscription "PT" is consistent with what would be expected of a point of triangulation, which is a control point used in the process of placing corner benchmarks (White 1991).

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. JFB-010 is situated within an active wash within the fan piedmont. This geomorphic landform indicates a Pleistocene (or older) period of formation. Because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits. Areas of active erosion within the fan piedmont, such as where this site is located, do have a slightly greater potential for the presence of subsurface archaeological deposits where recent alluvium has been deposited. Given the highly erosive nature of active washes within the fan piedmont, it seems unlikely that such subsurface deposits would have been preserved. Furthermore, if subsurface cultural deposits were to be preserved under such isolated inset pediments, they will most likely be similar in quality and quantity of artifacts to those sites found on the surface in nearby remnant portions of the fan piedmont (URS 2009: CUL-8). Therefore, data potential is considered exhausted through recordation of JFB-010.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, JFB-010 is not considered a contributor to an existing and/or proposed archaeological district or landscape. Destruction of GLO benchmarks is still prohibited under federal law; therefore it is recommended that the bench mark be left undisturbed during construction activities.

RAN-022

RAN-022 is an amorphous-shaped archaeological deposit that includes both prehistoric and historic components and covers a total surface area of 55,736 square meters. The site is located within the central portion of the 300 MW area of the proposed Solar Two project. It is situated atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The ground surface of the site consists of areas of highly disturbed desert pavement that appear in some parts to have been removed by surface scraping and pushing in the process of gravel mining, and/or damaged by off-highway vehicle use. In the parts of the site where the desert pavement is intact, it is well developed and highly deflated with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils at the site are primarily alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote, cholla, ocotillo, bunchgrass and mesquite.

This archaeological deposit measures 423 meters northeast to southwest by 285 meters east to west. The prehistoric component is primarily composed of extremely small, angular lithic material described as tertiary flakes or angular waste/shatter that were far too numerous to make a complete count practical. In order to address that issue, 6 Surface Sample Units (SSU), each measuring 2 meters by 2 meters, and a seventh measuring 1 meter by 1 meter, were laid out and artifacts within those units were counted. Within those 7 sample units were 1,300 artifacts. The density of those sample units ranges from high, at 1 artifact per 0.006 square meters (157 artifacts per square meter) to low, at 1 artifact per 4 square meters (0.25 artifacts per square meter). The overall average density of the SSUs is moderately high, at 1 artifact per 0.019 square meters (52 artifacts per square meter).

The historic component consists of 6 features, 7 concentrations (loci), 1 circular concrete structure foundation with approximately 1,512 total artifacts within loci and features, and approximately 878 additional artifacts observed outside the loci and features. The density of historic artifacts at RAN-022 is 1 artifact per 23.32 square meters (0.043 artifacts per square meter).

Historic artifacts present at RAN-022 include: 19 small hole-in-cap cans, 2 large matchstick filler cans, 47 sanitary food cans, 123 unidentifiable metal can fragments, 35 tobacco tins, 35 crockery fragments, 47 aqua bottle glass fragments, 9 brown glass fragments, 30 long cylindrical cans, 1 small condensed milk can (matchstick filler), 1 aqua bottle glass base with "A-1 Steak Sauce" embossed on it, and 3 sanitary condensed milk cans, 13 metal bucket/barrel rings, 1 metal pulley wheel, approximately 80 fragments of window and bottle glass, 3 crushed cans, 4 springs, 10 dishware fragments; white with green writing "johnson...England," 3 metal fragments, 10 bolts, 4 manganese decolorized glass fragments, and 2 large batteries, 329 plus nails, wire mesh, approximately 100 pieces of small to large mammal cut bone, and a double ended wrench, 1 horseshoe, 2 belt buckles, 9 pieces of wire, 1 chain, 2 screws, 1 piece milled wood, 11 copper washers, 9 copper rivets, 3 belt buckles, 9 pieces of wire, 1 bottle opener, 1 steak knife, and 1 historic olive glass body shard with edge modification.

Historic artifacts located within 30 meters and outside identified features and loci include: 10 small matchstick filler cans with solder dot, 22 large matchstick filler cans, 7 small and 19 large hole in cap cans with solder ring and dot, 39 sanitary cans (7 small and 27 large), 107 unidentifiable cans, 3 rectangular cans, 1 rectangular hole in cap can, 2 long cylindrical sanitary cans (6-inch diameter by 9.750 inches), 5 small condensed milk cans, 3 church key opened beverage cans, 1 belt buckle, 5 bolts, 62 hinged-lid tobacco tins, 3 crushed buckets, 8 paint cans, 1 gas can with a wire handle, 1 saw blade, 3 bottle caps, 1 turnkey, 3 washers, 6 metal barrel/ bucket rings, 1 chain link, 2 horseshoe fragments, 6 latch hooks, 145 pieces of wire, 43 small round nails, 76 small to large round nails, 3 lids, 1 stove pipe, 1 metal spring, 1 metal ring, 2 oil cans with friction cap, and 1 friction lid oval can (2.5-inch diameter by 3.875-inch length).

Prehistoric artifact types and materials represented at RAN-022 include: green metavolcanic (54 primary, 50 secondary, 1001 tertiary flakes, 26 pieces of angular waste/shatter, and 6 multi-directional cores), quartzite (5 primary, 6 secondary, and 9 tertiary flakes, 1 piece of angular waste/shatter, and 1 multi-directional core fragment), cryptocrystalline silicate (2 secondary and 5 tertiary flakes, 3 pieces of angular waste/shatter, and 1 multi-directional core), black metavolcanic (16 primary, 9 secondary, and 41 tertiary flakes, and 12 pieces of angular waste/shatter), basalt (3 primary, 3 secondary, and 5 tertiary flakes, 1 edge-modified secondary flake, 1 pieces of angular waste/shatter, and 1 multi-directional basalt core), silt stone (3 tertiary flakes), red/brown metavolcanic (1 large tertiary flake and 1 piece of angular waste/shatter), quartz (6 primary, 4 secondary, and 6 tertiary flakes and 26 pieces of angular waste/shatter), and 1 piece of petrified wood angular waste/shatter.

The 6 features are interpreted to be historic in age and are described as follows:

Feature 1 is located within southwestern portion of site and measures 17 feet northeast to southwest by 22 feet northwest to southeast. Feature 1 is a square-shaped clearing outlined with 50 large rocks and several hundred small rocks. There are round nails located within the feature and a large tent stake nearby, indicating that this clearing was for a tent structure.

Feature 2 is located 15 meters north of Feature 1 and measures 75 inches north to south by 75 inches east to west. Feature 2 is interpreted to be a fire feature consisting of 95 fragments of medium-large mammal bone (many exhibiting processing marks), 3 pieces of fire affected rock, 15 round head nails, and 2 pieces of wire.

Feature 3 is located 5 meters west of Feature 2 and measures 37 inches north to south by 65 inches east to west. Feature 3 is interpreted to be a fire feature consisting of 6 pieces burnt mammal bone, approximately 50 round nails, and 10 or more pieces fire-affected rock.

Feature 4 is located 3 meters northwest of Feature 3, within Locus 4, and measures 92 inches north to south by 83 inches east to west. Feature 4 is interpreted to be a fire feature consisting of 10 or more pieces of fire affected rock, 1 nut and bolt, and a scatter of approximately 105 nails.

Feature 5 is located 176 meters northeast of Feature 4 and measures 90 inches in diameter. Feature 5 is an historic circular concrete foundation. Feature 5 is fractured along its southern portion.

Feature 6 is located 173 meters east of Feature 5 and measures 21 inches long by 16 inches wide by 9 inches high. Feature 6 is a rock cluster that contains 12 rocks (quartz, porphyritic metavolcanic, and granitic cobbles). Feature 6 is likely recent due to the fact that there is no desert sheen or weathering of the rocks in place.

The 8 loci identified are comprised primarily of historic artifacts and are described below:

Locus 1 is located within the eastern portion of the site and measures 23 meters southwest to northeast by 10 meters northwest to southeast. Artifacts observed within

Locus 1 include: 19 small hole-in-cap cans, 2 large matchstick filler cans, 47 sanitary food cans, 102 unidentifiable metal can fragments, 13 tobacco tins, 12 crockery fragments, 28 aqua bottle glass fragments, 9 brown glass fragments, 30 long cylindrical cans, 1 small condensed milk can (matchstick filler), 1 aqua bottle glass base with "A-1 Steak Sauce" embossed on it, and 3 sanitary condensed milk cans.

Locus 2 is located 63 meters southeast of Locus 1 and measures 13 meters north to south by 16 meters east to west. Locus 2 is a low density concentration of 9 metal bucket/barrel rings, 1 metal pulley wheel, approximately 80 fragments of window and bottle glass, 1 crushed can, 4 springs, 10 dishware fragments; white with green writing "johnson...England," 3 metal fragments, 10 tobacco tins, 3 bolts, 30 plus nails, 4 manganese decolorized glass fragments, and 2 large batteries.

Locus 3 is located 67 meters northeast of Locus 2 and measures 760 centimeters northeast to southwest by 575 centimeters. Within Locus 3 are 3 tobacco tins, 2 crushed cans and 3 metal bucket barrel rings.

Locus 4 is located 16 meters southwest of Locus 3 and measures 9 meters north to south by 11 meters east to west. Locus 4 is a concentration of historic refuse containing 19 fragments of Aqua bottle glass, 200 plus round nails, wire mesh, 1 large bolt, 1 barrel/bucket ring, 23 tan crockery fragments, approximately 100 pieces of large mammal bone, 2 hinged tobacco tins and a double ended wrench.

Locus 5 is located 120 meters southeast of Locus 4 and measures 660 centimeters north to south by 660 centimeters east to west. Locus 5 is a scatter of nails and metal scraps containing 35 plus large round nails, 40 plus small nails, 1 horseshoe, 2 belt buckles, 21 unidentifiable metal fragments, 7 hinged tobacco tins, 9 pieces of wire, 1 chain, 2 screws, 6 bolts, 2 pieces of aluminum wire, 1 piece milled wood, 1 washer and 2 metavolcanic flakes (1 secondary and 1 fine grained tertiary).

Locus 6 is located 98 meters north of Locus 5 and measures 640 centimeters east to west by 515 centimeters north to south. Locus 6 is a concentration of ferrous metal wire and 1 large sanitary can. Metal wire from this locus is displaced throughout the site.

Locus 7 is located 20 meters west of Locus 6 and measures 515 centimeters east to west by 485 centimeters north to south and is a concentration of metal hardware including: 10 copper washers (0.4375-inch diameter by 0.0312 inches thick), 9 copper rivets (0.5-inch diameter 0.375 inch by 0.75 inch), 3 belt buckles, 9 pieces of wire, 1 bottle opener, 15 large nails, 7 small nails and 1 steak knife.

Locus 8 is located 160 meters south of Locus 7 and measures 370 centimeters north to south by 180 centimeters east to west and is a quartz lithic scatter containing 4 primary flakes, 4 secondary flakes, 4 tertiary flakes and 26 shatter.

The site also contains 599 historic artifacts not located within features or loci. These include: 10 small matchstick filler cans with solder dot, 22 large matchstick filler cans, 7 small and 19 large hole in cap cans with solder ring and dot, 39 sanitary cans (7 small and 27 large), 107 unidentifiable cans, 3 rectangular cans, 1 rectangular hole in cap can, 2 long cylindrical sanitary cans (6 in diameter by 9 and 0.750), 5 small condensed milk cans, 3 church key opened beverage cans, 1 belt buckle, 5 bolts, 62 hinged-lid tobacco tins, 3 crushed buckets, 8 paint cans, 1 gas can with a wire handle, 1 saw blade, 3 bottle caps, 1 turnkey, 3 washers, 6 metal barrel/bucket rings, 1 chain link, 2 horseshoe fragments, 6 latch hooks, 145 pieces of wire, 43 small round nails, 76 large nails, 3 lids, 1 stove pipe, 1 metal spring, 1 metal ring, 2 oil cans with friction cap, and 1 friction lid oval can (2.5-inch diameter by 3.875-inch length).

The Surface Sample Unit inventories yielded primarily prehistoric artifacts and are described as follows:

Surface Sample Unit 1, located in the eastern portion of the site, is a 2 by 2 meter unit aligned on a bearing of 339 degrees. Surface Sample Unit 1 contains several lithic materials including: green metavolcanic (18 primary flakes, 5 secondary, and 440 tertiary flakes smaller than 1 centimeter in diameter, 84 tertiary flakes larger than 1 centimeter in diameter, 3 shatter and 2 multi-directional cores), quartzite (1 primary flake, 4 secondary, 3 tertiary flakes smaller than 1 centimeter, 2 tertiary flakes larger than 1 centimeter and 1 multi-directional core fragment), cryptocrystalline silicate (4 tertiary flakes smaller than 1 centimeter, 1 tertiary flake larger than 1 centimeter, 2 pieces of angular waste/shatter, and 1 multi-directional core), black metavolcanic (6 primary flakes, 5 secondary flakes, 15 tertiary flakes smaller than 1 centimeter diameter, 12 tertiary flakes larger than 1 centimeter diameter, and 5 shatter), basalt (3 primary flakes, 3 secondary flakes, 1 tertiary flake less than 1 centimeter in diameter, 4 tertiary flakes greater than 1 centimeter in diameter, and 1 shatter), silt stone (1 tertiary flake larger than 1 centimeter in diameter). There are a total of 628 artifacts, with a density of 1 artifact per 0.0064 square meters (157 artifacts per square meter).

Surface Sample Unit 2 is located 27 meters east of Surface Sample 1 and is a 2 by 2 meter sample area aligned on a bearing 349 degrees. Surface Sample 2 is very sparse with 1 historic olive glass body shard with edge modification, 1 green metavolcanic shatter and 2 modern nails. Prehistoric artifact density of this sample is recorded as 1 artifact per 2 square meters (0.25 artifacts per square meter).

Surface Sample Unit 3 is located 24 meters east of Surface Sample 2 and is a 2 by 2 meter surface sample unit aligned on a bearing of 32 degrees. Surface Sample 3 contains several material types including green metavolcanic (17 primary flakes, 14 secondary flakes, 209 tertiary flakes smaller than 1 centimeter in diameter, 60 tertiary flakes greater than 1 centimeter in diameter, 16 pieces of shatter), black metavolcanic (9 primary flakes, 2 secondary flakes, 14 tertiary flakes larger than 1 centimeter and 7 pieces shatter), cryptocrystalline silicate (2 secondary flakes and 1 piece of shatter), red/brown metavolcanic (1 large tertiary flake and 1 piece of shatter), quartzite (3 primary flakes, 1 secondary flake, 1 small tertiary flake smaller than 1 centimeter in diameter, 3 larger tertiary flakes and 1 piece of shatter. Basalt: 1 edge-modified secondary flake), siltstone (2 small tertiary flakes smaller than 1 centimeter in diameter). Total artifact count for Surface Sample 3 is 258, with a prehistoric artifact density of 1 artifact per 0.016 square meters (64.5 artifacts per square meter).

Surface Sample Unit 4 is located to 26 meters southeast of Surface Sample 3 and is a one-by-one sample unit aligned on a bearing of 69 degrees. Surface Sample 4 contains green metavolcanic material (52 green metavolcanic tertiary flakes smaller than 1 centimeter in diameter and 3 green metavolcanic shatter) and 1 piece of petrified wood angular waste/shatter. This surface sample includes 60 total prehistoric artifacts with a density of 1 artifact per 0.017 square meters (57 artifacts per square meter).

Surface Sample Unit 5 is located 65 meters north of Surface Sample 4 and is a 2 by 2 meter sample unit aligned on a bearing of 21 degrees. This sample contains 2 materials; green metavolcanic (1 primary flake, 5 tertiary flakes smaller than 1 centimeter diameter, and 2 pieces of angular waste/shatter), with 1 multi-directional basalt core. There are 9 total artifacts, with a density of 1 artifact per 0.444 square meters (2.25 artifacts per square meter).

Surface Sample Unit 6 is located 30 meters east of Surface Sample 5 and is a 2 by 2 meter sample unit containing 3 different materials including green metavolcanic (16 primary, 29 secondary, 146 tertiary flakes and 4 multi-directional cores), quartz (2 primary flakes and 2 tertiary flakes), quartzite (1 primary flake and 1 secondary flake). Surface Sample 6 contains 203 total artifacts, with a density of 1 artifact per 0.197 square meters (50.75 artifacts per square meter).

Surface Sample Unit 7 is located 40 meters east of Surface Sample 6 and is a 2 by 2 sample unit containing 2 materials including green metavolcanic (2 primary flakes, 1 secondary flake, 3 tertiary flakes less than 1 centimeter in diameter and 1 tertiary flake larger than 1 centimeter in diameter) and black metavolcanic (1 primary and 2 secondary flakes). There are 10 total artifacts, with a density of 1 artifact per 0.4 square meters (2.5 artifacts per square meter).

The further character of artifacts found within RAN-022 is unreported.

The more particular physical context for RAN-022, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont. The desert pavement throughout much of the site is highly disturbed due to mechanical abrasion that appears to be a result of gravel mining and off-highway vehicle activity.

Though research into particulars about this site has uncovered no written records to describe past occurrences at RAN-022, the data recorded from the artifacts present, the composition of the artifact assemblage, and its distribution can be used to reconstruct at least some of its historic component.

The historic era artifacts and artifact types present would more likely have resulted from in-situ disposal rather than large-scale dumping. Though date ranges of manufacture can be determined for some of the artifacts present at RAN-022, the time between their manufacture, the use/consumption of the artifacts, and their ultimate disposal cannot be known, so the specific date of their disposal cannot be reliably determined. However, those date ranges obtained should provide a relatively close approximation of the dates of occupation at the site.

A wide variety of historic era artifacts were found at RAN-022 for which approximate date ranges of manufacture could be determined. For example, hole-in-cap cans such as the lap-seam cans present at this site were initially introduced in the mid-19th century and were common in the late 19th to early 20th century, but fell out of favor in the 1920s when most manufacturers switched to sanitary cans. In the western United States, sites such as this where sanitary cans outnumber hole-in-cap cans typically date to post 1922 (Goodman 2002).

Also present at this site are transparent glass fragments of a particular light purple color that is temporally diagnostic. Beginning circa 1880 manganese was added to glass to change its natural aqua color to clear. That addition had the unintended effect of turning the glass a particular amethyst color when exposed to ultraviolet light for extended periods of time. Such glass is termed "sun-colored-amethyst" glass (SCA) (Goodman 2002:1) and its manufacture predates 1920, when the practice of adding manganese ended.

Numerous straight-sided tobacco tins with oval bases and hinged lids are present at RAN-022. Tobacco tins of that style were common just after the turn of the 19th to 20th century and continued in production until R.J. Reynolds switched from cans to paper and plastic pouches in 1988 (Rock 1988).

Also identified were glass bottle shards of a particular aqua color that became common between 1880 and 1920 (Goodman 2002). One of those artifacts is an aqua glass bottle base fragment with a reverse embossed capital "B" that is part of the maker's mark for Boldt Glass Company. The Boldt Glass Company began in 1900 and had a severe drop in sales with the advent of national Prohibition (ca. 1919) because most of its contracts were for alcoholic beverage bottles. The company later fell victim to the Great Depression and was taken over in 1926 by Owens Glass Company. Because the pontil scar is centered on the bottle base, it is determined that this bottle was hand blown with the use of a mold, indicating that it was manufactured before 1909 when the Boldt Company installed Owens automatic bottle making machines, thereby eliminating hand blowing (Lockhart et al. 2007). Therefore, the particular bottle base found at RAN-022 was manufactured between 1900 and 1909.

Nails on site are exclusively modern wire nails; modern nails began circulation in 1850 and continue to be used up to the present day (IMACS 2001). All nails found at RAN-022 were manufactured from wire, indicating that the site dates to post 1902 (Goodman 2002).

Additionally, shell buttons recorded on site post date 1855 (Goodman 2002) and flat top beverage cans with large (3/4") church key openings were found that have an associated date range of 1935 to the 1950s (Goodman 2002).

Based on the date ranges described above, it can be inferred that there was an episode of occupation/activity at RAN-022 that began sometime after 1900 and extended through approximately 1935 and perhaps into the 1950s.

RAN-022 appears to have primarily been a gravel mining location with some amount of limited habitation at some point or points in time. Many of the artifacts as an assemblage represent the debris that would be expected from the remains of a tent house or other, less formal structure. The most conspicuous evidence is a 17 by 22 foot cleared area of ground that is lined with rocks. Present also are a multiplicity of wire nails, fragments of milled lumber, latch hooks, etc., that would have likely been components of a structure. Absent are artifacts that would be expected from a more permanent structure, such as roofing material and siding, therefore the structure was likely a large, wood-framed tent.

Also present are artifacts that would be expected from an early 19th century commercial operation or perhaps farm, and any habitation at the site would likely have been made by a small group of people, and/or in short episodes. Artifacts within the assemblage include: ferrous wire, wire mesh, large batteries, copper rivets, oil cans, a pulley wheel, and fragments of horse shoes. Conspicuously underrepresented in the assemblage are artifacts that give evidence of family life over longer periods of time. Among the refuse are multiple milk cans and food tins but virtually no kitchen spices, and kitchen utensils present are limited to a single table knife and a skillet. Also underrepresented are artifacts particularly attributed to women or children. The assemblage does include a single porcelain doll leg but no other toys or game pieces. A brush and a fragment of an ivory comb are present, but those could have been used by men as well as women. Though the horse shoes could have come from farm animals, draft animals could also have been used to transport gravel or for personnel transportation to and from the site. Still, even though the majority of historic era artifacts at RAN-022 seem to indicate the predominant activities that took place there were connected with gravel mining, from the limited household debris present, it does seem that at least short term, likely episodic habitation, perhaps including women and children for short periods of time, took place there. An alternative interpretation might be that the site was occupied, possibly by a family, sometime during the 1920s to 1930s and that most of the evidence of that habitation was obliterated later by a gravel mining operation.

A peculiar characteristic of the assemblage at RAN-022 is that it contains huge numbers of angular shatter and tertiary flakes smaller than 1 centimeter in diameter. The majority of these thousands of flakes appear to have resulted from angular fractures and all lack cortex. It seems unthinkable that any flint knapping activity could have produced such a large assemblage of predominantly angular waste/shatter with relatively few other flakes. Therefore, it is likely that the majority of the shatter/tertiary flakes present at RAN-022 were created during historic times by mechanical rock crushing associated with a gravel mining operation. Gravel is a high volume/low cost commodity, so it is uneconomical for it to be transported great distances. Therefore, surface and open pit gravel mines typically crushed and processed gravel in order to conform to the standards of the end user which then transported the gravel and aggregate to local construction sites and road building operations (MSU 2009).

Adding to the complexity of interpreting RAN-022 are artifacts indicating that activities took place there during prehistoric, protohistoric, or early historic times. Though the majority of the lithic artifacts present are small angular shatter and tertiary flakes that likely resulted from commercial gravel processing, there are clearly identifiable primary, secondary, and tertiary flakes, cores, and angular waste/shatter that have characteristics that indicate that they are the products of flint knapping, during prehistoric times. Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret the prehistoric component of this site as an expedient tool technology locality (Jones and Klar 2007). Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced at RAN-022 are of the same primary stone materials (metavolcanic, cryptocrystalline silicate, quartzite, and basalt) that are constituents of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent several single reduction localities or episodes, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Of particular interest is a single shard of hand-blown, deep olive green bottle glass with very heavy surface patina that is present. This type of glass typically dates to between 1815 and 1885 (Goodman 2002). What is particularly interesting about this shard is that one edge has been worked though pressure flaking to create a sharper, serrated edge, in a process that almost solely performed in flint knapping. Because of the combination of typically Native American flint knapping techniques on a historic era bottle, it can be inferred that this artifact dates to protohistoric or early historic era.

Therefore, the portrait of RAN-022 that results is a palimpsest of activities and occupation over time. It was first a place of expedient stone tool material acquisition and production occurring sometime between prehistoric and early historic times. Later, beginning sometime after the 1920s, the site was occupied. At some point women and children were there, but if and for how long they lived there is unclear. There was an informal tent structure that likely measured 17’ x 22’. Meals were likely cooked and served there. The site was occupied during the historic period for episodes beginning sometime after 1900 and perhaps extending into the 1950s, with the bulk of activities taking place roughly in the 1920s to 1930s. At some point or perhaps throughout the history of the site the major activity there was gravel mining, which included processing.

Even though this site possesses temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history.

Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. RAN-022 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits, therefore data potential is considered exhausted through recordation of RAN-022.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, RAN-022 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

RAN-025

RAN-025 is an amorphous-shaped lithic scatter that covers a total surface area of 458 square meters. The site is located within the western portion of the 300 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of an older fan surface ridge-top covered by intact desert pavement that is well developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. The active gully (wash) area is approximately 100 meters east of the site. Vegetation species on the site include desert trumpet and Rayless Encelia.

This lithic scatter site measures 35 meters northwest to southeast by 18 meters northeast to southwest, and contains a total of 7 prehistoric artifacts. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at RAN-025 is low, with a calculated distribution of 1 artifact per 65.43 square meters. The overall condition of the site is good with disturbances attributed to natural deflationary and erosional processes.

This site contains a total of 7 artifacts, which include: 1 metavolcanic secondary flake, 3 tested metavolcanic cobbles, and 3 metavolcanic hammerstones. The further character of artifacts found within RAN-025 is unreported.

The more particular physical context for RAN-025, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature; debitage consists of primarily tested cobbles with hammerstone. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction

(Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone (metavolcanic) material that is a constituent of the surrounding area (and exhibit expedient lithic reduction methods of percussion reduction processes), the site appears to represent 1 single reduction locality or episode, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

This site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. RAN-025 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits, therefore data potential is considered exhausted through recordation of RAN-025.

Based on its potential to provide data regarding regional prehistory, RAN-025 is recommended not eligible for the National Register and is not a historical resource pursuant to National Register and California Register under any of the criteria for eligibility. Based on geographic location and characteristics of the artifact assemblage at RAN-025, it is recommended as potentially contributing to the Yuha Basin Discontiguous Archaeological District.

RANA-003

RANA-003 is an amorphous-shaped historic site that covers a total surface area of 1,416.39 square meters. The site is located within the western portion of the 300 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of an open, elevated, older fan surface covered by heavily disturbed desert pavement that is moderately developed in undisturbed areas. The pavement consists of small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site includes creosote.

This historic site measures 112 meters east to west by 81 meters north to south, and contains 30 artifacts associated with a single surface depression feature (Feature 1). It consists of widely dispersed historic artifacts associated with what is interpreted to be an historic period bomb/mortar crater depression feature. The prevailing cultural constituents within this site consist of historic artifacts. Artifact density at RANA-003 is low, with a calculated distribution of 1 artifact per 47.2 square meters. The overall condition of the site is very poor and exhibits heavy mechanical surface disturbance with large cleared areas of pavement and push piles. There is also a linear path along the southeastern portion of the site, which appears to be a result of heavy equipment as well. The path has likely been cleared by equipment (ex. backhoe) which may have caught a boulder and dragged it across the surface directly toward the nearest access road.

This site contains 1 feature (Feature 1) and a total of 30 metal shrapnel fragments.

Feature 1 is centrally located within the site and consists of a historic-period bomb/mortar crater that measures 16 feet in diameter by 2 feet in depth. Seven of the 30 shrapnel fragments were mapped to provide a sample distribution pattern of the extant of mortar/bomb debris upon impact. The majority of metal shrapnel is located within 25 to 50 feet of the crater. The majority of shrapnel is located within 9 meters of the bomb/mortar crater. Thirteen of the fragments are located within the crater. The further character of the artifacts associated with RANA-003 is unreported.

The more particular physical context for RANA-003, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Due to the stability of this landform throughout history there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont. Though highly disturbed by mechanical activity that may have occurred prior to or after the crater, it does not appear to be associated with the feature. Portions of the surface have intact pavement that is moderately stabilized with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite and granite gravels and cobbles.

RANA-003 appears to be a crater formed by the detonation of an explosive device. As none of the artifacts present have any temporal or functional characteristics, the general form and arrangement of the site leads to a tentative interpretation as a location of an experimental aircraft escape system or bombardier/gunnery practice. Prior to becoming a Naval Air Station in 1946, nearby Naval Air Facility El Centro was a Marine Corps Air Station which served as a marine bombardier and gunnery school that trained enlisted gunners and bombardiers. Starting in 1947, the facility was used for aeronautical escape system design, evaluation, and testing. Experiments involving low altitude parachute escape systems were conducted throughout the surrounding desert at that time. During the late 1950s testing of ejection seat technology began. By 1979 design and testing operations were moved to other facilities and the El Centro Naval Air Base primarily focused on training military operatives (US Army 1999).

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot conclusively be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. RANA-003 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform has a very low likelihood for subsurface archaeological deposits; therefore, data potential is considered exhausted through recordation of RANA-003.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, RANA-003 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

SM-003

SM-003 is an amorphous-shaped prehistoric lithic scatter that covers a total surface area of 1,075 square meters. The site is located in the western portion of the 300 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface of the site consists of a raised very old fan surface covered by moderately developed desert pavement with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles. The predominant vegetation on the site include creosote, burroweed, desert lily and bunch grass.

This lithic scatter measures 50 meters northeast to southwest by 31 meters northwest to southeast, and contains a total of 159 artifacts. The site consists of 5 concentrations of lithic artifacts interpreted to be single reduction loci with a combined total of 150 artifacts; plus an additional 8 artifacts found outside the loci within 30 meters. The prevailing cultural constituents consist of prehistoric lithic debitage. Artifact density is low, with a calculated distribution of approximately 1 artifact per 18.5 square meters. The overall condition of the site is good with some alterations from off-highway vehicles, ephemeral gullies that run in a northeast to southwest direction, and an active wash east of the site.

SM-003 consists of 5 single reduction loci, with a combined total of 159 artifacts recorded across the site. Artifacts include: 58 metavolcanic flakes (13 primary, 14 secondary, 23 tertiary, and 8 shatter), 75 quartz flakes (9 primary, 6 secondary, 31 tertiary, and 29 shatter), 11 petrified wood flakes (4 primary, 2 secondary, and 5 shatter), 6 cryptocrystalline silicate chert flakes (1 primary, 3 secondary, and 2 shatter); 3 multi-directional cores (2 metavolcanic and 1 cryptocrystalline silicate chert); 1 bi-directional metavolcanic core, 1 metavolcanic tested cobble and 4 hammerstones (3 metavolcanic and 1 basalt).

Locus 1 is located 2 meters east of the westernmost site boundary and measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 1 include: 16 green gray metavolcanic flakes (3 primary, 1 secondary, and 12 tertiary), 1 bi-directional core and 1 metavolcanic hammerstone.

Locus 2 is located 26 meters southeast of Locus 1 and measures 3 meters northeast to southwest by 2 meters northwest to southeast. Artifacts observed within Locus 2 include: 72 quartz flakes (9 primary, 3 secondary, 31 tertiary, and 29 shatter), 1 multi-directional core and 1 basalt hammerstone.

Locus 3 is located 30 meters northeast of Locus 2 and measures 3 meters northeast to southwest by 1 meter northwest to southeast. Artifacts observed within Locus 3 include:

39 gray metavolcanic flakes (10 primary, 11 secondary, 11 tertiary, and 7 shatter), 1 multi-directional core and 1 metavolcanic tested cobble.

Locus 4 is located 17 meters northeast of Locus 3 and measures 1 meter northeast to southeast by 1 meter northeast to southwest. Artifacts observed within Locus 4 include 11 petrified wood flakes (4 primary, 2 secondary, and 5 shatter).

Locus 5 is located 12 meters east of Locus 4 and measures 2 meters northeast to southwest by 2 meters northwest to southeast. Artifacts observed within Locus 5 include 6 chert flakes (1 primary, 3 secondary, and 2 shatter) and 1 multi-directional core.

In addition, there are 3 quartz secondary flakes, 2 metavolcanic secondary flakes, 1 piece of angular waste/shatter, and 2 metavolcanic hammerstones located outside the loci and within 30 meters. The further characteristics of the artifacts within SM-003 are unreported.

The more particular physical context for SM-003, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a younger inset fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009: CUL-8). Despite geologically based claims for Early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007) therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont. Areas of active erosion within the fan piedmont, such as where this site is located, do have a slightly greater potential for the presence of subsurface deposits where recent alluvium has been deposited. Given the highly erosive nature of the fan piedmont it seems unlikely that such subsurface deposits would have been preserved. Furthermore, if subsurface cultural deposits were to be preserved under such isolated inset pediments, they will most likely be similar in quality and quantity of artifacts to those sites found on the surface in nearby remnant portions of the fan piedmont (URS 2009: CUL-8).

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature; debitage consists primarily of primary and tertiary flakes, angular waste/shatter, multi-directional and bi-directional cores and hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this site are of the same primary metavolcanic stone material (metavolcanic, quartz, petrified wood, cryptocrystalline silciate chert), and exhibit expedient lithic reduction methods of percussion reduction processes, it appears to represent 5 single reduction localities or episodes. It should not be discounted that artifacts within this locality may have been collected and/or used at another point in time after created.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. SM-003 is situated atop a subordinate landform characterized as a younger inset fan surface within the fan piedmont. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area there is very low likelihood for subsurface archaeological deposits. Areas of active erosion within the fan piedmont, such as where this site is located, do have a slightly greater potential for the presence of subsurface archaeological deposits where recent alluvium has been deposited. Given the highly erosive nature of the fan piedmont, it seems unlikely that such subsurface deposits would have been preserved. Furthermore, if subsurface cultural deposits were to be preserved under such isolated inset pediments, they will most likely be similar in quality and quantity of artifacts to those sites found on the surface in nearby remnant portions of the fan piedmont (URS 2009: CUL-8). Therefore, data potential is considered exhausted through recordation of SM-003.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, SM-003 is not considered a contributor to an existing and/or proposed archaeological district or landscape

T-17

T-17 is a linear prehistoric trail that covers a total length of 159 meters. The site is located within the southwestern portion of the 300 MW area of the Proposed Solar Two Project. The trail is situated atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of a very old fan surface with intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site includes creosote, saltbush and ocotillo. The slope of the site is less than 1 degree.

T-17 is a prehistoric trail recorded in 1 segment, trending in an east to west direction. This trail segment measures 159 meters long, 50 to 60 centimeters wide at both the top and bottom, and less than 5 centimeters deep. The trail was cleared through the castoff of larger cobbles to either side, leaving only small gravels and sand within the trail. The overall condition of the trail is poor, with evidence of off-road vehicle use in and around the trail.

The trail is situated atop moderately stabilized intact desert pavement and crossing over a fan piedmont geomorphic landform consisting of erosional fan remnants, sideslopes, gullies, and inset fans. The trail was cleared through the cast-off of larger cobbles to either side, leaving only small gravels and sand within the trail. The trail is situated atop moderately stabilized intact desert pavement. A single resource interpreted to be a lithic reduction site (DRK-041) is located approximately 65 meters east of the eastern terminus of the trail T-17. Additionally, the western terminus of trail T-41 lies approximately 100 meters north of the eastern end of T-17, and it is possible that they may have connected at one time, but if so, the connection point is no longer visible.

Trails such as T-17 may be surviving segments of a larger network of trails that once existed in the region. Trails were important to prehistoric people in that they helped fulfill an inherited human need for physical and spiritual security by providing safer and more reliable connections between territories and resource patches, and served the "socio-economic needs of settlement and exploitation patterns, migration, visitation, trade, war, quarrying, and making possible the location of central ceremonial areas" (von Werlhof 1988:52).

Trail T-17 does possess some characteristics that would support the interpretation of it as a prehistoric trail. The trail is evidenced as a narrow (approximately 40 centimeters) strip of land where larger stones are conspicuously absent from the desert pavement. Along the 2 sides of the trail are relatively higher concentrations of larger stones, supporting the interpretation that travelers would clear larger stones from the path, tossing them to the side. That practice of clearing stones would have made foot travel easier by removing obstructions. Additionally, the resulting trail would have a higher proportion of siliceous desert surface, which would reflect more moonlight, making night travel safer (von Werlhof 1988). Furthermore, the site DRK-041, interpreted to be a lithic reduction site, lies near the trail’s eastern extent and may be associated with it if the trail once extended further east. If that was the case, trail T-17 may have been used for travel to or through resource procurement areas.

Trails can be important and relatively rare resources that can help facilitate interpretation of prehistory and prehistoric lifeways. Trails such as T-17 are rare because the evidence of them is often so faint and ephemeral that it is most often erased by natural erosion, soils development, mechanical disturbance, and bioturbation. Additionally, trails often follow the most efficient travel route through an area. Over time, subsequent travel routes such as horse trails, ox cart roads, and eventually modern roads and highways are constructed to follow the same route and thereby overlay the prehistoric trail such that its existence is only known through oral history. It is in arid, relatively unpopulated places such as the project area, that can still be recognized as the remnants of ancient pathways (Davis 1974). Because trails were used to connect resource areas, territories, habitations, and ceremonial sites, they can be important sources of information to recover the locations of unknown archaeological resources and possibly traditional cultural properties.

However, the overall condition of the trail segment is poor, with disturbance caused by multiple parallel and perpendicular off highway vehicle tracks present in and around the trail, such that the trail’s integrity is compromised. As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register, or a historical resource per the California Register under any of the criteria for eligibility. In addition, T-17 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

T-42

Site T-42 is a linear alignment of ground that appears to have been cleared of larger stones and cobbles, which is interpreted to be a prehistoric trail. The site covers a total length of 839 meters, and is located within the southeastern portion of the 300 MW area of the Proposed Solar Two Project. T-42 is situated within the fan piedmont remnant geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of disturbed desert pavement with portions traversing ephemeral gullies such that have been washed out such that any observable evidence of the trail has been erased, thereby dividing the trail into 3 segments. The desert pavement is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote, salt bush, and burroweed.

T-42 is a prehistoric trail recorded in 3 separate segments (Segments A, B and C), all of which trend in a northeast to southwest direction. Segment A is approximately 114 meters in length, Segment B is approximately 108 meters in length, and Segment C is approximately 617 meters in length. All segments are 40 to 50 centimeters wide and the combined length measures approximately 839 meters. The surface of the trail appears to be tamped, with observable evidence indicating that its surface has been cleared by casting-off larger cobbles to either side of the trail. The overall condition of the trail ranges from good to fair with evidence of recent off-highway vehicle (OHV) disturbance in Segment A, as well as natural disturbances caused by erosion. The southwest-western portion of Segment C is truncated by an ephemeral drainage, and other ephemeral drainages divide the site into its 3 segments.

There are no artifacts associated with the trail. However, the trail does run close to DRK-009 and SM-001 and therefore may be associated. DRK-009 is a dense lithic concentration with a natural crystal manuport and site SM-001 is a chert lithic scatter. Additionally, the western terminus of trail T-42 lies approximately 100 meters north of the eastern end of T-17, and it is possible that they may have connected at one time, but if so, the connection point is no longer visible. Furthermore, if T-42 once extended further in its apparent direction of travel to the northeast, it would traverse near, to approximately parallel with, a cluster of 7 sites located 2.4 kilometers from its northeastern terminus. That cluster includes sites JF-007, JF-006, RAN-026, RAN-027, RAN-022, RAN-021, and RAN-023.

Trails such as T-42 are likely to be surviving segments of a larger network of trails that once existed in the region. Trails were important to prehistoric people in that they helped fulfill an inherent human need for physical and spiritual security, by providing safer and more reliable connections between territories and resources, and served the "socioeconomic needs of settlement and exploitation patterns, migration, visitation, trade, war, quarrying, and making possible the location of central ceremonial areas" (von Werlhof 1988:52).

Trail T-42 and the immediate area around it have characteristics that may speak to the importance of trails to prehistoric people. The trail is evidenced as a narrow (approximately 40 to 50 centimeters) strip of land where larger stones are conspicuously absent from the desert pavement. Along the 2 sides of the trail are relatively higher concentrations of larger stones, supporting the interpretation that travelers would clear larger stones from the path and toss them to either side. That practice of clearing stones would have made foot travel easier by removing obstructions. Additionally, the resulting trail would have a higher proportion of siliceous desert surface, which would reflect more moonlight, making night travel safer (von Werlhof 1988). Additionally, 2 lithic reduction sites are in close proximity to the trail and are in apparent alignment with it, giving evidence to the possible use of the trail to facilitate resource procurement.

Prehistoric trails are important and relatively rare resources that can help facilitate interpretation of prehistory and prehistoric lifeways. Trails such as T-42 are rare because the evidence of them is often so faint and ephemeral, that it is most often erased by natural erosion, soils development, mechanical disturbance, and bioturbation. Trails often follow the most efficient travel route through an area. Over time, subsequent travel routes such as horse trails, ox cart roads, and eventually modern roads and highways are constructed to follow the same route and thereby overlay the prehistoric trail such that its existence is only known through oral history. It is in arid, relatively unpopulated places such as the project area that can still be recognized as remnants of ancient pathways (Davis 1974). Because trails were used to connect resource areas, territories, habitations, and ceremonial sites, they can be important sources of information to recover the locations of unknown archaeological resources and possibly traditional cultural properties.

As a result, this site, as a stand-alone or individual resource, T-42 is recommended eligible for the National Register and is a historic property pursuant to the National Register and a historical resource per the California Register under the criteria for eligibility. In addition, T-42 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

450-MW AREA PHASE 11

DRK-023

DRK-023 is an amorphous-shaped archaeological deposit that includes both prehistoric and historic components and covers a total surface area of 262 square meters. The site is located within the western portion of the 450 MW area of the Proposed Solar Two Project. The site is situated atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of disturbed desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote, ocotillo, burroweed, bunch grass and desert trumpet.

This lithic scatter and rock cluster site measures 48 meters east to west by 7 meters north to south, and contains a total of 61 prehistoric artifacts and 2 historic (modern) features. The prehistoric component consists of 2 concentrations interpreted to be 1 lithic scatter and 1 single reduction loci, with 61 artifacts. The historic component consists of 2 concentrations interpreted to be 2 potentially modern rock cluster (cairn) features and no additional artifacts were observed outside the loci and features. The areas between loci and features are void of artifacts. The prevailing cultural constituents within this site consist of prehistoric artifacts and 2 potentially modern rock cluster features. Artifact density at DRK-023 is low, with a calculated distribution of 1 artifact per 4.3 square meters. The overall condition of the site is fair due to off highway vehicle tracks which criss-cross the site and seem to run adjacent to the rock cairns.

The site contains 2 lithic reduction loci, 2 rock cluster (cairn) features and a total of 61 artifacts, which include: 31 green metavolcanic flakes (10 primary, 19 secondary and 2 tertiary), 23 quartz flakes (3 primary, 17 secondary, 1 tertiary and 2 shatter), 4 petrified wood flakes (1 primary and 3 secondary), 2 green metavolcanic multi-directional cores, and 1 quartz core. The areas between the loci and features are void of any cultural materials.

Feature 1 is located at the northeast end of the site and measures 19 inches north to south by 18 inches east to west by 11 inches tall. Feature 1 consists of approximately 15 granite and metavolcanic cobbles and raised 3 courses high. No artifacts are associated with this feature.

Feature 2 is located approximately 50 meters southwest of Feature 1 and measures 25 inches north to south by 34 inches east to west by 4 inches tall. Feature 2 consists of approximately 20 granite, metavolcanic and basalt cobbles. The feature is in poor condition, with the rocks it is constructed of, being lightly scattered and rising 1 course high. No artifacts are associated with this feature.

Locus 1 is located at the northeast end of the site and measures 3 meters east to west by 2 meters north to south. Artifacts observed within Locus 1 include: 31 green metavolcanic flakes (10 primary, 19 secondary and 2 tertiary), 2 green metavolcanic multi-directional core fragments, 15 quartz flakes (2 primary, 12 secondary and 1 tertiary), 1 quartz core fragment, and 4 petrified wood flakes (1 primary and 3 secondary).

Locus 2 is located 29 meters southwest of Locus 1 and measures 2 meters east to west by 1 meter north to south. Artifacts observed within Locus 2 include 8 quartz flakes (1 primary, 5 secondary and 2 shatter). There are no artifacts observed within 30 meters and outside the loci and features. The further character of artifacts found with DRK-023 is unreported.

The more particular physical context for DRK-023, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007) therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists primarily of primary, secondary and tertiary flakes, multi-directional cores, and angular waste/shatter. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this archaeological deposit are of 2 primary stone materials (metavolcanic and quartz) that are constituents of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 2 reduction localities or episodes, but it should not be discounted that artifacts within these localities may have been collected and/or used at a later point in time.

Furthermore, archaeologists for the applicant interpret that even though the rock clusters present at DRK-023 have some characteristics similar to survey markers in the area, they cannot be conclusively identified as such. The size of the cluster and of the stones that comprise it conforms approximately to those surrounding General Land Office survey bench markers found in the surrounding region however the feature is not located on a current section or quarter section corner point.

Additionally, expediently constructed stone clusters can also be markers of mining claims or homestead boundaries. Mining claim markers sometimes contain tobacco tins to hold copies of official records substantiating the claim. Such a tin was not evident at this stone cluster.

The 2 rock cluster features present at DRK-023 have no clearly associated artifacts or any characteristics from which their antiquity might be determined. In addition, their apparent alignment with modern off-highway vehicle tracks would seem to support their being modern in age.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. DRK-023 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area there is very low likelihood for subsurface archaeological deposits, therefore data potential is considered exhausted through recordation of DRK-023.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, DRK-023 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

DRK-027

DRK-027 is an amorphous-shaped prehistoric site that covers a total surface of 1,614 square meters. The site is located within the western portion of the 450 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site includes creosote, ocotillo, and bunch grass.

This lithic scatter, groundstone tool and rock cluster feature site measures 171 meters north to south by 54 meters east to west, and contains a total of 310 prehistoric artifacts. It consists of 7 concentrations interpreted to be 6 single reduction loci and 1 lithic scatter with 282 artifacts, and 28 additional artifacts observed outside the loci. The prevailing cultural constituents within this site consist of prehistoric artifacts and 1 rock cluster feature. Artifact density at DRK-027 is low, with a calculated distribution of 1 artifact per 5.21 square meters. The overall condition of the site is good.

The artifact types and materials present include 272 metavolcanic flakes (109 primary, 97 secondary, 61 tertiary and 5 angular waste/shatter), 6 metavolcanic cores (1 uni-directional, 1 bi-directional and 4 multi-directional), 1 metavolcanic edge-modified flake, 2 quartz flakes (1 primary and 1 tertiary), 1 quartz multi-directional core, 1 quartzite secondary flake, 4 quartzite hammerstones, 5 basalt flakes (4 secondary and 1 tertiary), 2 cryptocrystalline silicate chert flakes (1 primary and 1 secondary), 1 cryptocrystalline silicate multi-directional core, 8 petrified wood primary flakes, 2 granite hammerstones, 1 granite mano, and 2 granitic hammerstones, 1 granitic biface, and 1 metavolcanic tested cobble.

Feature 1 is located at the center of the site within Locus 1 and measures 4.3 meters north to south by 4.6 meters east to west. Feature 1 is constructed of approximately 100 large to small sub-rounded to sub-angular cobbles of various source materials (metavolcanic, quartz and quartzite).

Locus 1 is located at the center of the site and measures 11 meters north to south by 10 meters east to west. Artifacts observed within Locus 1 include: 41 metavolcanic flakes (30 primary and 11 secondary), 2 metavolcanic multi-directional cores, 1 metavolcanic edge-modified flake, 1 quartz primary flake, 1 quartz multi-directional core, 4 quartzite hammerstones, 1 cryptocrystalline silicate chert secondary flake, and 8 petrified wood primary flakes. Feature 1 is also located within Locus 1.

Locus 2 is located 37 meters north of Locus 1 and measures 15 meters north to south by 7 meters east to west. Artifacts observed within Locus 2 includes: 45 metavolcanic flakes (28 primary, 11 secondary and 6 tertiary), 1 metavolcanic multi-directional core, Locus 5 is located 40 meters southwest of Locus 4 and measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 5 include 10 metavolcanic flakes (4 primary, 5 secondary, 1 shatter).

Locus 6 is located 164 meters north of Locus 5 and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 6 include: 20 metavolcanic flakes (3 primary, 8 secondary, 8 tertiary and 1 shatter), 1 granite hammerstone and 1 metavolcanic tested cobble.

Locus 7 is located 20 meters south of Locus 6 and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 7 include 14 metavolcanic flakes (4 primary, 3 secondary, 5 tertiary and 2 shatter) and 1 metavolcanic bi-directional core.

Those artifacts observed within 30 meters and outside of the loci consist of 16 metavolcanic flakes (5 primary, 10 secondary and 1 shatter), 1 metavolcanic uni-directional core, 1 quartzite secondary flake, 5 basalt flakes (4 secondary and 1 tertiary), 1 granitic biface, 1 granitic mano, 1 granitic hammerstone, 1 granitic hammerstone, and 1 quartz tertiary flake. The further character of artifacts found within DRK-027 is unreported.

The more particular physical context for DRK-027, extrapolating information from Data Response 112 Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007), therefore there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence

in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature; debitage consists primarily of primary flakes and multi-directional cores, angular waste/shatter, and hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone material (metavolcanic) that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 7 single reduction localities or episodes, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

A single groundstone tool, a mano, was found at DRK-027. Ground stone tools found in the area surrounding DRK-027 include manos, metates (sometimes referred to as milling stones) and pestles. Metates in this area are typically flattish slabs, manos were smaller, soap and loaf-shaped stones that were moved in a circular motion against the metate, in order to grind small seeds and other food resources; pestles were elongated, club-shaped stones used for pounding and grinding in a mortar. Manos, metates, and pestles were primarily constructed from coarse-grained stone such as sandstone or granite. Mortars in desert environments absent of large coarse bedrock outcrops were made from cottonwood. Manos, metates, and pestles are associated with subsistence procurement and/or processing (Chartkoff and Chartkoff 1984). The single granitic mano observed is bifacially ground with pecking noted.

The presence of flaked stone tools such as the granitic biface and metavolcanic edge-modified flake (EMF) within DRK-027 represents further evidence of resource procurement and/or processing of faunal or floral resources. The creation of flaked stone tools requires additional lithic technologies, possibly including bifacial thinning and pressure flaking to shape and refine cutting edges. The EMF is green metavolcanic material and unifacial retouch. The surface of the granitic biface is so eroded, the tool is nearly unrecognizable. Additionally, the biface was not found in spatial association with the edge-modified flake, so it is unlikely that they were used within the same time frame.

Though the single rock cluster feature found at DRK-027 does not have any temporally diagnostic characteristics, evidence seems to support the hypothesis that it is prehistoric in age. It is spatially associated with lithic debitage and is made up of predominantly the same stone material (metavolcanic) that also predominates in the overall artifact assemblage at DRK-027. Therefore, it seems likely that this rock cluster feature is a location where lithic raw material was collected in order to increase the efficiency of stone tool manufacture at DRK-027.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. DRK-027 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits, therefore data potential is considered exhausted through recordation of DRK-027.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, DRK-027 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

DRK-029

DRK-029 is an oblong-shaped lithic scatter site that covers a total surface of 27.93 square meters. The site is located within the western portion of the 450 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is moderately developed with small to large sub-rounded gravels and small to medium-sized sub-rounded cobbles comprised of metavolcanic, basalt, quartz, quartzite, and granitic rocks. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote, ocotillo, and desert trumpet.

This lithic scatter site measures 16 meters northeast to southwest by 3 meters northwest to southeast, and contains a total of 10 prehistoric artifacts. It consists of 1 concentration interpreted to be a single lithic reduction locus, with 9 artifacts, and 1 additional artifact observed outside the locus. The prevailing cultural constituents within this site consist of prehistoric lithic reduction artifacts. Artifact density at DRK-029 is low, with a calculated distribution of 1 artifact per 2.79 square meters. The overall condition of the site is fair due to off-road vehicle tracks that occur near the site.

The site contains 1 single lithic reduction locus and a total of 10 artifacts (9 associated with the locus), which include: 7 metavolcanic flakes (6 primary and 1 secondary), 1 basalt hammerstone, 1 metavolcanic multi-directional core, and 1 quartz tested cobble.

Locus 1 is located in the southwestern end of the site and contains the site datum (which is the metavolcanic core). It measures 3 meters east to west by 2 meters north to south. Artifacts observed within Locus 1 include: 7 green metavolcanic flakes (6 primary and 1 secondary), 1 basalt hammerstone, and 1 green metavolcanic multi-directional core.

The artifact observed outside and northeast of the locus consists of 1 quartz tested cobble. The further character of artifacts associated with DRK-029 is unreported.

The more particular physical context for DRK-029, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont geomorphic landform. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007) therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists predominantly of primary flakes and 1 multi-directional core, with 1 hammerstone. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone (metavolcanic) material that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 1 single reduction locality or episode, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

This site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area there is very low likelihood for subsurface archaeological deposits, therefore data potential is considered exhausted through recordation of DRK-029.

As a result, DRK-029 is recommended not eligible for the National Register and is not a historical resource pursuant to National Register and California Register under any of the criteria for eligibility. In addition, DRK-029 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

DRK-032

DRK-032 is an oval-shaped lithic scatter that covers a total surface area of 135 square meters. The site is located within the south-central portion of the 450 MW area of the Proposed Solar Two Project. The site is situated atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The site is situated atop moderately to well-developed intact desert pavement with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. A small amount of the site surface area is disturbed by off highway vehicle activity and sheetwash erosion such that no desert pavement remains. Soils contain alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote, ocotillo, burroweed and desert trumpet.

This lithic scatter site measures 23 meters northwest to southeast by 8 meters northeast to southwest, and contains a total of 111 prehistoric artifacts. It consists of 2 concentrations interpreted to be 2 single reduction loci, with 109 artifacts and 1 additional artifact observed outside the loci. The prevailing cultural constituents within this site consist of prehistoric lithic reduction artifacts. Artifact density at DRK-032 is low, with a calculated distribution of 1 artifact per 1.2 square meters. The overall condition of the site is good, with some alterations due to off-highway vehicle activity and sheetwash erosion.

The site has a total of 110 prehistoric artifacts occurring within the site boundary which include: 98 green metavolcanic flakes (33 primary flakes, 16 secondary flakes, 11 tertiary flakes and 38 shatter), 5 primary cryptocrystalline silicate brown chert flakes, 1 green metavolcanic multi-directional core, 3 green metavolcanic bi-directional cores, 3 basalt primary flakes, 1 basalt assayed cobble and 1 green metavolcanic hammerstone. Areas between the loci are void of artifacts with the exception of a single hammerstone which is located at the northwest boundary of the site.

Locus 1 is near the northern boundary of the site and measures 5 meters north to south by 3 meters east to west. Locus 1 contains a total of 105 prehistoric artifacts, which include: 98 green metavolcanic flakes (33 primary flakes, 16 secondary flakes, 11 tertiary flakes and 38 pieces of angular waste/shatter), 5 brown cryptocrystalline silicate primary flakes, 1 green metavolcanic multi-directional core, and 1 green metavolcanic bi-directional core.

Locus 2 is 16 meters south of Locus 1 and measures 2 meters north to south 5 meters east to west. Locus 2 contains a total of 4 prehistoric artifacts which include 1 basalt assayed cobble and 3 basalt primary flakes, which refit to the assayed cobble.

A single green metavolcanic hammerstone is located outside the observed loci. The further character of artifacts found within DRK-032 is unreported.

The more particular physical context for DRK-032, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont with heavy stage IV/V calcic horizon underlying the surface. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature; debitage consists mainly of primary flakes, secondary flakes, tertiary flakes, angular waste/shatter, cores, a hammerstone, and an assayed cobble. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone material (green metavolcanic) that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 2 single reduction localities or episodes, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. DRK-032 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area there is very low likelihood for subsurface archaeological deposits; therefore, data potential is considered exhausted through recordation of DRK-032.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, DRK-032 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

EBR-019

EBR-019 is an amorphous/oblong-shaped prehistoric site that covers a total surface of 786,087 square meters. The majority of the site occurs outside of the Proposed Solar Two Project, in the exclusion area that is not proposed for development. Those portions that occur within the Project area are located in the 100 foot buffer of the proposed Water Line to the north and the 450 MW area of the Proposed Solar Two Project to the south. The site appears to be within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation (URS 2009). The surface consists of finer grained material eroded from the fan piedmont that has formed a number of fan “aprons,” which do not individually fully cover the entire area, and which interfinger and partially bury one another and piedmont remnants. Large portions of the site located inside the Project area are situated within fan piedmont remnants frequently cut through by gullies and active washes with intact desert pavement that is poorly to moderately developed, consisting of small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. An active wash transects the site east to west, through the north central portion of the site and numerous smaller ephemeral washes and gullies are evident as well. Soils of moderately to well-sorted finer grained clasts contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. The northwest and northeastern portions of the site within the Project area, as well as portions that extend into the exclusion area, are located within or adjacent to the sub-landform interface between the lake basin, fan apron and beach zone. Observed profiles within the lake basin areas indicate that the soils are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments, as well as fines flushed into the lake by stream/wash that once terminated nearby at the shoreline. The soils within the beach zone consist of sands that are non-cohesive and vary from coarse sub-angular to sub-rounded sand, small gravels to medium and coarse well rounded sands overlaid by fine silts and clays. Vegetation species on the site include ocotillo, desert trumpet, bunch grasses, creosote and saltbush.

This prehistoric site measures 1,685 meters southeast to northwest by 1,579 meters southwest to northeast, and contains approximately 14,413 prehistoric artifacts. It consists of concentrations interpreted as follows: 87 lithic scatters, 2 ceramic scatters, 32 lithic and ceramic scatters, 1 lithic, ceramic, and groundstone scatter, 4 cremations with associated lithic and ceramics, 54 fire-affected rock/hearth features and 1 cremation feature. The prevailing cultural constituents within this site consist of prehistoric artifacts and fire affected rocks/hearth features. Artifact density at EBR-019 is low, with an approximate calculated distribution of 1 artifact per 0.05 square meters. The overall condition of the site is good to fair. Additionally, natural erosion and deposition is also taking place in washes and drainages within the site which have evidence of seasonal flooding.

The site contains an approximate total of 126 loci (14 of which occur within the Project area and 9 of which contain possible cremations), 53 features (52 fire affected rock/hearth features and 1 cremation feature) and approximately 14,413 artifacts. Prehistoric artifact types represented at EBR-019 consist of: 8,676 ceramic sherds (including both Colorado buffware and Tizon brownware), 4,969 pieces of lithic debitage, 378 cores, 304 lithic tools (which include core-tools, hammerstones, bifaces, edge-modified flakes, and preforms), 27 groundstone artifacts (which include manos and metates), 50 fire affected rocks, 9 Olivella shell beads and 15 projectile points (7 Cottonwood Series projectile points, 4 Desert Side-notched Series projectile points and 4 indeterminate projectile points). An approximate total of 231 calcined human bone fragments and 42 animal and unidentified bone fragments were also observed within the site and are located in features F3, F18 and loci L50 through L52, L55, L57, L58, L61, L62 and L65. The predominate lithic reduction stone identified at EBR-019 include metavolcanic, basalt, petrified wood, quartzite, quartz, cryptocrystalline silicate (chert, jasper and chalcedony), and wonderstone rocks. Further detail of artifact material types and characteristics can be found within the loci and feature descriptions.

There are a total of 52 features identified; 51 are comprised primarily of fire-affected rocks/hearths and 1 is a cremation feature. Features 2, 15 through 20, 24, 55 and 56 are found with the Area of Potential Effect (APE); Features 1, 3 through 13, and 25 through 53 are located outside the Project area. Feature 15 was not relocated during re-survey by URS, September 2009, which archaeologist interpreted to be a result of recent sheet wash within the site, which appeared to have been redeposited and/or buried artifacts and/or features within active washes. In the process of data collection the following feature numbers were inadvertently skipped: 14, 21 through 23, 48 and 54. All features are described below:

Feature 1 is situated on the northwest portion of the site and located out of the APE. It consists of a deflated hearth with, at minimum, 25 fragments of fire affected rock, primarily black metavolcanic material. The feature is oriented southeast to northwest in a linear alignment.

Feature 2 is situated on the southwestern portion of Locus 8. The feature is located within the APE and is approximately 24 meters south-southwest from locus center sub-datum. The feature is approximately 26 meters west of Feature 1 and approximately 15 meters southwest from Feature 16. Feature 2 measures 1 meter east to west by 1 meter north to south. The feature is a hearth remnant comprised of 6 small cobble-sized fire-affected metavolcanic and sandstone rocks arranged in a semi-circular ring. The feature is firmly imbedded and situated on a south-facing slope toe of a deflating rise, adjacent to a creosote hummock. The artifacts associated with the feature include: 5

porphyritic metavolcanic flakes located within a 1 meter proximity to the hearth. There is no visible staining or charcoal on surface, however subsurface potential is good.

Feature 3 is located out of the APE and is approximately 462 meters southeast of Feature 2. It measures approximately 5 by 5 meters. The artifacts observed within this feature consist of at least 3 fragments of undetermined calcined bone, 2 spire-ground beads, Olivella shell beads and a dense scatter of 100 ceramic sherds, mostly brownware. The ceramic sherds represent a variety of vessel forms including dry storage vessels, cooking vessels, a large open mouth bowl and a small open mouth bowl.

Feature 4 is located out of the APE and is approximately 66 meters northeast of Feature 3. It consists of a deflated hearth measuring 5 meters by 3 meters and 15 or more fragments of metavolcanic and sandstone fire-affected rock.

Feature 5 is located out of the APE and is approximately 35 meters southwest of Feature 5. It consists of a deflated hearth measuring 6 meters by 6 meters. This feature is comprised of 20 or more fragments of sandstone and metavolcanic fire affected rock. The feature appears to be eroding from a hummock with a creosote bush. This feature has potential for buried deposits.

Feature 6 is located out of the APE and is approximately 9 meters south southwest of Feature 5. It consists of a deflated hearth measuring 6 meters by 7 meters and consists of 12 or more fragments of metavolcanic and sandstone fire affected rock. The feature is located at a high point on a low hummock. The feature has potential for buried deposits within the hummock.

Feature 7 is located out of the APE and is approximately 93 meters north northeast of Feature 6. It consists of a deflated hearth measuring 4 meters by 4 meters and consists of 10 or more fragments of granitic, sandstone and metavolcanic fire affected rock. This feature is located on top of a small hummock. The feature has potential for buried deposits in the hummock.

Feature 8 is located out of the APE and is approximately 373 meters southwest of Feature 7. It consists of a deflated hearth measuring 2 meters by 2 meters and is comprised of 8 or more primarily metavolcanic fragments. Eight to 10 Tizon brownware ceramic vessel body sherds were observed in this location.

Feature 9 is located out of the APE and is approximately 93 meters east of Feature 8. It consists of a deflated hearth measuring 5 meters by 3 meters and is comprised of 30 or more fragments of metavolcanic, granitic, quartzite and sandstone fire affected rock.

Feature 10 is located out of the APE and is approximately 60 meters east southeast of Feature 9. It consists of a deflated hearth measuring 4 meters by 4 meters and is comprised of 15 or more fragments of metavolcanic, sandstone and granitic fire affect rock.

Feature 11 is located out of the APE and is approximately 833 meters southeast of Feature 10. It consists of a deflated hearth measuring 3 meters by 1 meter and consists of 15 metavolcanic, sandstone and quartz cobbles. All the cobbles show evidence of fire altering.

Feature 12 is situated within Locus 13. The feature is located out of the APE and is approximately 49 meters west southwest of Feature 11. It consists of a deflated hearth measuring 75 centimeters by 40 centimeters with 5 fragments of metavolcanic and sandstone fire affected rock.

Feature 13 is situated within Locus 13. The feature is located out of the APE and is approximately 19 meters southeast of Feature 12. It consists of a deflated hearth measuring 2 meters by 2 meters with 5 or more metavolcanic fire affected cobbles. One of the cobbles appears to be battered (possible hammerstone).

Feature 16 is situated within Locus 8. The feature is located within the APE and is approximately 16 meters northeast of Feature 13 and approximately 15 meters northeast of Feature 2. Feature 16 measures 4 meters east to west by 1 meter north to south. It is described as a deflated hearth but a general scatter of fire-affected rock would be more accurate. Feature 16 consists of 2 sandstone, 1 granitic and 5 metavolcanic very small to small cobble-sized rocks. Seventeen ceramic body vessel sherds (10 brownware and 7 buffware); 3 porphyritic metavolcanic flakes and 1 quartzite decortical flake are located within feature boundary. Two cores and several ceramic rim sherds are located within a 1 meter proximity to the feature. All above mentioned artifacts were included in Locus 8 Description. Integrity of the feature is poor. Krotovina disturbance is prevalent, but subsurface potential is good.

Feature 17 is situated on the northwestern portion of Locus 67. The feature is located within the APE and is approximately 100 meters west northwest of Feature 16. It measures approximately 8 meters north to south by 7 meters east to west. Feature 17 is described as deflated hearth scatter consisting of 20 or more fragments (averaging 8 to 15 centimeters diameter in size) of fire-affected sandstone and 2 metavolcanic small cobbles. A quartzite battered cobble, 20 or more porphyritic metavolcanic flakes and several cryptocrystalline silicate (mostly thinning) flakes are located within 1 meter around the feature boundary. These artifacts were not included in Locus 67 sample inventory but types and reduction stages are consistent with locus constituents, and also those of Feature 20. Condition of the feature is fair and subsurface potential is moderate due to eroding pavement impacted by siltation.

Feature 18 is located within the APE and is approximately 78 meters south of Feature 19. The feature is composed of the remains of a human cremation and measures 18 meters by 10 meters. Artifacts observed in this location include: 30 brownware ceramic vessel fragments, 15 green metavolcanic flakes and 1 quartzite multi-platform core. Faunal bones observed include: 1 small to medium carnivore artial dentary fragment, sheep/goat innominate fragments including portions of ilium, ischium, and pubis at the acetabulum. Human bones observed include: 1 calcined portion of the occipital bone with arterial sulcus, 1 calcined fragment of an ulna mid-shaft fragment and several (10) small calcined cranial fragments.

Feature 19 is located situated on the northeastern portion of Locus 67. The feature is located within the APE and is approximately 99 meters northeast of Feature 18. It measures 5 meters north to south by 3 meters east to west. The feature is described as a deflated hearth comprised of 12 or more fire-affected sandstone, quartz, metavolcanic and granitic rocks, all small cobble-sized. Five porphyritic metavolcanic flakes (mostly interior reduction stage), 1 basalt secondary flake and 1 brownware direct, reinforced rim sherd were observed within and 1 meter around the feature boundary. Condition of the feature is fair as it is situated atop a high point of the landform.

Feature 20 is situated on the northeastern portion of Locus 67. The feature is within the APE and approximately 33 meters east northeast from Feature 19. It measures 11 meters east to west by 5 meters north to south. The feature consists of 2 distinct concentrations of fire-affected rock and disarticulated fire-affected rock scattered proximal to those concentrations. The easternmost concentration measures 3 meters east to west by 3 meters north to south. It is comprised of 70 or more fire-affected fist-sized cobbles and medium-large gravel-sized spalls (50 or more metavolcanic, 9 or more granitic and 11 or more sandstone). The largest rocks are arranged in a circular pattern, approximately 2 meters in diameter. A total of 20 artifacts were observed within this concentration, and include: 9 white chalcedony flakes (3 primary, 5 secondary and 1 tertiary); 1 white chalcedony edge-modified flake, 1 porphyritic metavolcanic secondary flake, 1 porphyritic metavolcanic angular shatter piece, 3 cryptocrystalline silicate flakes (1 primary and 2 secondary) and 5 buffware body vessel sherds. The westernmost concentration measures approximately 4 meters north to south by 3 meters east to west. A total of 69 or more fist-sized to medium-large, gravel-sized, fire-affected rocks comprise this concentration, and include: 36 or more metavolcanic, 28 or more sandstone, 3 quartz cobbles and 2 or more granitic cobbles. Two artifacts were observed within this concentration and include 1 quartz decortical flake and 1 decortical basalt flake. All above mentioned artifacts for Feature 20 were included in the artifact inventory for Locus 67 description. Overall condition of Feature 20 is fair. The feature occurs on the east-facing slope of the landform, which is subject to colluvial wash and eolian deflation. Most of the fire-affected rocks are disarticulated, somewhat scattered, and moderately imbedded, except for the easternmost concentration, which still preserves a circular arrangement. Based on the amount of fire-affected rock, the degree of thermal alteration, and the diameter of the circular arrangement in the eastern portion, it is likely that Feature 20 represents roasting activities and consists of 2 distinct pits. Subsurface potential is good because the easternmost concentration contains carbonized soil.

Feature 24 is located within the APE and on the western portion of Locus 68. The feature is approximately 993 meters northwest of Feature 45 and measures 2 meters east to west by at least 2 meters north to south. Recent sheetwash events have impacted the southern portion. Dark, carbonized soils are revealed in the soft road cut. Feature 24 contains 13 small cobbles of fire-affected sandstone, metavolcanics and granitics. Faintly, a semi-circular pattern can be discerned, but the majority of fire-affected rocks are disarticulated. The 50 or more ceramic sherds and 20 lithic debitage pieces that occur proximal to the feature are inventoried in Locus 68 description. Generally, the condition is poor because of the road cut and erosion. However, there is a definable subsurface component, based on the road cut.

Feature 25 is located out of the APE and is approximately 1,123 meters southeast of Feature 24. It consists of a deflated hearth, located to the west of Locus 39, and is situated in a drainage. The feature measures 2 meters north to south by 2 meters east to west. Fire-affected rock occurs in, and around, Locus 39, which appears to represent more than one hearth in this general area. East of Locus 39, more fire-affected rock is present but no discernable hearth could be identified. The feature contains 20 or more fire affected rock and 2 brownware sherds.

Feature 26 is located out of the APE and is approximately 143 meters northwest of Feature 25. It consists of a deflated hearth that measures 2 meters north to south by 2 meters east to west. The feature contains 30 or more dispersed metavolcanic, quartz and quartzite fire affected rocks. One Tizon brownware sherd is associated with the feature.

Feature 27 is located out of the APE and is approximately 64 meters southwest of Feature 26. It consists of a round, intact hearth that measures externally 2 meters north to south by 2 meters east to west, and internally 1 meter north to south by 1 meter east to west. The hearth contains quartz, quartzite and metavolcanic rocks and 1 green metavolcanic core. Other artifacts observed in and around the hearth include, at minimum, 10 green metavolcanic flakes.

Feature 28 is located out of the APE and is approximately 130 meters northeast of Feature 27. It consists of a cleared area situated atop desert pavement and measures 6 meters northeast to southwest by 4 meters northwest to southeast. Debitage is present in low quantities including less than 5 metavolcanic and cryptocrystalline flakes.

Feature 29 is located out of the APE and is approximately 59 meters south southeast of Feature 28. It consists of 2 cleared areas separated by 1 meter of intact desert pavement. The larger cleared area measures 4 meters east to west by 3 meters north to south and the smaller area measures 2 meters north to south by 2 meters east to west. Debitage is present in low quantities with less than 20 flakes observed (approximately 90% metavolcanic).

Feature 30 is located out of the APE and is approximately 15 meters northwest of Feature 29. It consists of a cleared area in a cobble field environment and measures 4 meters north to south by 4 meters east to west. Debitage is present in low quantities, with 5 metavolcanic flakes observed within the feature. The western edge is undefined as it transitions into a sandy wash.

Feature 31 is located out of the APE and is approximately 87 meters northwest of Feature 30. It consists of a hearth feature with a poorly defined shape and boundary and measures 0.2 meters north to south by 0.5 meters east to west. The feature contains approximately 10 small metavolcanic fire affected rocks.

Feature 32 is also located out of the APE and within Locus 57. This feature is 400 meters east southeast of Feature 31 and consists of a widely dispersed hearth that measures 1 meter north to south by 1 meter east to west. The feature contains approximately 20 sandstone, metavolcanic, quartz and quartzite fire-affected rocks.

Feature 33 is located out of the APE and is approximately 300 meters west northwest of Feature 32. It consists of a deflated hearth measuring 1 meter north to south by 1 meter east to west. The hearth contains 17 granite, basalt and cryptocrystalline silicate fire-affected rock.

Feature 34 is located out of the APE and is approximately 47 meters northeast of Feature 33. It consists of a deflated hearth that measures 2 meters north to south by 2 meters east to west. The feature contains 10 metavolcanic fire-affected rocks.

Feature 35 is situated on the southwest corner of Locus 52. The feature is located out of the APE and is approximately 58 meters southeast of Feature 34. It consists of a hearth that is situated within a small wash. The feature contains 15 metavolcanic and basalt fire-affected rocks.

Feature 36 is located out of the APE and is approximately 193 meters southwest of Feature 35. It consists of a hearth feature. The feature contains 35 basalt, metavolcanic and quartz fire-affected cobbles.

Feature 37 is located out of the APE and is approximately 295 meters north of Feature 36. It consists of a deflated hearth measuring 1 meter by 1 meter. The feature contains granite, quartz, cryptocrystalline silicate and a single green metavolcanic fire-affected rock.

Feature 38 is located out of the APE and is approximately 2 meters north of Feature 37. It consists of a deflated hearth situated in an ephemeral drainage measuring 1 meter north to south by 1 meter east to west. The feature contains 18 fire-affected rocks.

Feature 39 is situated within Locus 63. The feature is located out of the APE and is approximately 47 meters southeast of Feature 38. It consists of a lightly embedded (less than 1 centimeter) hearth that measures 1 meter north to south by 2 meters east to west. The feature contains 13 fist-sized or larger fire-affected rocks (2 basalt, 1 granite and 10 metavolcanic) and 1 ceramic fragment.

Feature 40 is situated within Locus 57. The feature is located out of the APE and is approximately 294 meters southeast of Feature 39. It is interpreted as a fire-affected rock/hearth feature that measures 1 meter north to south by 1 meter east to west. The feature contains 30 predominately metavolcanic with some quartz and quartzite fire-affected rocks that are cracked and oxidized.

Feature 41 is located out of the APE and is approximately 12 meters north northwest of Feature 40. It consists of a rounded deflated hearth that measures 2 meters east to west by 2 meters north to south externally and 1 meter by 1 meter internally. This feature contains 55 basalt, granite and metavolcanic fire-affected rocks.

Feature 42 is situated within Locus 59. The feature is located out of the APE and is approximately 33 meters north northwest of Feature 41. It consists of a hearth feature that measures 1 meter north to south by 1 meter east to west. This feature contains 15 fist-sized and larger fire-affected rocks.

Feature 43 is located out of the APE and is approximately 63 meters north northwest of Locus 42. It consists of a dispersed hearth that measures 2 meters north to south by 3 meters east to west. The feature contains 30 fist-sized and larger metavolcanic, basalt and mudstone fire-affected rocks.

Feature 44 is situated within Locus 57. The feature is located out of the APE and is approximately 119 meters south southwest of Feature 43. It consists of a small cluster of fire affected rocks that measures 1 meter north to south by 1 meter east to west. The feature contains approximately 15 sandstone, metavolcanic and quartz fire-affected rocks.

Feature 45 is located out of the APE and is approximately 138 meters north northeast of Feature 44. It consists of a dispersed hearth that measures 2 meters north to south by 1 meter east to west. The feature contains 15 fist-sized metavolcanic and basalt fire-affected rocks.

Feature 46 is situated within Locus 61. The feature is located out of the APE and is approximately 316 meters northwest of Feature 45 and approximately 483 meters north northwest of Feature 53. It consists of an artifact and fire-affected rock scatter that measures 1 meter north to south by 1 meter east to west. The feature contains 3 metavolcanic cores, 1 sandstone mano and 7 fire-affected rocks.

Feature 47 is situated within Locus 61. The feature is located out of the APE and is approximately 89 meters southwest of Feature 46. It consists of a dispersed hearth that measures approximately 3 meters north to south by 2 meters east to west. The feature contains 22 mostly metavolcanic fire-affected rocks.

Feature 49 is situated within Locus 64. The feature is located out of the APE and is approximately 225 meters southwest of Feature 47. It consists of a deflated hearth that measures 1 meter north to south by 1 meter east to west. The feature contains approximately 40 metavolcanic, quartz, granite and sandstone fire-affected rocks that are slightly embedded (1 to 3 centimeters) and 4 Tizon brownware sherds.

Feature 50 is located out of the APE and is approximately 321 meters southeast of Feature 49. It consists of a somewhat deflated hearth feature and measures 2 meters east to west by 1 meter north to south. The feature contains approximately 20 metavolcanic, quartz and quartzite fire-affected cobbles.

Feature 51 is situated within Locus 64. The feature is located out of the APE and is approximately 189 meters east southeast of Feature 49. It consists of a deflated and disturbed hearth with embedded carbon. It measures 1 meter north to south by 1 meter east to west. The feature contains 5 metavolcanic and quartzite fire-affected rocks (some are completely embedded), and in situ firewood, ceramic and groundstone. The embedding, size and patination of the hearth constituents, as well as the associated artifacts, indicate prehistoric use. Although, nearby hearths appear to be modern or have been used during modern times.

Feature 52 is situated within Locus 64. The feature is located out of the APE and is approximately 156 meters west southwest of Feature 19 and approximately 4 meters north of Feature 52. It consists of a hearth with modern use but likely was constructed with stones from nearby hearths. The feature contains metavolcanic, quartz and sandstone fire-affected/oxidized rock, with a majority not embedded and modern wire.

Carbon is present on the surface. There is a possibility of pot hunting and/or recent camping in the area. Artifacts observed in Feature 52 include 121 Colorado buffware and Colorado Tizon brownware body sherds and 2 Tizon brownware rim sherds, 2 metavolcanic cores, 1 cryptocrystalline core, 1 metavolcanic flake and 1 quartz hammerstone.

Feature 53 is situated within Locus 64. The feature is located out of the APE and is approximately 154 meters east of Feature 52. It consists of a deflated hearth composed of approximately 70 metavolcanic, quartz, granite and sandstone fire-affected rocks that are slightly embedded (1 to 3 centimeters).

Feature 55 is within the APE, located approximately 812 meters northwest of Feature 46. It consists of a hearth measuring 3 meters north to south by 2 meters east to west. The hearth consists of a total of 38 medium to large-sized cobbles and fragments situated in an oblong shape with 18 vesicular basalt fragments, ranging in size from 5 to 22 centimeters in length and 20 cobbles of various materials (quartzite, granite, quartz, metavolcanic and 1 tabular piece of sandstone), ranging in size from 8 to 19 centimeters. Artifacts observed in association with the feature include: 4 Colorado Tizon brownware sherds (3 body and 1 rim), 1 green metavolcanic tertiary flake, 1 metavolcanic core fragment and 1 tested cobble.

Feature 56 is located within the APE and is approximately 3 meters south of Feature 55. It consists of a hearth measuring 3 meters southwest to northeast by 1 meter northwest to southeast and is approximately 1 meter from Locus 55. The hearth consists of 26 medium to large cobbles and fragments of vesicular basalt in roughly an “L” shape. Artifacts observed in association with the feature include 2 green metavolcanic tertiary flakes and 4 Colorado buffware sherds (1 bowl rim and 3 body sherds).

The following 3 fire-affected rock/hearth features were found in Locus 64 (exclusion area) and therefore were not individually mapped. These 3 features are described as the following:

A disturbed and deflated hearth that measures 2 meters north to south by 1 meter east to west. The feature is comprised of approximately 18 sandstone, metavolcanic, quartz and granite rocks, some fire-affected and some embedded along with some carbon. This feature appears to have been disturbed by modern activities.

A deflated hearth that measures 1 meter north to south by 1 meter east to west. The feature contains 22 metavolcanic, quartz and rhyolite fire affected rocks. The stones are embedded approximately 6 centimeters. Below the surface the stones have a carbon coating. Artifacts observed include 1 unifacial limestone mano and 1 basalt core tool with battering on 2 edges.

A poorly embedded (less than 2 centimeters) deflated hearth that measures 2 meters north to south by 2 meters east to west. The feature is comprised of, at minimum, 20 metavolcanic, quartz, quartzite and basalt fire-affected rocks.

There are a total of 126 loci identified within EBR-019. The majority of loci are largely comprised of lithic and ceramic artifacts. Although, Loci 1, 2, 8, 18, 67 through 73 and 124 through 126 are found within the APE; Loci 3 through 7, 9 through 17, 19 through

66 and 74 through 123 are located out of the Project APE. These loci are described below:

Locus 1 is located within the APE and is in the northeastern portion of the site. It measures 67 meters north to south by 40 meters east to west. Artifacts observed within Locus 1 include: 135 ceramic body sherds (128 buffware and 7 Tizon brownware), 5 ceramic basal sherds (2 buffware and 3 Tizon brownware), 5 ceramic rim sherds (1 Tizon brownware slight recurved, rounded lip; 1 Tizon brownware direct, flattened lip; 1 buffware direct, rounded lip; 1 buffware slightly recurved, rounded lip with horizontal incising and 1 buffware with beveled lip for lid fitting or is a lid fragment), 8 porphyritic metavolcanic flakes (6 primary and 2 secondary), 2 porphyritic metavolcanic shatter, 1 brown chalcedony secondary flake and 1 quartzite hammerstone.

Locus 2 is located within the APE and is approximately 44 meters west of Locus 1. It measures 25 meters north to south by 25 meters east to west. Artifacts observed within Locus 2 include: 21 ceramic body sherds (15 red buffware and 6 Tizon brownware), 2 Tizon brownware basal sherds, 4 porphyritic metavolcanic flakes (2 primary and 2 secondary), 6 ceramic rim sherds (4 Tizon brownware direct, rounded lips; 1 Tizon brownware slightly recurved, rounded lip of small olla neck vessel and 1 red buffware slightly recurved, rounded lip), 1 porphyritic metavolcanic tested cobble and 1 basalt multi-directional core tool.

Locus 3 is located out of the APE and is approximately 75 meters south of Locus 2. It measures 20 meters north to south by 53 meters east to west. Artifacts observed include: 23 Tizon brownware ceramic body fragments, 24 Colorado buffware ceramic body fragments, 1 buffware rounded lip direct rim sherd, 1 Colorado buffware recurved rounded top rim sherd, 4 brownware ceramic direct rounded lip rim sherds, 7 green metavolcanic flakes (3 primary, 3 secondary and 1 shatter), 2 brown secondary metavolcanic flakes, 1 exhausted gray metavolcanic uni-directional core, 1 gray/brown chert multi-directional core, 1 green metavolcanic uni-directional core, 1 green metavolcanic hammerstone, 1 fragment of a green metavolcanic hammerstone, 1 light gray/white quartzite bi-directional and bifacial core and 1 heavily weathered white granitic unifacial mano.

Locus 4 is located out of the APE and is approximately 94 meters west of Locus 3. It measures 65 meters northeast to southwest by 45 meters northwest to southeast. Artifacts observed within Locus 4 include: 57 Tizon brownware ceramic body sherds, 50 Colorado buffware ceramic body sherds, 21 green metavolcanic flakes (6 primary and 15 secondary), 5 fragments of fire altered sandstone, 5 gray-white quartzite flakes (3 primary and 2 secondary), 2 brown metavolcanic flakes (1 primary and 1 secondary), 1 white quartz primary flake, 5 gray chert flakes, 1 brown chert flake, 1 Colorado buffware direct rounded lip rim sherd, 1 Colorado buffware slight recurved rounded lip rim sherd, 1 cryptocrystalline biface fragment, 1 Tizon brownware direct rounded lip rim sherd, 1 Tizon brownware rounded slight lip curve rim sherd, 1 Tizon brownware direct rounded lip rim sherd with a drilled mend hole and 1 dark gray/brown cryptocrystalline core fragment.

Locus 5 is located out of the APE and is approximately 137.5 meters south-southwest of Locus 4. It measures 90 meters north to south by 130 meters east to west. An 80 to

90% sample of surface artifacts was recorded at this location. Artifacts observed within Locus 5 include: 127 Colorado buffware ceramic body sherds, 365 Tizon brownware ceramic body sherds, 69 green metavolcanic flakes (20 primary, 40 secondary, 5 tertiary and 4 shatter), 6 black metavolcanic secondary flakes, 5 brown quartzite flakes (2 primary and 3 secondary), 3 secondary gray chert flakes, 6 white quartz flakes (4 secondary, 1 tertiary and 1 shatter), 9 banded reddish-brown chert secondary flakes, 1 black basalt secondary flake, 1 drilled brownware ceramic body sherd, 1 black basalt multi-directional core, 1 green metavolcanic core tool, 1 unifacially modified white quartz flake, 1 unifacial quartzite mano fragment, 2 Tizon brownware direct flattened lip rim sherds, 3 Tizon brownware direct rounded lip rim sherds, 1 Tizon brownware slight recurved flattened lip, 1 Tizon brownware neck sherd slightly recurved flattened lip, 1 Colorado buffware direct rounded lip, 1 green metavolcanic spent core, 1 green metavolcanic core/hammerstone, 1 green metavolcanic scraper tool, 1 green metavolcanic unifacially modified tool, 1 green metavolcanic hammerstone/chopper, 1 green metavolcanic bifacial, 1 bi-directional spent core, 1 distal end of a red/black banded chert mid to late stage biface, 1 green metavolcanic bifacial, 1 uni-directional core, 1 green metavolcanic bifacial multi-directional core, 1 green metavolcanic early stage biface with cortex present, 1 brown metavolcanic edge-modified flake, 1 green metavolcanic unifacial tool with battering, 1 Cottonwood Series red/brown banded chert projectile point, 1 green metavolcanic unifacial core, 1 green metavolcanic uni-directional unifacial core and 1 multi-directional core.

Locus 6 is located out of the APE and is approximately 160 meters northwest of Locus 5. It measures 80 meters northeast to southwest by 28 meters northwest to southeast. Locus 6 contains a linear concentration of fire altered rock. The southwest portion contains 70% of the artifacts and the remaining artifacts are concentrated in the northeast half of the locus. Artifacts observed within Locus 6 include 151 Tizon brownware ceramic body sherds, 62 Colorado buffware ceramic body sherds, 56 green metavolcanic flakes (9 primary, 17 secondary and 30 tertiary), 6 brown and black mottled chert flakes (2 primary and 4 secondary), 2 brown metavolcanic flakes (1 secondary and 1 shatter), 1 black basalt flake, 4 light brown quartzite flakes (1 primary and 3 secondary), 1 gray and black mottled chert flake, 4 light brown chalcedony flakes (2 secondary and 2 shatter), 3 light gray chert flakes (1 primary and 2 secondary), 1 Colorado buffware recurved rounded lip rim sherd, 1 Colorado buffware recurved rounded lip neck fragment sherd, 1 Colorado buffware slightly recurved rounded lip rim sherd and 1 Colorado buffware direct flattened lip rim sherd.

Locus 7 is located out of the APE and is approximately 66 meters northwest of Locus 6. It measures 100 meters north to south by 75 meters east to west. The southern portion of the locus contains a 2-square-meter area of diffusely scattered, lithic, ceramic and indeterminate bone. All artifact counts represent an 80 to 90% sample of the artifacts observed at each locus. Artifacts observed within Locus 7 include: 6 petrified wood primary flakes, 6 cryptocrystalline primary flakes, 39 green metavolcanic (primary and secondary flakes), 2 black metavolcanic (secondary and tertiary flakes), 4 quartz primary flakes, 12 basalt primary flakes, 1 yellow jasper primary flake, 2 black metavolcanic cores, 2 green metavolcanic cores, 2 green metavolcanic core tools, 1 basalt core tool, 1 petrified wood core, 1 green metavolcanic cobble tool, 1 green metavolcanic retouched flake, 1 petrified wood tool, 1 Desert Side-notched Series projectile point, 70 Tizon brownware body sherds, 1 Tizon brownware direct rounded lip rim sherd, 1 Tizon brownware flat reinforced lip rim sherd, 133 Colorado buffware ceramic vessel body sherds, 2 Colorado buffware direct flattened lip rim sherds, 2 Colorado buffware direct rounded lip rim sherds, 1 Colorado buffware recurved, rounded lip rim sherd, 6 unidentified bone fragments and 13 fragments of fire-affected rock.

Locus 8 is located within the APE and is approximately 127 meters northeast of Locus 7. It measures 60 meters north to south by 38 meters east to west. Artifacts observed within Locus 8 include: 1 white chert edge-modified flake, 1 sandstone mano fragment, 1 porphyritic metavolcanic hammerstone, 2 sandstone metate fragments, 1 porphyritic metavolcanic flaked stone tool, 3 core tools (1 porphyritic metavolcanic and 2 quartzite), 321 ceramic body vessel sherds (223 brownware and 98 buffware), 10 basal vessel sherds (7 brownware and 3 buffware), 58 porphyritic metavolcanic flakes (13 primary, 30 secondary, and 15 tertiary), 10 porphyritic metavolcanic shatter pieces, 3 quartzite flakes (all secondary), 5 petrified wood flakes (1 secondary, 1 primary and 3 tertiary), 6 fine-grained basalt flakes (1 primary, 4 secondary and 1 tertiary), 5 white chalcedonic chert flakes (all tertiary), 3 red jasper flakes (all tertiary), 2 yellow jasper flakes (all tertiary), 10 quartz flakes (5 primary, 1 secondary and 4 tertiary), 13 ceramic buffware storage or cooking vessel rim sherds (5 direct flattened lips — 1 exhibiting drilled mend hole; 2 direct rounded lips; 2 recurved rounded lips and 4 recurved flattened lips), 3 buffware ceramic olla neck rim sherds, 24 brownware storage or cooking vessel rim sherds (12 direct flattened lips; 6 direct rounded lips; 2 recurved rounded lips; 3 recurved flattened lip, and 1 recurved reinforced rim), 6 porphyritic metavolcanic cores (3 multi-directional, 1 uni-directional and 2 unknown), 1 quartz uni-directional core and 2 cryptocrystalline siliceous cores (1 multi-directional heat-treated and 1 uni-directional heat-treated). Additionally, 15 fist-sized, and at minimum 50 gravel-sized fire-affected rocks (mix of granitic, metavolcanic and sandstone) were observed within Locus 8, outside feature polygons. Several pieces of desiccated faunal bone (non-calcine) were also observed within Locus 8.

Locus 9 is located out of the APE and is approximately 475 meters southeast of Locus 8. It measures 195 meters northeast to southwest by 95 meters northwest to southeast. Locus 9 includes 4 features (F3 through F6). Artifacts observed within Locus 9 include: 75 green metavolcanic flakes, 7 black metavolcanic flakes, 30 black basalt flakes, 10 chert flakes, 20 quartz flakes, 10 quartzite flakes, 1 petrified wood flake, 2 quartzite cores, 1 quartzite hammerstone, 1 tested quartzite cobble, 1 unifacial quartzite tool, 1 quartzite mano fragment, 5 green metavolcanic cores, 1 green metavolcanic hammerstone, 3 green metavolcanic core tools, 1 green metavolcanic unifacial tool, 1 quartz hammerstone, 3 black metavolcanic discodial unifacial cores, 1 black metavolcanic tool, 2 black metavolcanic chopping tools, 1 chert biface, 1 basalt core tool, at minimum 135 Colorado buffware ceramic vessel body sherds, 1 Colorado buffware direct rounded lip rim sherd, 1 Colorado buffware recurved rounded lip rim sherd, 1 Colorado buffware recurved flattened lip rim sherd, at minimum 250 Tizon brownware ceramic vessel body sherds, 37 Tizon brownware rim sherds, 6 Tizon brownware direct flattened lip rim sherd, 3 Tizon brownware direct rounded lip rim sherds, 5 Tizon brownware recurved rounded lip rim sherds, 13 Tizon brownware recurved, flattened lip rim sherds, 5 Tizon brownware reinforced direct lip rim sherds, 2 Tizon brownware reinforced recurved lip and 6 fragments of bone were observed outside of Feature 3.

Locus 10 is located out of the APE and is approximately 84 meters north-northwest of Locus 9. It measures 20 meters north to south by 13 meters east to west. Locus 10 includes 1 feature (F7). Artifacts observed within Locus 10 include 3 Tizon brownware ceramic vessel body sherds and at minimum 15 primary and secondary quartz flakes.

Locus 11 is located out of the APE and is approximately 367 meters southwest of Locus 10. It measures 25 meters north to south by 42 meters east to west. Locus 11 includes 1 feature (F8) located along the western margin of the locus. Artifacts observed in this location include: 120 Tizon brownware ceramic vessel body sherds (approximately 25% of the sherds have stucco coating), 3 Tizon brownware rim sherds (2 direct rims rounded lip and 1 direct rim flattened lip), 2 bifaces (1 cryptocrystalline projectile point tip and 1 quartz biface end), 35 green metavolcanic, quartz and cryptocrystalline flakes, 2 green metavolcanic unifacial tools, 3 green metavolcanic cores and 1 quartz core.

Locus 12 is located out of the APE and is approximately 187 meters east of Locus 11. It measures 50 meters north to south by 30 meters east to west. Artifacts observed within Locus 12 include: 6 basalt flakes, 8 black metavolcanic flakes, 28 green metavolcanic flakes, 1 petrified wood flake, 1 chalcedony flake, 1 black basalt unifacially retouched core, 1 green metavolcanic unifacial scraper, 1 Tizon brownware ceramic direct rounded lip sherd and 5 Tizon brownware body sherds. Ceramics are concentrated on the eastern site of the locus, adjacent to an intermittent drainage, which flows across the eastern boundary of the locus. Fire affected rocks (sandstone, granite and metavolcanic materials) were observed throughout the site, with a higher concentration in the southern half of the site.

Locus 13 is located out of the APE and measures 57 meters east to west by 67 meters north to south. Locus 13 includes 2 features (F12 and F13). Artifacts observed in Locus 13 include 12 Colorado buffware ceramic vessel body sherds, 150 Tizon brownware ceramic vessel body sherds, 50 green metavolcanic flakes, 2 cryptocrystalline silicate chert flakes, 1 cryptocrystalline silicate jasper flake, 30 black metavolcanic flakes, 40 black basalt flakes and 2 quartz flakes. A Colorado buffware ceramic pot drop with a minimum of 100 fragments of ceramics (including body and rim sherds) was observed on the southeast portion of the locus boundary. The pot drop covers an area of 2 meters north to south by 1 meter east to west. Some of the ceramics observed at the locus are blackened suggestive of cooking vessels.

Locus 14 is located out of the APE and is approximately 490 meters west-southwest of Locus 13. It measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 14 include 10 green metavolcanic flakes.

Locus 15 is located out of the APE and is approximately 58 meters northeast of Locus 14. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 15 include: 2 black metavolcanic hammerstones, 1 metavolcanic core and at minimum 20 metavolcanic flakes.

Locus 16 is located out of the APE and is approximately 38 meters southwest of Locus 15. It measures 3 meters north to south by 2 meters east to west. Artifacts observed within Locus 16 include 1 black metavolcanic core and at minimum 10 metavolcanic flakes.

Locus 17 is located out of the APE and is approximately 21 meters northeast of Locus 16. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 17 include 1 black metavolcanic core and at minimum 110 black metavolcanic flakes.

Locus 18 is located within the APE and is approximately 1,213 meters northeast of Locus 17 and approximately 118 meters northeast from Locus 1 (nearest locus). Locus 18 measures 39 meters northeast to southwest by 15 meters northwest to southeast. Artifacts observed within Locus 18 include: 1 porphyritic metavolcanic bi-directional core, 1 brownware body sherd and 1 basalt core tool. However, upon revisit (Sept.2009), recent sheetwash flooding has obliterated 90% of locus with 25 porphyritic metavolcanic flakes that had been previously recorded not relocated.

Locus 19 is located out of the APE and is approximately 1,224 meters south-southwest of Locus 18. It measures 11 meters north to south by 17 meters east to west. Artifacts observed within Locus 19 include: 4 metavolcanic cores, 1 metavolcanic tested cobble and at minimum 50 metavolcanic flakes.

Locus 20 is located out of the APE and is approximately 14 meters northeast of Locus 19. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 20 include 1 metavolcanic core, 1 tested metavolcanic cobble and 15 metavolcanic flakes.

Locus 21 is located out of the APE and is approximately 10 meters north-northwest of Locus 20. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 21 include 15 metavolcanic flakes.

Locus 22 is located out of the APE and is approximately 16 meters northwest of Locus 21. Locus 22 measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 22 include: 1 hammerstone, 1 metavolcanic core and 20 metavolcanic flakes.

Locus 23 is located out of the APE and is approximately 9 meters west-northwest of Locus 22. It measures 5 meters north to south by 5 meters east to west. Artifacts observed within Locus 23 include 1 green metavolcanic core and at minimum 25 metavolcanic flakes.

Locus 24 is located out of the APE and is approximately 36 meters east of Locus 23. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 23 include 15 black metavolcanic flakes.

Locus 25 is located out of the APE and is approximately 22 meters northeast of Locus 24. It measures 2 meters north to south by 4 meters east to west. Artifacts observed within Locus 25 include: 1 metavolcanic hammerstone, 1 metavolcanic core, 1 metavolcanic core tool and at minimum 25 quartzite, metavolcanic and basalt flakes.

Locus 26 is located out of the APE and is approximately 26 meters north-northwest of Locus 25. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 26 include: 1 metavolcanic core, 1 tested metavolcanic cobble and 5 metavolcanic flakes.

Locus 27 is located out of the APE and is approximately 7 meters north of Locus 26. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within locus 27 include at minimum 10 metavolcanic flakes.

Locus 28 is located out of the APE and is approximately 24 meters southeast of Locus 27. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 28 include: 1 hammerstone, 1 tested quartzite cobble, 1 metavolcanic core and at minimum15 metavolcanic flakes.

Locus 29 is located out of the APE and is approximately 26 meters northeast of Locus 28. It measures 5 meters north to south by 5 meters east to west. Artifacts observed within Locus 29 include 2 metavolcanic cores and at minimum 40 metavolcanic flakes.

Locus 30 is located out of the APE and is approximately 26 meters southeast of Locus 29. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 30 include 2 metavolcanic core and at minimum 5 metavolcanic flakes.

Locus 31 is located out of the APE and is approximately 36 meters north-northwest of Locus 30. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 31 include 1 brown chert core tool and at minimum 5 quartzite and cryptocrystalline silicate chert flakes.

Locus 32 is located out of the APE and is approximately 34 meters northeast of Locus 31. It measures 1 meter north to south by 3 meters east to west. Artifacts observed within Locus 32 include: 1 green metavolcanic hammerstone, 1 metavolcanic core and at minimum 5 metavolcanic flakes.

Locus 33 is located out of the APE and is approximately 11 meters northeast of Locus 32. It measures 13 meters northeast to southwest by 10 meters northwest to southeast. Artifacts observed within Locus 33 include 2 ceramic vessel rim fragments and at minimum15 body sherds of Tizon brownware.

Locus 34 is located out of the APE and is approximately 117 meters southwest of Locus 33. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 34 include at minimum 20 metavolcanic flakes.

Locus 35 is located out of the APE and is approximately 47 meters south of Locus 34. It measures 2 meters north to south by 3 meters east to west. Artifacts observed within Locus 35 include at minimum 25 metavolcanic flakes and 5 or more fire-affected cobbles.

Locus 36 is located out of the APE and is approximately 116 meters north-northeast of Locus 35. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 36 include 1 metavolcanic core and at minimum 10 metavolcanic flakes.

Locus 37 is located out of the APE and is approximately 85 meters southwest of Locus 36. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 37 include 1 quartzite hammerstone and at minimum 3 basalt flakes.

Locus 38 is located out of the APE and is approximately 76 meters north of Locus 38. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 38 include 1 metavolcanic core and 6 metavolcanic flakes.

Locus 39 is located out of the APE and is approximately 50 meters northwest of Locus 38. It measures 50 meters northeast to southwest by 20 meters northwest to southeast. Artifacts observed within Locus 39 include: 114 Tizon brownware ceramic vessel body fragments, 10 Tizon brownware ceramic rim sherds, 62 Colorado buffware ceramic vessel body fragments, 11 cores (10 metavolcanic and 1 petrified wood), 1 fire altered basalt core tool, 1 quartzite hammerstone, 64 metavolcanic flakes, 26 cryptocrystalline flakes, 5 quartzite flakes, 3 petrified wood flakes, 3 quartzite flakes and 5 unidentified marine shell fragments.

Locus 40 is located out of the APE and is approximately 99 meters south-southwest of Locus 39. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 40 include 1 cryptocrystalline silicate core and 10 cryptocrystalline silicate flakes.

Locus 41 is located out of the APE and is approximately 26 meters northwest of Locus 40. It measures 3 meters north to south by 2 meters east to west. Artifacts observed within Locus 41 include 15 milky white quartz flakes.

Locus 42 is located out of the APE and is approximately 134 meters northeast of Locus 41. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 42 include 1 basalt core tool and 6 basalt flakes.

Locus 43 is located out of the APE and is approximately 47 meters northwest of Locus 42. It measures 9 meters north to south by 4 meters north to south. Artifacts observed within Locus 43 include: 16 Tizon brownware ceramic vessel body fragments, 7 Colorado buffware ceramic vessel body fragments, 1 gray cryptocrystalline hammerstone and 1 black speckled chert flake.

Locus 44 is located out of the APE and is approximately 40 meters northeast of Locus 43. It measures 5 meters north to south by 2 meters east to west. Artifacts observed within Locus 44 include 26 Colorado buffware ceramic vessel body fragments.

Locus 45 is located out of the APE and is approximately 80 meters southwest of Locus 44. It measures 3 meters east to west by 3 meters north to south. Artifacts observed within Locus 45 include: 2 metavolcanic cores, 27 metavolcanic flakes and 9 quartz flakes.

Locus 46 is located out of the APE and is approximately 137 meters southeast of Locus 45. It measures 4 meters east to west by 2 meters north to south. Artifacts observed within Locus 46 include 1 brown cryptocrystalline silicate core and at minimum 20 metavolcanic and cryptocrystalline silicate flakes.

Locus 47 is located out of the APE and is approximately 143 meters north-northwest of Locus 46 and measures 6 meters east to west by 3 meters north to south. Artifacts observed within Locus 47 include 1 possible basalt hammerstone and at minimum 20 metavolcanic flakes.

Locus 48 is located out of the APE and is approximately 64 meters northwest of Locus 47. It measures 4 meters north to south by 4 meters east to west. Artifacts observed within Locus 48 include 2 metavolcanic cores and at minimum 20 metavolcanic flakes.

Locus 49 is located out of the APE and is approximately 89 meters northeast of Locus 48. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 49 include 1 green cryptocrystalline core and 3 green cryptocrystalline flakes.

Locus 50 is located out of the APE and is approximately 67 meters west-southwest of Locus 49. It measures 102 meters east to west by 50 meters north to south. Artifacts observed within Locus 50 include: 391 ceramic vessel fragments (227 Tizon brownware and 164 Colorado buffware), 36 ceramic rim sherds (17 Colorado buffware and 19 Tizon brownware), 18 cores (12 metavolcanic, 5 cryptocrystalline silicate and 1 basalt), 2 metavolcanic tested cobbles, 279 flakes (162 metavolcanic, 80 cryptocrystalline silicate, 17 quartz, 18 petrified wood and 2 basalt). A potential human cremation was also observed in this location measuring 4 meters north to south by 5 meters east to west. The cremation consists of approximately 25 or more calcined long bone and cranial bone fragments. Ceramic vessel and rim fragments were observed within the extent of the cremation.

Locus 51 is located out of the APE and is approximately 167 meters southeast of Locus 50. It measures 48 meters north to south by 38 meters east to west. Artifacts observed within Locus 51 include: 51 flakes (40 metavolcanic, 8 cryptocrystalline silicate and 3 basalt), 5 cores (4 metavolcanic and 1 cryptocrystalline silicate), 117 ceramic vessel fragments (78 Tizon brownware and 39 Colorado buffware), 10 ceramic rim sherds (5 Tizon brownware and 5 Colorado buffware). In addition, a potential human cremation is reported but unconfirmed within this locus. A minimum of 50 calcined bong fragments were observed and included in what archaeologists interpreted to be long bone and cranial fragments. This locus also included ceramic sherds and an unidentified projectile point. The area immediately surrounding Locus 51 (possible cremation) was recorded separately from the surrounding locus. These artifact include: 22 flakes (17 metavolcanic, 1 cryptocrystalline silicate, 3 quartz and 1 basalt), 88 ceramic vessel fragments (14 Tizon brownware and 74 Colorado buffware) and 4 Colorado buffware ceramic rim sherds.

Locus 52 is located out of the APE and is approximately 56 meters southeast of Locus 51. It measures 27 meters east to west by 17 meters north to south. Artifacts observed within Locus 52 include: 30 ceramic vessel body fragments (5 Tizon brownware and 25 Colorado buffware), 2 ceramic rim sherds (1 Colorado buffware and 1 Tizon brownware), 18 flakes (3 quartz, 8 metavolcanic, 5 basalt and 2 cryptocrystalline silicate), 4 cores (2 quartz and 2 metavolcanic) and 1 metavolcanic core tool. A possible human cremation was observed on the surface within the locus, which includes at minimum 20 high fragmented long bone and cranial calcined bones. Artifacts associated with the cremation include: 5 whole lively beads (4 of which are fire-affected), 38 ceramic vessel sherds (15 Tizon brownware and 23 Colorado buffware), 4 Colorado buffware ceramic rim fragments, 10 flakes (1 quartz, 2 metavolcanic, 3 basalt and 4 cryptocrystalline silicate) and 1 metavolcanic core.

Locus 53 is located out of the APE and is approximately 26 meters northeast of Locus 52. It measures 26 meters north to south by 22 meters east to west. Artifacts observed within Locus 53 include, at minimum: 60 vessel fragments (40 Colorado buffware and 20 Tizon brownware), 10 Colorado buffware ceramic rim sherds, 1 black metavolcanic core and 40 flakes of various materials including metavolcanic, cryptocrystalline, quartz and quartzite. A possible human cremation was observed on the surface which includes at minimum 21 pieces of highly fragmented calcined long bone and cranial bones that appear to be very weathered and splintered. A single complete Olivella shell bead and a complete Desert Side-notched Series projectile point were also observed at this location.

Locus 54 is located out of the APE and is approximately 183 meters southwest of Locus 53. It measures 16 meters north to south by 14 meters east to west. Artifacts observed within Locus 54 include, at a minimum: 35 Tizon brownware and Colorado buffware ceramic vessel body sherd fragments, 1 quartz Desert Side-notched Series point, 1 drill tip fragment, 1 chalcedony edge-modified flake, 1 metavolcanic chopper, 1 metavolcanic core tool, and at a minimum 40 flakes of a variety of materials including metavolcanic, quartz, cryptocrystalline, basalt and petrified wood. This location also contains 4 articulated fish vertebrae, some of which are fire-affected, and 1 small stick with flat, cut edges on both sides.

Locus 55 is located out of the APE and is approximately 222 meters northeast of Locus 54. It measures 100 meters north to south by 78 meters east to west. Artifacts observed within Locus 54 include, at a minimum: 33 ceramic rim sherds (15 Colorado buffware and 18 Tizon brownware), 635 ceramic vessel sherds (595 Colorado buffware, 40 Tizon brownware - some display stucco and drilled holes), 6 hammerstones, 11 stone tools including core tools, scrapers, and choppers, 32 cores, 1 edge-modified flake, 1 utilized flake, 297 flakes (206 green and black metavolcanic, 42 cryptocrystalline silicate, 21 basalt, 20 quartz and 8 quartzite) and 1 stone bowl and groundstone. A possible human cremation was observed on the surface which includes at minimum 15 highly calcined bone fragments and 5 fire affected rock concentrations associated with it, as well as the remains of a fish, observed in a cut bank along the eastern edge of the locus.

Locus 56 is located out of the APE and is approximately 331 meters northeast of Locus 55. It measures 240 meters northeast to southwest by 73 meters northwest to southeast. Artifacts observed within Locus 56 include, at a minimum: 139 ceramic rim and body fragments (47 Colorado buffware and 92 Tizon brownware sherds with rim sherds displaying direct flat, direct round and recurved flat construction), 135 pieces of debitage (97 green metavolcanic flakes, 15 dark green metavolcanic flakes, 5 chert, 16 quartz/quartzite and 2 chalcedony flakes), 6 green metavolcanic tested cobbles and 40 primarily multi-directional and bifacial cores.

Locus 57 is located out of the APE and is approximately 250 meters southwest of Locus 56. It measures 73 meters north to south by 70 meters east to west. Artifacts observed within Locus 57 include, at a minimum: 395 Tizon brownware sherds, 399 sherds of Colorado buffware (rim sherds display direct flat, direct rounded, recurved flat, and recurved round construction), 215 metavolcanic flakes, 77 cryptocrystalline flakes, 20 quartzite flakes, 45 quartz flakes, 27 basalt flakes, 2 petrified wood flakes, 26 cores, 6 edge-modified flakes, 5 hammerstones, 8 core tools, 1 utilized flake and 1 tested cobble. A possible human cremation was observed on surface, consisting of 10 unidentified bone fragments. Also observed within the locus were 5 fish, 2 mammal and 62 unidentifiable bone fragments.

Locus 58 is located out of the APE and is approximately 131 meters west of Locus 57. It measures 22 meters north to south by 23 meters east to west. Artifacts observed within Locus 58 include lithic and ceramic scatter with 1 hearth feature. Fire-affected rock occurs throughout the locus and the site appears to have been subject to pot hunting. Artifacts observed within Locus 58 include: 88 ceramic vessel and rim sherds displaying direct flat and direct rounded construction (39 Tizon brownware and 49 Colorado buffware), 38 flakes (24 metavolcanic, 5 cryptocrystalline silicate, 4 quartz, 3 petrified wood and 2 basalt), 1 green metavolcanic utilized flake, 1 metavolcanic core tool, 1 cryptocrystalline edge-modified flake, 1 metavolcanic chopping tool, 1 cryptocrystalline silicate core tool and 1 cryptocrystalline silicate Cottonwood Series projectile point (preform).

Locus 59 is located out of the APE and is approximately 127 meters northeast of Locus 58. It measures 102 meters east to west by 54 meters north to south. Artifacts observed within Locus 59 include: shell pendants, fire affected rock, 102 Tizon brownware sherds, 174 Colorado buffware sherds (rim sherds display direct, flat, direct round, and recurved flat construction), 185 flakes (146 metavolcanic, 16 cryptocrystalline silicate, 4 quartzite, 13 quartz and 6 basalt), 5 edge-modified flakes, 19 cores (2 bifacially retouched), 2 hammerstones, 12 core tools, 1 chopper and 3 tested cobbles. Bones include 10 fish and 13 unidentifiable fragments, some being highly calcined and possibly be human.

Locus 60 is located out of the APE and is approximately 145 meters north-northwest of Locus 59. It measures 80 meters northeast to southwest by 44 meters northwest to southeast. Artifacts observed within Locus 60 include: unidentifiable shell fragments, 81 sherds of Tizon brownware, 42 sherds of Colorado buffware (Colorado buffware rim types include direct flat, direct round and recurved flat), 1 drilled Colorado buffware rim sherd, 17 flakes (14 metavolcanic, 2 cryptocrystalline silicate and 1 basalt), 4 lithic tools, 2 core tools and 1 utilized flake.

Locus 61 is located out of the APE and is approximately 180 meters northwest of Locus 60. It measures 192 meters northeast to southwest by 52 meters northwest to southeast, forming an oval shape upon a low-lying landform divided by a drainage.

Artifacts observed at Locus 61 include: 191 sherds of Tizon brownware, 250 sherds of Colorado buffware (ceramic rim types include direct rounded, direct flat, recurved flat and rounded), 65 metavolcanic flakes, 4 quartz flakes, 8 cores and 1 unidentifiable shell fragment. Locus 61 is a lithic and ceramic scatter associated with 3 cremation features. The first cremation contains 30 to 40 fragments of burned human bone, 40 ceramic sherds and limited lithic constituents. The second cremation contains 40 fragments of burned human bone, 20 ceramic sherds and limited lithic constituents. The third cremation is composed of 20 fragments of burned human bone, 20 ceramic sherds and limited lithic constituents. Two hearths were located in the eastern portion of the locus. On November 11, 2008 URS physical anthropologist Robert Mutaw visited this locus and identified a human infant mandible fragment, a proximal ulna fragment, and a proximal right humerus fragment; concluding that there is a 99% certainty that this locus contains human remains.

Locus 62 is located out of the APE and is approximately 192 meters southwest of Locus 61. It measures 154 meters north to south by 126 meters east to west. Locus 62 is associated with an unconsolidated hearth feature. Artifacts observed within Locus 62 include: 180 metavolcanic flakes, 15 cryptocrystalline flakes, 14 basalt flakes, 13 quartz flakes, 4 quartzite flakes, 2 petrified wood flakes, 1 chalcedony flake, 3 sandstone groundstone fragments, 4 hammerstones, 2 edge-modified flakes, 13 core tools, 20 cores, 2 broken unidentified projectile points, 1 petrified wood tool, 142 Tizon brownware sherds and 266 Colorado buffware sherds (rim types include direct flat, direct round, and recurved). Stucco coating is present on less than 10% of both ware types, and drill holes are present on 1 rim and 1 body sherd. Bones observed within Locus 62 include 10 highly calcined, possibly human fragments and some bird bones. This locus appears to have a high potential for subsurface deposits.

Locus 63 is located out of the APE and is approximately 165 meters southeast of Locus 62. It measures 96 meters northeast to southwest by 33 meters northwest to southeast. Locus 63 is associated with a hearth feature. Artifacts observed within Locus 63 include: 40 Tizon brownware sherds, 42 Colorado buffware sherds (rim types include direct flat, indirect flat and recurved flat), 88 flakes (72 metavolcanic, 3 basalt, 7 cryptocrystalline silicate, 2 quartz, 3 quartzite 1 petrified wood), 5 cores, 6 core tools, 1 edge-modified flake, 1 utilized flake, 2 hammerstones and 1 cryptocrystalline silicate jasper projectile point base. No bone was observed on the surface at this locus; however, given the close proximity of this locus with loci containing human bone, the potential for subsurface deposits is high.

Locus 64 is located out of the APE and is approximately 286 meters southeast of Locus 63. It measures 247 meters east to west by 90 meters north to south. Locus 64 is associated with 7 hearth features and 1 human cremation. Artifacts observed within Locus 64 include: 247 flakes (199 metavolcanic, 9 basalt, 10 quartz, 6 quartzite, 21 cryptocrystalline silicate, 1 gypsum and 1 petrified wood), 4 manos, 3 metate fragments, 14 tested cobbles, 18 cores, 8 core tools, 1 edge-modified flake, 8 hammerstones, 1 Desert Side-notched Series projectile point and 1 Cottonwood Series projectile point. Ceramics observed within the locus include at minimum 604 ceramic rim and vessel sherds (266 Tizon brownware, 338 Colorado buffware), with rim types displaying direct flat, direct rounded, flat lipped, lipped, recurved round and recurved flat forms. Three sherds of Colorado buffware display drill holes and others have a stucco coating on the surface. One Colorado buffware sherd has a yellowish-white slip. Bone fragments include 1 tortoise carapace fragment, 6 unknown bone fragments and 12 highly calcined human bone fragments.

Locus 65 is located out of the APE and is approximately 205 meters northeast of Locus 64. It measures 115 meters north to south by 162 meters east to west. Artifacts observed within Locus 65 include: 274 ceramic rim and body sherds (164 Tizon brownware and 110 Colorado buffware; rim types include direct flat, direct rounded, and recurved flat), at a minimum 168 flakes (125 metavolcanic, 10 basalt, 12 cryptocrystalline silicate, 13 quartz, 6 quartzite, and 2 petrified wood), 6 tested cobbles, 12 cores, 9 core tools, 1 edge-modified flake, 2 quartzite hammerstones, 2 metate fragments, 4 manos and 1 marine shell fragment with a hinge. In addition, a minimum of 30 bone fragments were observed, including unknown species, fish and possibly human.

Locus 66 is located out of the APE and is approximately 187 meters southeast of Locus 65. It measures 20 meters northeast to southwest by 62 meters southeast to northwest. Artifacts observed within Locus 66 include: 8 ceramic sherds (2 Tizon brownware and 6 Colorado buffware), 23 flakes (16 metavolcanic, 2 cryptocrystalline silicate, 2 quartzite, 1 quartz, 1 basalt and 1 petrified wood), 2 cores and 1 test cobble. A mano was observed near the locus.

Locus 67 is located out of the APE and is approximately 1,276 meters northwest of Locus 66, approximately 506 meters west-southwest from Locus 18 and approximately 79 meters west from Locus 8 (nearest locus). It measures 156 meters northeast to southwest by 79 meters northwest to southeast. A total of 868 artifacts were observed within Locus 67. They include 140 brownware body vessel sherds (4 fire-affected and 6 having a scum coat residue), 220 buffware body vessel sherds (5 exhibiting horizontal incised lines and 10 fire-affected), 19 buffware body vessel sherds exhibiting a light tan, dull exterior, 28 red buffware body vessel sherds, 5 brownware basal vessel sherds, 13 buffware basal vessel sherds, 11 brownware storage/cooking vessel rim sherds (3 direct, flattened lips; 1 direct, reinforced rim; 3 direct, rounded lips; 3 slightly recurved, rounded lips; and 1 recurved, flattened lip fire-affected), 28 buffware storage/cooking vessel rim sherds (2 slightly recurved, flattened lips; 12 direct, rounded lips; 1 recurved, reinforced rim; 4 slightly recurved, rounded lips; 3 slightly recurved, rounded exhibiting horizontal incised lines; 2 slightly recurved, rounded having a mend hole; 1 direct, flattened lip; and 3 dramatically recurved, rounded lips), 3 buffware olla neck rim fragments (all slightly recurved, rounded), 1 porphyritic metavolcanic battered cobble, 1 quartzite battered cobble, 1 quartz battered cobble, 2 porphyritic metavolcanic hammerstones, 2 quartzite hammerstones, 5 porphyritic metavolcanic cores (4 multi-directional, 1 uni-directional), 3 quartzite cores (2 uni-directional, 1 multi-directional), 1 crypto-crystalline silicate multi-directional core, 3 porphyritic metavolcanic edge-modified flakes, 2 porphyritic metavolcanic flaked stone tools, 1 quartzite scraper, 1 basalt scraper, 3 crypto-crystalline silicate edge-modified flakes, 2 porphyritic metavolcanic core tools, 3 quartzite core tools, 4 Cottonwood Series type projectile points (2 clear quartz crystal and 2 white chalcedony), 7 crypto-crystalline silicate bifaces preform/point blank stage, 2 clear quartz crystal bifaces preform/point blank stage, 1 porphyritic metavolcanic utilized primary flake, 1 granitic unifacial mano, 1 gray chert knife or scraper, 160 porphyritic metavolcanic flakes (31 primary, 81 secondary and 48 tertiary), 38 porphyritic metavolcanic angular shatter pieces, 1 porphyritic metavolcanic tested cobble, 50 crypto-crystalline silicate flakes (9 primary, 29 secondary, and 12 tertiary), 1 crypto-crystalline silicate shatter piece, 1 crypto-crystalline silicate tested cobble, 33 quartz flakes (15 primary, 11 secondary and 7 tertiary), 9 quartz angular shatter pieces, 5 quartzite flakes (2 primary, 1 secondary and 2 tertiary), 2 quartzite angular shatter pieces, 12 basalt flakes (5 primary, 6 secondary and 1 tertiary), 6 fine-grained igneous flakes (3 primary, 1 secondary and 2 tertiary), 2 petrified wood flakes (1 primary and 1 secondary), 1 secondary siltstone flake, 2 siltstone angular shatter pieces and 1 wonderstone secondary flake. Additionally, 30 or more small cobble-sized fire-affected rocks can be observed across the locus, outside of the Feature 17, 19, and 20 boundaries. They are largely disarticulated from preexisting hearths or pits and subjected to redeposition. Several faunal bone pieces can be observed proximal to these fire-affected rocks. However, they are too weathered for identification of thermal alteration and much too sparsely distributed.

Locus 68 is located within the APE and is approximately 105 meters northeast from Locus 67. It measures 11 meters northwest to southeast by 9 meters northeast to southwest. Artifact inventory was conducted based on a 2 by 2 meter sample study unit (SSU-3) superimposed over highest artifact density within this locus. A total of 76 artifacts were observed within SSU-3, they include: 13 red buffware body vessel sherds, 37 brownware body vessel sherds, 4 buffware body vessel sherds, 11 porphyritic metavolcanic flakes (2 primary, 3 secondary, and 6 tertiary), 1 porphyritic metavolcanic angular shatter piece, 2 mottled chert tertiary flakes, 3 quartzite flakes (1 secondary and 2 tertiary), 1 basalt edge-modified flake, 1 chert flaked stone tool, 1 porphyritic metavolcanic battered cobble, and 2 fragmented brownware cooking/storage vessel rim sherds direct, rounded lip which refit each other. Three additional brownware cooking/storage vessel rim sherds-all direct, rounded-were observed within locus, outside SSU-3. More than 50 artifacts could be observed outside SSU-3, frequencies and types consistent with those within sample inventory. 10 or more fire-affected small cobbles are scattered across locus, outside of Feature 24, 2 of which occur within SSU-3.

Locus 69 is located within the APE and is approximately 63 meters north-northeast from Locus 68. It measures 7 meters northwest to southeast by 3 meters northeast to southwest. A total of 51 artifacts were observed within Locus 69, they include: 12 buffware body vessel sherds, 6 red buffware body sherds, 5 brownware body vessel sherds, 17 porphyritic metavolcanic flakes (5 primary, 10 secondary and 2 tertiary), 4 porphyritic metavolcanic angular shatter pieces, 5 basalt flakes (4 secondary and 1 tertiary), 1 porphyritic metavolcanic multi-directional core, and 1 buffware cooking/storage vessel direct rim sherd, flattened lip. Ten small cobbles of fire-affected sandstone and metavolcanic rock were observed scattered across locus.

Locus 70 is located within the APE and is approximately 1,483 meters southeast of Locus 69. It measures 29 meters north to south by 16 meters east to west. Artifacts observed within Locus 70 include: 3 metavolcanic flakes (1 primary and 2 secondary), 1 fine grain quartzite secondary flake, 1 chalcedony shatter and 1 cryptocrystalline silicate chert secondary flake.

Locus 71 is located within the APE and is approximately 46 meters southeast of Locus 70. It measures 6 meters north to south by 4 meters east to west. Artifacts observed within Locus 71 include: 12 metavolcanic flakes (2 primary, 4 secondary and 6 tertiary), 1 metavolcanic tested cobble and 3 fine grain quartzite secondary flakes.

Locus 72 is located within the APE and is approximately 16 meters northwest of Locus 71. It measures 3 meters north to south by 3 meters east to west. Artifacts observed within Locus 72 include 2 fine grain quartzite secondary flakes and 1 metavolcanic fire-affected rock (FAR).

Locus 73 is located within the APE approximately 18 meters north-northeast of Locus 72 and measures 4 meters east to west by 3 meters north to south. Artifacts observed within Locus 73 include: 5 metavolcanic flakes (1 primary, 2 secondary, 1 tertiary and 1 shatter), 1 metavolcanic tested cobble, 5 fine grain quartzite flakes (2 primary, 1 secondary and 2 tertiary) and 1 fine grain quartzite tested cobble.

Locus 74 is located out of the APE and is approximately 6 meters west-southwest of Locus 73. It measures 4 meters north to south by 2 meters east to west. Artifacts observed within Locus 74 include: approximately 35 metavolcanic flakes (23 primary, 10 secondary and 2 shatter), 1 chalcedony primary flake, 3 green metavolcanic multi-directional cores, 1 green metavolcanic uni-directional core and 1 tested green metavolcanic cobble.

Locus 75 is located out of the APE and is approximately 8 meters east of Locus 74. It measures 3 meters north to south by 2 meters east to west. Artifacts observed within Locus 75 include approximately 40 quartz flakes (28 primary, 8 secondary and 4 shatter) and 1 white/pink quartz multi-directional core.

Locus 76 is located out of the APE and is approximately 1,111 meters southwest of Locus 75. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 76 include: 3 black metavolcanic flakes (2 primary and 1 secondary), 10 wonderstone primary flakes and 1 cryptocrystalline silicate primary flake.

Locus 77 is located out of the APE and is approximately 16 meters west of Locus 76. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 76 include 7 cryptocrystalline silicate flakes (5 primary and 2 secondary).

Locus 78 is located out of the APE and is approximately 46 meters north of Locus 77. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 78 include 13 brown cryptocrystalline silicate flakes (6 primary and 7 secondary) ranging in size from 2 to 5 centimeters and 1 brown cryptocrystalline silicate multi-directional core.

Locus 79 is located out of the APE and is approximately 21 meters northeast of Locus 78. It measures 3 meters north to south by 2 meters east to west. Artifacts observed within Locus 79 include 15 green metavolcanic flakes (12 primary, 2 secondary and 1 shatter) and 1 green metavolcanic multi-directional core.

Locus 80 is located out of the APE and is approximately 40 meters east of Locus 79. It measures 4 meters north to south by 2 meters east to west. Artifacts observed within

Locus 80 include: 10 green metavolcanic flakes (4 primary and 6 secondary), 1 green metavolcanic bi-directional core, 1 green metavolcanic multi-directional core and 1 green metavolcanic hammerstone.

Locus 81 is located out of the APE and is approximately 14 meters northeast of Locus 80. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 81 include 6 black metavolcanic flakes (3 primary and 3 secondary) and 1 black metavolcanic bi-directional core.

Locus 82 is located out of the APE and is approximately 5 meters south of Locus 81. It measures 1 meter north to south by 2 meters east to west. Artifacts observed within Locus 82 include 5 green metavolcanic flakes (4 primary and 1 secondary) and 1 green metavolcanic uni-directional core.

Locus 83 is located out of the APE and is approximately 17 meters south of Locus 82. It measures 1 meter north to south by 2 meters east to west. Artifacts observed within Locus 83 include 15 petrified wood flakes (10 primary and 5 secondary) and 1 tested petrified wood cobble.

Locus 84 is located out of the APE and is approximately 23 meters north-northeast of Locus 83. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 84 include: 7 green metavolcanic primary flakes, 1 tested green metavolcanic cobble (3 fragments that refit) and 2 white cryptocrystalline silicate tested cobbles.

Locus 85 is located out of the APE and is approximately 38 meters south of Locus It84. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 85 include: 10 green metavolcanic flakes (6 primary and 4 secondary), 2 green metavolcanic bi-directional cores and 1 green metavolcanic multi-directional core.

Locus 86 is located out of the APE and is approximately 5 meters south-southeast of Locus 85. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 86 include: 4 brown cryptocrystalline silicate flakes (3 primary and 1 secondary), 1 cryptocrystalline silicate bi-directional core and 7 quartz flakes (5 primary and 2 secondary) and 1 quartz multi-directional core.

Locus 87 is located out of the APE and is approximately 1,010 meters northeast of Locus 86. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 87 include: 10 quartz flakes (5 primary and 5 secondary), 1 quartz bi-directional core and 1 quartz multi-directional core.

Locus 88 is located out of the APE and is approximately 44 meters southwest of Locus 87. It measures 4 meters north to south by 2 meters east to west. Artifacts observed within Locus 88 include: 3 gray cryptocrystalline silicate primary flakes, 1 cryptocrystalline silicate multi-directional core, 10 quartz flakes (5 primary and 5 secondary) and 1 quartz bi-directional core.

Locus 89 is located out of the APE and is approximately 12 meters south of Locus 88. It measures 2 meters north to south by 1 meter east to west. Artifacts observed within

Locus 89 include: 13 green metavolcanic flakes (8 primary and 5 secondary), 1 green metavolcanic bi-directional core and 1 green metavolcanic multi-directional core.

Locus 90 is located out of the APE and is approximately 12 meters east-southeast of Locus 89. It measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 90 include: 5 metavolcanic primary flakes, 1 green metavolcanic bi-directional core and 1 green metavolcanic multi-directional core.

Locus 91 is located out of the APE and is approximately 52 meters west of Locus 90. It measures 2 meters north to south by 3 meters east to west. Artifacts observed within Locus 91 include: 20 cryptocrystalline silicate flakes (10 primary and 10 secondary), 5 green cryptocrystalline silicate primary flakes and 1 cryptocrystalline silicate bi-directional core.

Locus 92 is located out of the APE and is approximately 87 meters southwest of Locus 91. It measures 3 meters north to south by 2 meters east to west. Artifacts observed within Locus 92 include 30 cryptocrystalline silicate flakes (12 primary and 18 secondary) and 1 brown cryptocrystalline silicate multi-directional exhausted core.

Locus 93 is located out of the APE and is approximately 44 meters southeast of Locus 92. It measures 3 meters north to south by 2 meters east to west. Artifacts observed within Locus 93 include 20 metavolcanic flakes (10 primary and 10 secondary) and 1 black metavolcanic multi-directional core.

Locus 94 is located out of the APE and is approximately 269 meters northeast of Locus 93. It measures 3 meters north to south by 2 meters east to west. Artifacts observed within Locus 94 include 15 metavolcanic flakes (5 primary and 10 secondary) and 1 black metavolcanic multi-directional core.

Locus 95 is located out of the APE and is approximately 125 meters south-southwest of Locus 94. It measures 3 meters north to south by 3 meters east to west. Artifacts observed within Locus 95 include 20 metavolcanic flakes (4 primary and 16 secondary).

Locus 96 is located out of the APE and is approximately 90 meters northwest of Locus 95. It measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 96 include 25 white quartz flakes (13 primary, 10 secondary and 2 shatter) and 1 white quartz uni-directional core.

Locus 97 is located out of the APE and is approximately 42 meters east-southeast of Locus 96. It measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 97 include 3 black metavolcanic primary flakes and 1 black metavolcanic multi-directional core with 3 extraction scars.

Locus 98 is located out of the APE and is approximately 108 meters northeast of Locus 97. It measures 6 meters north to south by 3 meters east to west. Artifacts observed within Locus 98 include 25 black metavolcanic flakes (15 primary and 10 secondary) and 1 black metavolcanic multi-directional core with 7 extraction scars.

Locus 99 is located out of the APE and is approximately 32 meters northeast of Locus 98. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 99 include 35 metavolcanic flakes (21 primary and 14 secondary) and 1 green metavolcanic multi-directional core with 4 extraction scars.==

Locus 100 is located out of the APE and is approximately 18 meters northeast of Locus 99. It measures 4 meters north to south by 2 meters east to west. Artifacts observed within Locus 100 include 10 black metavolcanic flakes (8 primary and 2 secondary) and 1 black metavolcanic multi-directional core with 7 extraction scars.

Locus 101 is located out of the APE and is approximately 64 meters south-southwest of Locus 100. It measures 4 meters north to south by 3 meters east to west. Artifacts observed within Locus 101 include 30 metavolcanic flakes (15 primary and 15 secondary) and 1 cryptocrystalline silicate secondary flake.

Locus 102 is located out of the APE and is approximately 8 meters south of Locus 101. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 102 include 10 metavolcanic flakes (7 primary and 3 secondary) and 1 green metavolcanic multi-directional core with 3 extraction scars.

Locus 103 is located out of the APE and is approximately 93 meters north-northeast of Locus 102. It measures 2 meters north to south by 3 meters east to west. Artifacts observed within Locus 103 include 30 green metavolcanic flakes (24 primary and 6 secondary) and 1 green metavolcanic bi-directional core with 4 extraction scars.

Locus 104 is located out of the APE and is approximately 48 meters northwest of Locus 103. It measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 103 include 10 black metavolcanic flakes (9 primary and 1 secondary).

Locus 105 is located out of the APE and is approximately 73 meters southeast from Locus 104. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 105 include: 21 basalt flakes (13 primary and 8 secondary), 14 metavolcanic flakes (8 primary and 6 secondary), 1 basalt bi-directional core with 6 extraction scars and 1 black metavolcanic bi-directional core with 4 extraction scars.

Locus 106 is located out of the APE and is approximately 63 meters northwest of Locus 105. It measures 3 meters north to south by 3 meters east to west. Artifacts observed within Locus 106 include 20 metavolcanic flakes (16 primary and 4 secondary) and 1 green metavolcanic multi-directional core with 4 extraction scars.

Locus 107 is located out of the APE and is approximately 64 meters southeast of Locus 106. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 107 include 8 metavolcanic primary flakes and 1 green metavolcanic bi-directional core with 3 extraction scars.

Locus 108 is located out of the APE and is approximately 6 meters southeast of Locus 107. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 108 include 8 green metavolcanic primary flakes and 1 quartzite pebble with pressure flaking on one of its sides.

Locus 109 is located out of the APE and is approximately 42 meters east-southeast of Locus 108. It measures 3 meters north to south by 4 meters east to west. Artifacts observed within Locus 109 include: 30 metavolcanic flakes (6 primary and 24 secondary), 2 black metavolcanic tested cobbles, 1 black metavolcanic uni-directional core with 3 extraction scars and 1 black metavolcanic multi-directional core with 7 extraction scars.

Locus 110 is located out of the APE and is approximately 32 meters northeast of Locus 109. It measures 3 meters north to south by 3 meters east to west. Artifacts observed within Locus 110 include: 30 metavolcanic flakes (15 primary, 14 secondary and 1 shatter), 3 cryptocrystalline silicate flakes (2 primary and 1 secondary), 1 cryptocrystalline silicate tested cobble, 1 metavolcanic tested cobble and 2 green metavolcanic multi-directional cores with 3 extraction scars.

Locus 111 is located out of the APE and is approximately 8 meters north of Locus 110. It measures 2 meters north to south by 3 meters east to west. Artifacts observed within Locus 111 include 20 white quartz flakes (6 primary and 14 secondary) and 3 brown cryptocrystalline silicate primary flakes.

Locus 112 is located out of the APE and is approximately 37 meters northeast of Locus 111. It measures 5 meters north to south by 5 meters east to west. Artifacts observed within Locus 112 include: 6 cryptocrystalline silicate flakes (3 primary and 3 secondary), 36 metavolcanic flakes (18 primary and 18 secondary), 8 quartz flakes (4 primary and 4 secondary), 1 cryptocrystalline silicate multi-directional core fragment with 5 extraction scars and 1 metavolcanic multi-directional core with 3 extraction scars.

Locus 113 is located out of the APE and is approximately 29 meters southwest of Locus 112. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 113 include 10 metavolcanic flakes (8 primary and 2 secondary).

Locus 114 is located out of the APE and is approximately 15 meters southeast of Locus 113. It measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 114 include 6 black metavolcanic flakes (2 primary and 4 secondary).

Locus 115 is located out of the APE and is approximately 97 meters south-southwest of Locus 114. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 115 include: 30 metavolcanic flakes (12 primary and 18 secondary), 1 metavolcanic uni-directional core with 3 extraction scars and 1 black metavolcanic multi-directional core with 6 extraction scars.

Locus 116 is located out of the APE and is approximately 106 meters south of Locus 115. It measures 5 meters north to south by 4 meters east to west. Artifacts observed within Locus 116 include 19 black metavolcanic flakes (9 primary and 10 secondary).

Locus 117 is located out of the APE and is approximately 45 meters southwest of Locus 116. It measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 117 include 24 petrified wood flakes (12 primary and 12 secondary), and 1 petrified wood multi-directional core with 3 extraction scars.

Locus 118 is located out of the APE and is approximately 82 meters north-northeast of Locus 117. It measures 1 meter north to south by 2 meters east to west. Artifacts observed within Locus 118 include: 10 metavolcanic flakes (5 primary and 5 secondary), 1 metavolcanic tested cobble that refits with a primary flake and 1 black metavolcanic multi-directional core with 4 extraction scars.

Locus 119 is located out of the APE and is approximately 10 meters northwest of Locus 118. It measures 3 meters north to south by 4 meters east to west. Artifacts observed within Locus 119 include: 20 metavolcanic flakes (10 primary and 10 secondary), 3 basalt primary flakes and 2 metavolcanic uni-directional cores with 3 extraction scars.

Locus 120 is located out of the APE and is approximately 102 meters south of Locus 119. It measures 2 meters north to south by 3 meters east to west. Artifacts observed within Locus 120 include: 25 metavolcanic flakes (13 primary and 12 secondary), 1 green metavolcanic tested cobble, 1 black metavolcanic uni-directional core with 3 extraction scars and 1 green metavolcanic multi-directional core with 6 extraction scars.

Locus 121 is located out of the APE and is approximately 15 meters north-northwest from Locus 120. It measures 2 meters north to south by 3 meters east to west. Artifacts observed within Locus 120 include 20 black metavolcanic flakes (10 primary and 10 secondary).

Locus 122 is located out of the APE and is approximately 10 meters east of Locus 121. It measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 122 include: 15 metavolcanic flakes (8 primary and 7 secondary), 1 black metavolcanic tested cobble and 1 black metavolcanic uni-directional core with 3 extraction scars.

Locus 123 is located out of the APE and is approximately 44 meters north-northeast of Locus 122. It measures 6 meters north to south by 6 meters east to west. Artifacts observed within Locus 123 include 20 brown cryptocrystalline silicate flakes (11 primary and 9 secondary) and 4 metavolcanic flakes (2 primary and 2 secondary).

Locus 124 is located within the APE and is approximately 1,238 meters north-northwest of locus 123. It measures 8 meters north to south by 18 meters east to west. With artifact density more than 5 artifacts per square meter, a 2 by 2 meter sample unit of the overall artifacts was taken and recorded. Artifacts observed within the sample unit include: 2 Colorado buff ware sherds, 94 Tizon brownware sherds, 1 brownware flattened lip rim, 1 brownware rim/neck sherd), 26 metavolcanic flakes (4 primary, 20 tertiary and 2 shatter), 2 basalt tertiary flakes, 1 quartzite shatter, 1 metavolcanic uni-directional core, 2 green metavolcanic multi-directional cores, 1 quartzite tested cobble, 1 green metavolcanic hinge fractured edge-modified flake, 1 quartzite uni-directional edge-modified flake fragment, 1 basalt bi-directional core, 1 quartzite preform, 1 cryptocrystalline silicate edge-modified flake/perform and 1 green/gray cryptocrystalline silicate biface preform.

Locus 125 is located within the APE and is approximately 4 meters northwest of Locus 124. It measures 9 meters north to south by 3 meters east to west. Artifacts observed within Locus 125 include: 19 Tizon brownware body sherds, 1 Tizon brownware jar rim, 1 Colorado buffware body sherd, 10 green metavolcanic flakes (3 primary, 6 tertiary and 1 shatter), 1 agate secondary flake, 1 white cryptocrystalline primary flake, 2 quartzite primary flakes, 1 red cryptocrystalline primary flake, 1 green metavolcanic bi-directional core fragment, 1 green metavolcanic edge-modified flake and 1 weathered faunal long bone fragment.

Locus 126 is located within the APE and is approximately 55 meters southwest of Locus 125. It measures 80 meters east to west by 10 meters north to south. Artifacts observed within Locus 126 include: 181 brownware body sherds, 7 brownware rim fragments (4 flattened and 3 recurved), 76 green metavolcanic flakes (16 primary, 6 secondary, 42 tertiary and 12 shatter), 10 quartzite flakes (3 secondary, 4 tertiary and 3 shatter), 7 quartz tertiary flakes, 14 cryptocrystalline silicate flakes (4 secondary, 9 tertiary and 1 shatter), 1 petrified wood secondary flake, 7 basalt flakes (3 primary, 2 secondary and 2 shatter), 2 chalcedony secondary flakes, 1 wonderstone secondary flake, 1 metavolcanic core fragment, 1 metavolcanic core, 1 yellow/orange cryptocrystalline silicate unifacial edge-modified flake, 1 cryptocrystalline silicate biface, 1 quartzite multi-directional core, 1 green metavolcanic spent core and 1 green metavolcanic multi-directional core.

The further character of artifacts found within EBR-019 is unreported.

The general physical context for EBR-019, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. Large fan aprons dominate the central portion of the Project area, where EBR-019 is located, and enter the basin floor up to 3 kilometers from the Lake Cahuilla high shoreline, and extend up to, and in some places, past that line. The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan “aprons” which do not individually fully cover the entire area, and which interfinger and partially bury one another and piedmont remnants. Intact desert pavement exists throughout much of the site, and consists of small to large, sub-rounded to sub-angular metavolcanic, basalt, quartz, quartzite and granite gravels and cobbles overlaying coarse sands and fine gravels. The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus, reducing the potential for extensive buried archaeology on that surface. Nonetheless, this area demonstrates the potential for (shallowly) buried preserved surfaces. As a result, there is a low to moderate, and in some places, high likelihood for subsurface deposition that has been buried by geomorphic processes.

Portions of the site to the north-northwest, south and southwest margins, and western side of this site interface with very old slightly raised fan surfaces. In addition, the southern and southwestern margins of the site border on possible fan piedmont remnant surfaces. The ground surface along these margins consists of intact desert pavement that is moderately to well developed, with larger, poorly sorted clasts (i.e., much higher frequency of sub-angular cobbles and medium to large gravels). These older remnant surfaces are frequently truncated by later Holocene inset fan aprons and active gullies or washes.

However, the more terminal northwestern, northeastern, southwestern and southeastern portions of EBR-019 are within the APE, while the vast majority of

EBR-019 is not within the APE. This area is situated within or adjacent to the sub-landform interface between the lake basin, fan apron and beach zone, which correlates to the proposed Lake Cahuilla maximum 12 meter-high shoreline or ancient beach zone. These landforms indicate a Late Pleistocene/Early Holocene period of formation. The lake basin geomorphic landform consists of 2 distinct components: the lower lake basin and the beach zone or interface between the lake basin and the fan apron. The surface of the lower lake basin is generally very flat to very gently sloping, with a thin mantle of Late Holocene alluvium and eolian silts overlaying silts and clays. Because older surfaces have been overlain with a thin layer of more recent materials that were deposited after human occupation began in the area, there is a moderate to high likelihood for subsurface deposition within the lower-lying lake basin portion. Because episodes of filling and emptying of Lake Cahuilla that have occurred at various times in prehistory would have moved and disturbed soils at or near the surface of the lake basin landform, archaeological features preserved there will likely be disturbed or fragmentary. Soils within the lower lake basin are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines flushed into the lake by streams and washes that once terminated nearby at the shoreline. The land surface of the beach zone is undulating and consists of beach flats, sand berms, and deflated beach sands that are consistent with the multiple formation and recessional events of the maximum Lake Cahuilla shoreline. Because the advance and recession of the waters of Lake Cahuilla at various times in prehistory would have moved surface soils within the beach zone, the potential for subsurface deposition is heightened. The soils within the beach zone consist of sands that are non-cohesive and vary from coarse sub-angular to rounded sand and small gravels to medium and coarse well rounded sands overlaid by fine silts and clays.

Temporally diagnostic artifacts indicate that EBR-019 was primarily inhabited during the Late Prehistoric period, likely sometime after AD 1100. Copious numbers of ceramic sherds commonly attributed to the Late Prehistoric period were identified, as well as Cottonwood and Desert Side-notched Series projectile points, which began to appear in this area around AD 1100. Though no temporally diagnostic artifacts were present that date to earlier periods due to the paucity of diagnostic artifacts it cannot be ruled out that EBR-019 could have been occupied during earlier times, such as the Archaic period.

Further analysis of the geographic location of this site reveals that it is located above and close to the high water line of the maximal potential filling of prehistoric Lake Cahuilla. Four events of maximal filling of Lake Cahuilla occurred between A.D. 700 and AD 1540 (Cleland et al. 2000). The first of these episodes began about AD 700 and the lake was fully desiccated again by AD 940. The date of the second occurrence was sometime between AD 940 and AD 1210, and the third happened between AD 1210 and AD 1430. Therefore, it is likely that EBR-019 was occupied sometime between AD 1210 and AD 1430, a time after the advent of Desert Side-notched Series and Cottonwood Series points and during a high lake stand. It also seems likely that people from surrounding regions were drawn to EBR-019 because of the site's proximity to lacustrine and wetlands resources.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the Applicant interpret sites such as EBR-019 with rich assemblages containing ceramics in association with hearth features and artifacts, such as groundstone and lithic tools, as representing subsistence procurement and processing activities.

Based on temporally diagnostic materials found on the surface of EBR-019, there is no indication that it was occupied other than during the Late Prehistoric period; however, EBR-019 has considerable evidence of intensive and/or repeated habitation. A total of 52 hearths and scatters of fire-affected rock were identified. Of those, 30.8% have associated ceramic sherds (n=16) and 28.8% have associated lithic materials (n=15). In addition, various faunal remains were found including fish and land mammal.

Furthermore, the presence of human cremations/calcined bone suggests a long period of inhabitation and use of the area. One locus contained a total of 3 confirmed individual human cremations, and 13 additional loci were identified to contain potential, unconfirmed human cremations, all of which appear to have the potential for subsurface deposition. This evidence supports the hypothesis that EBR-019 was intensively inhabited episodically and/or for long periods of time, during which time, various subsistence and material resources associated with Lake Cahuilla and the surrounding area, were exploited. More significantly, the duration of occupation and/or use of this area allowed for ritual/religious practices of the deceased to be employed.

Several loci were interpreted to be expedient tool technology localities (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature with debitage, cores, angular waste/shatter and hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this prehistoric site are of the same primary stone materials (metavolcanic, basalt, petrified wood, quartzite, quartz, cryptocrystalline silicate and wonderstone) that are constituents of the surrounding area, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent numerous stone tool reduction and manufacturing localities.

The presence of flaked stone tools within EBR-019 represent additional evidence of resource procurement and/or processing of faunal or floral resources. Other evidence can be seen in utilized flakes found within EBR-019, which show evidence of edge wear consistent with their use as an expedient cutting and/or scraping tool. The creation of flaked stone tools requires additional lithic technologies, including bifacial thinning and pressure flaking, to shape and refine cutting edges. Additionally, some of the flaked stone tools are associated both with human cremations/calcined bone and faunal bone, which may be evidence that some of the flaked stone assemblage represent grave goods and may have been considered prestige items. However, other evidence of rarity among the flaked stone tool assemblage, such as tools created from uniquely extralocal materials, was not found on the surface at EBR-019.

A large assemblage of ceramic sherds were identified at EBR-019. At least some of these sherds have potentially diagnostic surface treatments, incising, temper and/or are rim pieces. Data from such artifacts can yield information about ceramic production techniques in use at the time or can help determine the ethnic origin of the vessels they came from. Currently, the primary ethnic groups known to have occupied the region surrounding EBR-019 include the Diegueño and Kamia. Other groups known to have used/traveled/inhabited the area include the Tipai, Cocopa, Kumeyaay, Ipai, Quechan, Paipai and Cahuilla (Luomala 1978; Schaefer and Laylander 2007; URS 2009). In approximately AD 1200, the course of the Colorado River changed, refilling Lake Cahuilla and providing a stable water source that drew people from surrounding regions to repopulate the Colorado Desert. Ceramic wares which were introduced centuries before in other areas were brought into this region at that time (URS 2009). However, it has been argued that stable populations around the lake developed their own distinctive pottery formulas that became regional expressions of their families and locales (May ND). Although these groups each had specific approaches to the creation of ceramics, ceramic vessels were also traded along with subsistence resources and other items infusing some uncertainty into the use of data from ceramics to associate one particular area with a particular tribal group or family (May ND). Therefore, it is unlikely that surface data could directly relate EBR-019 or the area surrounding it to a particular tribe.

Data gathered on ceramics in the area surrounding EBR-019 show evidence of a variety of ceramic types and techniques. Though paddle-and-anvil construction techniques were common among groups using this area, the tempers employed, vessel types manufactured and decoration did vary between groups. The Diegueño used ground clay and did not add temper when manufacturing ceramics. They created a variety of vessels including ollas, bowls, cooking pots and pipes (Rogers 1973:18, URS 2009). The Kamia sometimes added rose quartz as temper and produced the greatest variety of ceramics among the Yuman bands including ollas, jars, canteens, bowls, rattles, plates, scoops, cups and parchers. Kamia ceramics were painted after firing with red and/or black designs (Gifford 1931, Rogers 1973, URS 2009, Van Camp 1979:57). The Cocopah used ground and winnowed clay tempered with ground sherds to create a variety of vessels used for storage and cooking (Alvarez de Williams 1983:99, URS 2009). Quechan vessel types include bowls, parchers, cooking pots, small figurines and large storage vessels that were used to float goods across rivers (Bee 1983:10, McGuire 1982, URS 2009).

The analysis necessary to collect all possible data from ceramics generally takes place in the laboratory, and therefore, is beyond the scope of surface survey. However, it can be generally said that the presence of amount and diversity of ceramic artifacts at EBR-019 is further evidence that subsistence resources were processed and would be consistent with intensive and/or episodic occupation possibly taking place over a long period of time. Additionally, all of the cremations identified at EBR-019 have associated ceramic sherds, which may be indicative of the offering of ceramic vessels as grave goods and/or their use to hold grave goods or for some other purpose connected with the cremation ritual.

Furthermore, archaeologists for the Applicant interpret that ground stone tools present at EBR-019 are further evidence of resource processing. Ground stone tools were made by grinding, abrading, pecking, pounding and polishing rather than chipping and flaking. Groundstone tools found in the area surrounding EBR-019 include manos, metates (sometimes referred to as milling stones) and pestles. Metates in this area are typically flat slabs; manos were smaller, soap and loaf-shaped stones were moved in a circular motion against the metate in order to grind small seeds and other food resources;

pestles were elongated, club-shaped stones used for pounding and grinding in mortar. Manos, metates, and pestles were primarily constructed from coarse-grained stone such as sandstone or granite. Mortars in desert environments absent of large coarse bedrock outcrops were often made from cottonwood trees. Manos, metates, and pestles are associated with subsistence procurement and/or processing (Chartkoff and Chartkoff 1984). Such groundstone tools are associated to human and faunal bone in Locus 65, and therefore could feasibly be grave goods.

A large number of the features at EBR-019 were identified as hearths. The presence of a hearth feature or fire-affected rock is evidence of resource processing and/or other activities. Hearth features found in association with lithic debitage could be evidence of more complex lithic resource processing activities. Lithic materials intended for flaked tool production were sometimes heat treated using open hearths in order to improve the flaking characteristics of the stone. Additionally, open hearths were used in prehistory for various other purposes such as parching seeds and grains, cooking, and to provide personal warmth. Such features may also represent sacred/ritualistic activities associated with cremating the deceased and/or animals.

Extralocal materials observed within EBR-019 include Olivella shell beads, marine shell beads/pendants, shell fragments and wonderstone. Although additional testing/data is needed to determine their significance; artifacts such as these reflect direct procurement by the desert inhabitants through nomadic movements to the western and southern coastal areas or indirect procurement through exchange with other groups inhabiting the Colorado/Yuha Desert; thus indicating links with areas within and beyond the region (Schaefer and Laylander 2007).

Based on the presence of temporally diagnostic artifacts, EBR-019 can be associated with a period of time late in prehistory, when people of the Yuha desert were drawn to resources available due to episodic filling of ancient Lake Cahuilla. Data that might be gathered through further study of archaeological deposits present at EBR-019 could greatly expand our knowledge of this unique phenomenon and how desert peoples adapted to such a rapidly changing environment.

Much of EBR-019 lies on relatively stable ground surfaces and it is virtually certain that it contains buried and potentially intact archaeological resources. Loci 27, for example is adjacent to a road where subsurface deposits are visible in the road cut. Likewise, potential roasting pits were identified at Locus 20. All areas with cremations identified at EBR-019 almost certainly have subsurface cultural deposits. Therefore, it can be assumed that EBR-019 has significant additional data potential.

Additionally, EBR-019 has characteristics that qualify it as a contributing resource of the proposed Lake Cahuilla High Water Line Archaeological District.

As a result, this site, as a stand-alone or individual resource and as a contributor to a proposed district, is recommended eligible for the National Register, and is a historic property pursuant to the National Register, and a historical resource per the California Register under the criteria for eligibility. In addition, EBR-019 is considered a contributor to the proposed Lake Cahuilla High Water Line Archaeological District.

EBR-070

EBR-070 is an oblong-shaped prehistoric lithic reduction site that covers a total surface of 257 square meters. The site is located within the southern portion of the 450 MW area of the Proposed Solar Two Project. The surface area of the site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact moderately developed desert pavement, with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote, burroweed and bunch grass.

This site measures 63 meters from east to west by 6 meters north to south, and contains a total of 79 prehistoric artifacts. It consists of 2 concentrations of lithic artifacts interpreted to be single reduction loci. The prevailing cultural constituents within this site consist of prehistoric lithic reduction debitage. Artifact density at EBR-070 is low, with a calculated distribution of 1 artifact per 3.2 square meters. The overall condition of the site is good with no visible alterations.

This site contains 2 loci and a total of 79 artifacts (76 associated with loci), which include: 72 green metavolcanic flakes (7 primary, 13 secondary, 51 tertiary and 1 shatter), 2 granitic hammerstones, 1 quartzite hammerstone, 1 unifacial metavolcanic core, 1 multi-directional metavolcanic core, 1 bifacial metavolcanic core tool and 1 unifacial metavolcanic core tool.

Locus 1 is located at the center of the site and measures 1.5 meters north to south by 2 meters east to west. Artifacts observed within Locus 1 include: 64 green metavolcanic flakes (5 primary, 8 secondary, 50 tertiary and 1 shatter), 1 unifacial green metavolcanic core, 1 multi-directional metavolcanic core, 1 bifacial metavolcanic core tool, 1 uni-directional metavolcanic core tool and 1 quartzite hammerstone.

Locus 2 located 3.7 meters west of Locus 1 and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 2 include: 6 metavolcanic flakes (2 primary, 3 secondary and 1 tertiary,) and 1 granite hammerstone.

Those artifacts observed within 30 meters and outside of the loci consist of 1 granitic hammerstone and 2 heavily patinated metavolcanic secondary flakes. The further character of artifacts found within EBR-70 is unreported.

The more particular physical context for EBR-070, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for Early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007); therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists primarily of secondary and tertiary flakes, uni-directional, bi-directional, and multi-directional cores, angular waste/shatter and 3 hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same 3 primary stone (metavolcanic, quartzite, granitic) materials that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 2 single reduction localities or episodes. It should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. EBR-070 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits; therefore, data potential is considered exhausted through recordation of EBR-070.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, EBR-070 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

EBR-072

EBR-072 is a circular shaped prehistoric site lithic scatter that covers a total surface area of 7 square meters. The site is located within the south, central portion of the 450 MW area of the Proposed Solar Two Project. The site is situated atop a very old fan surface that is covered by intact desert pavement within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The desert pavement is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposing metavolcanic and granitic gravels and cobbles. Vegetation species observed on the site include: creosote, burrowbush, bunch grass and desert trumpet.

This lithic scatter site measures 2 meters north to south by 3 meters east to west, and contains a total of 5 prehistoric artifacts. The prevailing cultural constituents within this site consist of lithic reduction debitage. Artifact density at EBR-072 is low, with a calculated distribution of 1 artifact per 1.32 square meters. The overall condition of the site is good with minor alterations by a 2 track off-highway vehicle (OHV) road running in an east-west direction located approximately 7 meters to the north of the site.

This prehistoric lithic scatter consists of 5 caramel-colored cryptocrystalline silicate chert flakes (1 primary flake and 4 secondary flakes). Four flakes are located along the western boundary and 1 flake is located in the south east corner of the site. The further character of artifacts within EBR-072 is unreported.

The more particular physical context for EBR-072, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for Early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, with debitage consisting of primary and secondary flakes. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone material (cryptocrystalline silicate) that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent a single reduction locality or episode. It should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. EBR-072 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area there is very low likelihood for subsurface archaeological deposits; therefore, data potential is considered exhausted through recordation of EBR-072.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria. In addition, EBR-072 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

EBR-079

EBR-079 is an amorphous-shaped prehistoric lithic scatter and rock feature site that covers a total surface area of 318 square meters. The site is located within the south central portion of the 450 MW area of the Proposed Solar Two Project. The site is situated atop a very old elevated fan surface covered by intact desert pavement within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The desert pavement is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands composed of decomposing metavolcanic and granitic gravels and cobbles. Vegetation species on the site include: creosote, burroweed, desert trumpet and bunch grass.

This lithic scatter and rock cluster site measures 77 meters north to south by 33 meters east to west and contains a total of 88 prehistoric artifacts. The prevailing cultural constituents within this site consist of prehistoric lithic reduction artifacts. Artifact density at EBR-079 is low, with a calculated distribution of 1 artifact per 3.61 square meters. The overall condition of the site is good, with some alterations caused by off-highway vehicles in the northern portion of the site location.

This site contains 3 concentrations interpreted by the archaeologist to be 2 lithic reduction loci and 1 quartz smash loci with 3 additional artifacts observed outside these loci. A total of 88 artifacts were recorded within the site boundary, which include: 1 quartzite hammerstone, 1 brown multi-directional core, 1 green metavolcanic multi-directional core, 1 green metavolcanic bi-facial core tool, 21 green metavolcanic flakes (7 primary, 7 secondary, 7 tertiary), 30 dark brown chert flakes (5 primary 14 secondary, 10 tertiary, 1 shatter), approximately 30 pieces of quartz angular waste/shatter, 2 carmel chert secondary flakes and 1 metavolcanic hammerstone.

Feature 1 is located near the northern portion of the site boundary. Feature 1 measures 1 meter north to south by 1 meter east to west by 16 centimeters in height. The feature is constructed of 36 small to large sub-round to sub-angular granite metavolcanic and quartzite cobbles and is 1 course high. The rock cluster feature appears to be loosely stacked, lacks extensive sediment accumulation and appears to be partially imbedded/deflated. No artifacts were found associated with Feature 1.

Locus 1 is located in the central portion of the site and measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 1 include: 21 green metavolcanic flakes (7 primary, 7 secondary, 7 tertiary) with 1 green metavolcanic bifacial core tool chopper, and 1 green metavolcanic multi-directional core.

Locus 2 is 25 meters southeast of Locus 1 and measures 1 meter north to south by 3 meters east to west. Artifacts observed within Locus 2 include: 30 dark brown chert flakes (5 primary, 14 secondary, 10 tertiary, 1 piece of angular waste/shatter) and 1 multi-directional core.

Locus 3 is 44 meters northwest of Locus 2 and measures 6 meters north to south by 5 meters east to west. Artifacts observed within Locus 3 include approximately 30 pieces of quartz shatter and 1 quartzite hammerstone.

The further character of artifacts associated with Loci 1 through 3 is unreported.

One green metavolcanic hammerstone and 2 carmel-colored chert secondary flakes were observed within 30 meters of the identified loci.

The more particular physical context for EBR-079, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for Early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007) with a rock cluster feature of unknown age and/or function. The predominant cultural constituents of this site are lithic reduction in nature, debitage consists primarily secondary and tertiary flakes, cores, angular waste/ shatter, and hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic reduction debitage are of 3 primary stone materials (metavolcanic, quartz, and chert) that are constituents of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 3 single reduction localities/episodes. It should not be discounted that artifacts within this site may have been collected and/or used at a later point in time. Feature 1 is interpreted as a deflated prehistoric cairn or possible modern feature. Due to the frequent off-highway vehicle (OHV) traffic in this area, such rock clusters are often used to demarcate OHV trails, and as a result, the age and function of this feature cannot be determined.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been

accounted for during the recordation process. EBR-079 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform (URS 2009). This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area there is very low likelihood for subsurface archaeological deposits; therefore, data potential is considered exhausted through recordation of EBR-079.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, EBR-079 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

EBR-080

EBR-080 is an oblong-shaped lithic scatter that covers a total surface of 11.6 square meters. The site is located within the southern portion of the 450 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles. Vegetation is sparse, consisting of ocotillo, burroweed, bunch grass and desert trumpet, primarily located in adjacent gullies to the east and south.

This lithic scatter site measures 4 meters north to south by 4 meters east to west, and contains a total of 3 prehistoric artifacts. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at EBR-080 is low, with a calculated distribution of 1 artifact per 3.9 square meters. The overall condition of the site is good.

This site consists of 3 artifacts which include 1 fine grain green metavolcanic multi-directional core located in the northeast corner of the site boundary and 2 green metavolcanic flakes (1 primary and 1 secondary) located in the southeastern portion of the site (see attached artifact record for details). The further character of artifacts found within EBR-080 is unreported.

The more particular physical context for EBR-080, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007); therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

This site represents an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, and debitage consists of primary and secondary flakes and a single multi-directional core. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone (metavolcanic) material that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent a single reduction locality or episode, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. EBR-080 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area there is very low likelihood for subsurface archaeological deposits, therefore data potential is considered exhausted through recordation of EBR-080.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, EBR-080 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

EBR-092

EBR-092 is an oblong-shaped historic site that covers a total surface of 567 square meters. The site is located within southern portion of the 450 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote, burrowbush/burroweed, bunch grass, and desert trumpet. Vegetation is sparse and primarily located within the surrounding gullies to the south and east.

This historic refuse scatter and historic/modern rock cluster site measures 68 meters northwest to southeast by 17 meters northeast to southwest and contains a total of 34 historic artifacts. The prevailing cultural constituents within this site consist of 2 concentrations with 28 artifacts that are interpreted to be glass bottle fragment scatter loci, plus 6 additional historic artifacts observed outside the loci. Also present within the site are 2 rock cluster features. Artifact density at EBR-092 is low, with a calculated distribution of 1 artifact per 16.7 square meters. The overall condition of the site is good with minor disturbances by the historic road (HR-02) and 2 off-road vehicle 2-track trails that run through the site in east to west and north to south directions.

The site contains 2 historic/modern rock cluster features, 2 broken glass loci and 34 artifacts, which include: 11 aqua hand blown bottle fragments, 17 hand blown amethyst bottle fragments, 2 hole-and-cap cans, 1 lap seam can, 1 can bottom lid, 1 bolt, and 1 square cut nail/spike.

Feature 1 is located at the southern boundary of the site and consists of a historic/modern rock cluster that measures 28 inches north to south by 28 inches east to west. It contains 29 sub-rounded metavolcanic, granite and quartzite cobbles stacked in 2 courses to a height of 8 inches.

Feature 2 is located 64 meters northwest of Feature 1 and consists of a historic/modern rock cluster that measures 32 inches north to south by 26 inches east to west. It contains 23 sub-rounded basalt, granite and metavolcanic cobbles stacked in 2 courses to a height of 7 inches.

Locus 1 is located at the south central portion of the site and measures 1 meter east to west by 1 meter north to south. Artifacts observed within Locus 1 include 11 fragments of a hand blown aqua prescription bottle which consist of a bottle neck, square base and "BLE" and "LLER" marked on both sides of bottle.

Locus 2 is located 13 meters north of Locus 1 and measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 2 include 17 fragments of manganese decolorized (amethyst) glass.

Those artifacts observed within 30 meters and outside of the loci and features consist of 2 hole-and-cap cans, 1 lap seam can, 1 can bottom lid, 1 bolt and 1 square cut nail/spike. The further character of artifacts found within EBR-092 is unreported.

The more particular physical context for EBR-092, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret that although the rock cluster present at EBR-092 has characteristics similar to survey markers in the area, it cannot be conclusively identified as such. The size of the cluster and of the stones that comprise it conforms approximately to those surrounding General Land Office survey benchmarks found in the surrounding region, however the feature is not located on a current section or quarter section corner point.

Additionally, expediently constructed stone clusters can also be markers of mining claims or homestead boundaries. Mining claim markers sometimes contain tobacco tins to hold copies of official records substantiating the claim. Such a tin was not evident at this stone cluster.

No temporally diagnostic historic artifacts were found associated with the rock clusters and it seems unlikely that the feature contains cultural materials, given the structure of the rock cluster (size-sorted stones that have become tightly packed and evidence of sand accumulation/deposition amongst stones). Therefore, it is noteworthy that this stone cluster cannot be definitively determined to be either historic or prehistoric in age. The site is situated within a large recreational area which is frequently used by off-highway vehicles. It is possible that the stone cluster is modern in age and perhaps was expediently placed to provide a visible landmark to facilitate navigation.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret that deposits of historic artifacts such as the ones found at EBR-092 typically represent episodes of refuse disposal after initial discard in another location (dumping) or discard and/or loss of individual articles in situ. In the case of EBR-092, the small number of artifacts and artifact types present would more likely have resulted from in-situ disposal rather than dumping of a wide range of artifact types that would be expected in an assemblage of common household refuse. Though dates of manufacture can be determined for some of the artifacts present at EBR-092, the time between the initial use/consumption of the artifacts and their ultimate disposal cannot be known so the specific date of their disposal cannot be reliably determined.

Artifacts for which general dates of manufacture could be determined include: a patent medicine bottle with embossed lettering on the side panels that dates to sometime between 1867 and 1906 (when the passage of the Pure Food and Drug Act stopped their production) manganese decolorized glass (also known as sun colored amethyst glass, which was produced between 1880 and 1920 when manganese was added to glass to turn it from its natural aqua color to clear, but eventually reacts with sunlight to turn the glass a light shade of purple); and 2 hole-in-cap cans which were generally manufactured between 1840 and 1920 but persisted being manufactured in small numbers into the 1950s (Goodman 2002). Also present is a single square cut nail. The particular example at this site is larger than most nails (5.75 inches in length) such that it might accurately be described as a small spike. Square cut nails were common until the 1880s when round nails began being machine produced from wire stock (Goodman 2002). The unusual size of this nail may have required that it be hand-forged at a later time when smaller wire nails were available, so this example alone cannot be considered to be temporally diagnostic.

Based on the date ranges associated with the artifacts listed, the deposition episode at EBR-092 would have likely been the late 19th or early 20th century but may have been as late as the 1950s.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, EBR-092 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

EBR-095

EBR-095 is an oblong-shaped lithic scatter that covers a total surface area of 488.52 square meters. The site is located within the north central portion of the 450 MW area of the Proposed Solar 2 Project, on the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation (URS 2009). The surface area of the site consists of flat, open intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles overlaying coarse sands and fine gravels. Vegetation species on the site include creosote, cholla, bunch grass and ocotillo. Prehistoric trail T-003 runs east to west through northern half of site.

This lithic scatter measures 47 meters north to south by 16 meters east to west and contains a total of 51 prehistoric artifacts. It consists of concentrations interpreted to be 3 single reduction loci with 50 artifacts and 1 additional artifact located between the loci. The prevailing cultural constituents within this site consist of prehistoric lithic reduction debitage. Artifact density at EBR-095 is low, with a calculated distribution of 1 artifact per 9.77 square meters. The overall condition of the site is fair to good, with some alterations caused by off-road vehicle activity as is evidenced by the presence of 2 parallel off-road vehicle tracks that cut through the northern portion of the site. Also, recent alluvial sheetwash has impacted northern portions where it nearly overlies some artifacts within Locus 3.

The artifact types and materials present at this site include: 17 metavolcanic flakes (7 primary, 8 secondary and 2 tertiary), 4 metavolcanic shatter, 17 quartz flakes (6 primary, 3 secondary and 8 tertiary), 6 quartz shatter, 2 metavolcanic cores (1 uni-directional and 1 bi-directional), 1 quartz bi-directional core, 1 metavolcanic edge-modified flake and 3 metavolcanic tested cobbles.

Locus 1 is located within the southwestern portion of the site and measures 3 meters north to south by 2 meters east to west. Artifacts observed within Locus 1 include: 13 green metavolcanic flakes (4 primary, 7 secondary, and 2 tertiary), 4 green metavolcanic shatter, 1 green metavolcanic bi-directional core, 1 green metavolcanic edge-modified flake and 2 green metavolcanic tested cobbles.

Locus 2 is located 13 meters southeast of Locus 1 and measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 2 include: 17 quartz flakes (6 primary, 3 secondary, and 8 tertiary), 6 quartz shatter and 1 quartz bi-directional core.

Locus 3 is located 44 meters north of Locus 2 and measures 30 centimeters north to south by 30 centimeters east to west. Artifacts observed within Locus 3 include: 4 green metavolcanic flakes (3 primary and 1 secondary) and 1 green metavolcanic uni-directional core.

Those artifacts observed within 30 meters and outside of the loci consist of 1 green metavolcanic tested cobble. The further character of artifacts associated with EBR-095 is unreported.

The more particular physical context for EBR-095, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. Large fan aprons dominate the central portion of the Project area and enter the basin floor up to 3 kilometers from the Lake Cahuilla high shoreline, and extend up to, and in some places, past that line. The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan “aprons” which do not individually fully cover the entire area, and which interfinger and partially bury one another and piedmont remnants. The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units, suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeology on that surface. Nonetheless, this area does demonstrate the potential for (shallowly) buried preserved surfaces, but there is a high likelihood these deposits will represent the same constituents recorded on the surface. As a result, there is a very low to moderate likelihood for subsurface deposition. The particular land surface on which this site is situated, however, appears to be a smaller piedmont remnant that is relatively stable; therefore, the likelihood of the presence of subsurface archaeological deposits may be reduced. The landform that the site is situated on appears bound to the west and north by younger inset fan aprons. The fan piedmont remnant landform appears to continue beyond the southern and eastern portions of the site. Ephemeral gullies, somewhat braided but not very incised, immediately binds the site to west and east.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature. Debitage consists predominantly of that which would result from early stage reduction and uni-directional or bi-directional cores. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone (metavolcanic and quartz) material that is a constituent of the site's and surrounding area's lithology, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 3 single reduction localities or episodes; but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time. The presence of flaked stone tools edge-modified flake within EBR-095 represents resource procurement and/or processing of faunal or floral resources. In addition, the creation of flaked stone tools requires additional lithic technologies, possibly including bifacial thinning and pressure flaking to shape and refine cutting edges. The metavolcanic edge-modified flake appears to be a scraping implement similar to a spokeshave, and as such little energy was expended to modify it in order to increase its effectiveness.

It is possible that cultural constituents of the site may be associated with the prehistoric trail T-03 that runs through the northern portion of the site. EBR-095 is centrally located in a group of 3 sites and 3 isolates that seem roughly aligned with the direction of the trail. It seems possible that trail T-03 may have been used prehistorically as a travel route to or through resource procurement areas.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. The particular location of this site on a remnant portion of the fan piedmont indicates that it is relatively stable and therefore reduces the likelihood of subsurface deposits. Thus, due to the low density of artifacts and low probability for significant subsurface artifacts, the data potential is considered exhausted through recordation of EBR-095.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, EBR-095 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

EBR-096

EBR-096 is a circular-shaped prehistoric lithic scatter that covers a total surface area of 13 square meters. The site is located within the northern central portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation (URS 2009). The surface area of the site is comprised of an open, partially stabilized desert pavement that is weakly developed with well-sorted sub-angular to sub-rounded granitic, metavolcanic, gabbro, gneiss, quartz, and quartzite small gravels. Larger sub-angular to sub-rounded gravels and cobbles do occur but are sparsely distributed across the sub-landform. Soils contain alluvial-borne silts and sands underlain by hard pan. Vegetation species on the site include creosote, bunch grasses, ocotillo, burrowbush, and saltbush.

This lithic scatter site measures 4 meters north to south by 4 meters east to west, and contains a total of 35 prehistoric artifacts. It consists of 1 concentration interpreted to be a single lithic reduction locus, with 35 artifacts. The prevailing cultural constituents within this site consist of prehistoric lithics. Artifact density at EBR-096 is high, with a calculated distribution of 1 artifact per 0.37 square meters. The overall condition of the site is fair to good due to the displacement of artifacts by natural erosion.

This site is a single lithic reduction locus with a total of 35 green metavolcanic flakes (15 primary, 11 secondary, and 9 tertiary). The further character of artifacts found within EBR-096 is unreported.

The more particular physical context for EBR-096, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be on a younger (Late Holocene) alluvial fan within the fan apron/skirt geomorphic landform, which has a Late Pleistocene/Early Holocene period of formation. Large fan aprons dominate the central portion of the Project area and enter the basin floor up to 3 kilometers from the Lake Cahuilla high shoreline, and extend up to, and in some places, past that line. The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan “aprons” which do not individually fully cover the entire area, and which interfinger and partially bury one another and piedmont remnants. The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeology on that surface. As a result, there is a very low to moderate likelihood for subsurface deposition, and it is likely that these deposits, if any, will represent the same constituents recorded on the surface. The desert pavement at the site seems partially stabilized but is weakly developed as it is periodically subject to natural erosion via alluvial and aeolian-borne agents. The fan apron sublandform is frequently dissected by very shallow, ephemeral to intermittent gullies.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage dominated by early stage reduction. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary material (metavolcanic) that is a typical constituent of the surrounding area, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 1 single reduction locality or episode; but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. EBR-096 is located within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The lack of soil development within the capped alluvial unit suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time, thus reducing the potential for extensive buried archaeological deposits. As a result there is a very low to moderate likelihood for subsurface deposition. The location of the site on a younger fan combined with the presence of recent alluvium on the surface increases that likelihood. Though this area does demonstrate some potential for (shallowly) buried preserved surfaces, there is a high likelihood these deposits will represent the same constituents recorded on the surface. Therefore, due to the lack of unique or temporally diagnostic artifacts and low probability for significant subsurface artifacts, the data potential is considered exhausted through recordation of EBR-096. Additionally, there is evidence that recent erosion at the site has displaced artifacts to some degree; therefore, the integrity of surface distributions may be compromised.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, EBR-096 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

EBR-100

EBR-100 is an oblong-shaped prehistoric lithic scatter that covers a total surface of 28 square meters. The site is located within the north central portion of the 450 MW area of the Proposed Solar Two Project. The site is situated on a younger fan (Late Holocene formation) within the fan apron/skirt geomorphic landform, which was formed in the Late Pleistocene/Early Holocene (URS 2009). The surface area of the site consists of recent alluvium and disturbed desert pavement that is moderately to poorly developed with small sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Vegetation on the site include creosote, ocotillo and burroweed.

This lithic scatter measures 9.6 meters northeast to southwest by 3.2 meters northwest to southeast, and contains a total of 31 prehistoric artifacts. It consists of 2 concentrations interpreted to be 2 single reduction loci with 26 artifacts, and 5 additional artifacts observed outside the loci. The prevailing cultural constituents within this site consist of prehistoric lithic reduction debitage. Artifact density at EBR-100 is low, with a calculated distribution of 1 artifact per 1.16 square meters. The overall condition of the site is fair due to off-highway vehicles tracks that cross over the loci.

The site contains 2 lithic reduction loci and a total of 31 artifacts, which include: 29 metavolcanic flakes (5 primary, 17 secondary, 1 tertiary and 6 shatter), 1 metavolcanic hammerstone and 1 metavolcanic bi-directional core.

Locus 1 is located 2 meters south of the site datum and measures 2 meters east to west by 2 meters north to south. Artifacts observed within Locus 1 include 15 metavolcanic flakes (2 primary, 11 secondary and 2 shatter) and 1 metavolcanic hammerstone.

Locus 2 is located 7 meters northeast from Locus 1 and measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 2 include 9 metavolcanic flakes (1 primary, 4 secondary, 1 tertiary and 3 shatter) and 1 metavolcanic bi-directional core.

Those artifacts observed within 30 meters and outside of the loci consist of 5 metavolcanic flakes (2 primary, 2 secondary and 1 shatter). The further character of artifacts associated with EBR-100 is unreported.

The more particular physical context for EBR-100, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. Large fan aprons dominate the central portion of the Project area and enter the basin floor up to 3 kilometers from the Lake Cahuilla high shoreline, and extend up to, and in some places, past that line. The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan “aprons” which do not individually fully cover the entire area, and which interfinger and partially bury one another and piedmont remnants. The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units, suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeology on that surface. Nonetheless, this area does demonstrate the potential for (shallowly) buried preserved surfaces, but there is a high likelihood these deposits will represent the same constituents recorded on the surface. As a result, there is a very low to moderate likelihood for subsurface deposition. The desert pavement consists of small to large, sub-rounded to sub-angular metavolcanic, basalt, quartz, quartzite and granite gravels and cobbles overlaying coarse sands and fine gravels.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature; debitage consists of primary, secondary and tertiary flakes, 1 bi-directional core, angular waste/shatter, with 1 hammerstone. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone (metavolcanic) material that is a constituent of the surrounding area, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 2 single reduction localities or episodes; but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, EBR-100 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

EBR-102

EBR-102 is an amorphous-shaped prehistoric lithic scatter that covers a total surface of 2,198 square meters. The site is located within the central portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation (URS 2009). The surface area of the site consists of an older fan surface mantled by younger fan apron with disturbed desert pavement that is poorly developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Vegetation species on the site include creosote, ocotillo, burroweed, bunch grass and mesquite. The site is bound by ephemeral gullies to the north, west and east.

This lithic scatter site measures 88 meters northeast to southwest by 70 meters northwest to southeast, and contains a total of 97 prehistoric artifacts. It consists of 3 concentrations interpreted to be 1 lithic scatter locus and 2 single reduction loci, with 90 artifacts, and 6 additional artifacts observed outside the loci. The prevailing cultural constituents within this site consist of prehistoric lithic reduction artifacts. Artifact density at EBR-102 is low, with a calculated distribution of 1 artifact per 23 square meters. The overall condition of the site is fair due to alterations caused by off-highway vehicle activity and natural erosion.

The artifact types and materials represented at the site include 76 metavolcanic flakes (15 primary, 25 secondary, 17 tertiary and 19 shatter), 3 metavolcanic tested cobbles, 4 metavolcanic cores (2 uni-directional, 1 bi-directional and 1 multi-directional), 8 basalt flakes (1 primary, 4 secondary, 1 tertiary and 2 shatter), 1 basalt edge-modified flake, 2 basalt uni-directional cores, 1 chalcedony multi-directional core and 1 cryptocrystalline silicate chert tertiary flake.

Additionally, prehistoric trail T-03 lies approximately 12 meters to the south of the site. This site is the easternmost of a group of 3 isolated artifacts and 2 other sites that may be associated with trail T-03.

Locus 1 is located in the southwest center of the site and measures 14 meters north to south by 5 meters east to west. Artifacts observed within Locus 1 include: 15 metavolcanic flakes (3 primary, 5 secondary, 4 tertiary and 3 shatter), 2 metavolcanic cores (1 uni-directional and 1 bi-directional) and 1 metavolcanic tested cobble.

Locus 2 is located 43 meters east of Locus 1 and measures 8 meters north to south by 6 meters east to west. Artifacts observed within Locus 2 include 34 metavolcanic flakes (6 primary, 12 secondary, 13 tertiary and 3 shatter) and 1 metavolcanic multi-directional core.

Locus 3 is located 61 meters southwest of Locus 2 and measures 9 meters north to south by 1 meter east to west. Artifacts observed within Locus 3 include 27 metavolcanic flakes (6 primary, 8 secondary and 13 shatter), 1 metavolcanic tested cobble, 1 metavolcanic uni-directional core, 7 basalt flakes (1 primary, 3 secondary, 1 tertiary and 2 shatter) and 1 uni-directional core.

Those artifacts observed within 30 meters and outside of the loci consist of 6 artifacts that include 1 metavolcanic tested cobble, 1 uni-directional basalt core, 1 chalcedony multi-directional core, 1 basalt edge-modified flake, 1 basalt secondary flake and 1 cryptocrystalline silicate chert tertiary flake. The further character of artifacts found with EBR-102 is unreported.

The more particular physical context for EBR-102, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. Large fan aprons dominate the central portion of the project area and enter the basin floor up to 3 kilometers from the Lake Cahuilla high shoreline, and extend up to, and in some places, past that line. The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan “aprons” which do not individually fully cover the entire area, and which interfinger and partially bury one another and piedmont remnants. The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeology on that surface. The particular location of this site on a younger fan may increase the potential for subsurface deposits. None the less, though this area does demonstrate the potential for (shallowly) buried preserved surfaces, there is a high likelihood these deposits will represent the same constituents recorded on the surface. As a result there is a very low to moderate likelihood for significant subsurface deposition. The desert pavement consists of small to large, sub-rounded to sub-angular metavolcanic, basalt, quartz, quartzite and granite gravels and cobbles overlaying coarse sands and fine gravels.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists primarily of secondary flakes and uni-directional cores. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone material (metavolcanic) that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 3 single reduction localities or episodes, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time. The presence of flaked stone tool (a single edge-modified flake) within EBR-102 represents resource procurement and/or processing of faunal or floral resources. The creation of flaked stone tools requires additional lithic technologies, possible including bifacial thinning and pressure flaking to shape and refine cutting edges. However, the example present here shows little modification to increase its efficiency, and therefore may still be considered an expedient tool.

Additionally, this site may be associated with trail T-03 that lies approximately 12 meters off its southern boundary. That trail is approximately 438 meters long and runs through a group of 3 sites and 3 isolates. Those sites and isolates appear to be roughly aligned in the same direction as the trail, leading to the speculation that the trail may have been used for travel to and from or through areas where resources were collected.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been

accounted for during the recordation process. EBR-102 is located within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The lack of soil development within the capped alluvial unit suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time, thus reducing the potential for extensive buried archaeological deposits. As a result there is a very low to moderate likelihood for subsurface deposition. None the less, though this area does demonstrate some potential for (shallowly) buried preserved surfaces, there is a high likelihood these deposits will represent the same constituents recorded on the surface. Therefore, due to the low density of artifacts and low probability for significant subsurface artifacts, the data potential is considered exhausted through recordation of EBR-102.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, EBR-102 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

EBR-106

EBR-106 is an oblong prehistoric lithic scatter that covers a total surface area of 6.78 square meters. The site is located within the center portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan apron/skirt geomorphic landform, which indicates a

Late Pleistocene/Early Holocene period of formation (URS 2009). The surface area of the site consists of an open, elevated, older fan surface covered by intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Vegetation species on the site include creosote and bunchgrass.

This lithic scatter site measures 2 meters north to south by 2 meters east to west, and contains a total of 8 prehistoric artifacts. Artifact density at EBR-106 is medium, with a calculated distribution of 1 artifact per 0.85 square meters. The overall condition of the site is fair with natural erosional processes taking place.

Artifacts observed within the site include 8 black metavolcanic secondary flakes with a highly weathered sheen. The further character of artifacts within the site is unreported.

The more particular physical context for EBR-106, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. Large fan aprons dominate the central portion of the Project area and enter the basin floor up to 3 kilometers from the Lake Cahuilla high shoreline, and extend up to, and in some places, past that line (URS 2009). The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan "aprons" which do not individually fully cover the entire area, and which interfinger and partially bury one another and piedmont remnants. The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units, suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeology on that surface (URS 2009). Nonetheless, this area does demonstrate the potential for (shallowly) buried preserved surfaces, but there is a high likelihood these deposits will represent the same constituents recorded on the surface. As a result there is a very low to moderate likelihood for subsurface deposition. The desert pavement consists of small to large, sub-rounded to sub-angular metavolcanic, basalt, quartz, quartzite and granite gravels and cobbles overlaying coarse sands and fine gravels.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, with debitage consisting solely of secondary flakes. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the lithic materials reduced in this lithic scatter are of one stone material (metavolcanic) that is a constituent of the surrounding area; and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 1 single reduction locality or episode, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. EBR-106 is located within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The lack of soil development within the capped alluvial unit suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time, thus reducing the potential for extensive buried archaeological deposits. As a result, there is a very low to moderate likelihood for subsurface deposition. Nonetheless, though this area does demonstrate some potential for (shallowly) buried preserved surfaces, there is a high likelihood these deposits will represent the same constituents recorded on the surface. Due to the low density of artifacts and low probability for significant subsurface artifacts, the data potential for this site is considered exhausted through recordation.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, EBR-106 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

EBR-222

EBR-222 is an amorphous-shaped ceramic/lithic scatter, and fire altered rock (FAR)/ hearth feature, that covers a total surface area of 1033 square meters. The site is located within the eastern portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation (URS 2009). The surface area of the site consists of disturbed moderately stabilized desert pavement with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Vegetation species on the site includes creosote, ocotillo, burroweed and bunch grass.

This ceramic/lithic scatter and FAR feature site measures 39 meters north to south by 48 meters east to west, and contains a total of 6 prehistoric artifacts. It consists of 1 FAR feature interpreted to be a deflated hearth with 6 associated artifacts within 30 meters. The artifacts are scattered along the edges of the site boundary. The areas between the feature and site boundary are void of artifacts. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at EBR-222 is low, with a calculated distribution of 1 artifact per 172.17 square meters. The overall condition of the site is fair with some disturbances due to off-highway vehicles.

Six artifacts are observed outside the feature that consist of 1 weathered petrified wood tested cobble, 4 buffware ceramic body sherds and 1 green metavolcanic primary flake. The further character of artifacts associated with EBR-222 is unreported.

Feature 1 is located on the western boundary of the site and measures 2 meters north to south by 2 meters east to west. Feature 1 is interpreted to be a deflated hearth, which includes approximately 50 fire altered granitic and metavolcanic cobbles.

The more particular physical context for EBR-222, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan "aprons" which do not individually fully cover the entire area, and which interfinger and partially bury one another and piedmont remnants. The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units, suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeology on that surface. Nonetheless, this area does demonstrate the potential for (shallowly) buried preserved surfaces, but there is a high likelihood these deposits will represent the same constituents recorded on the surface. As a result there is a very low to moderate likelihood for subsurface deposition.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret that sites such as EBR-222 with richer assemblages containing ceramics and lithics in association with hearth features, to represent subsistence procurement, processing activities, and potentially temporary encampment and/or sacred or ritual activities.

The flaked stone assemblage of this site appears to represent an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature; debitage consists of 1 metavolcanic secondary flake and 1 tested petrified wood cobble. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the lithic materials reduced in this lithic scatter are of 2 materials (metavolcanic and petrified wood) that are constituents of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent a single reduction locality or episode; but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Ceramics such as those represented by the 4 buffware body sherds present at EBR-222 offer insight into a specific time in prehistory, vessel type, ware, clay origin, and possibly the ethnic group who constructed them. Currently, the primary ethnic groups known to have occupied the region surrounding EBR-222 include the Diegueño and Kamia. Other groups known to have used/traveled/inhabited the area include the Tipai, Cocopa, Kumeyaay, Ipai, Quechan, Paipai and Cahuilla (Luomala 1978; Schaefer and Laylander 2007; URS 2009). In approximately AD 1200, the course of the Colorado River changed, refilling Lake Cahuilla and providing a stable water source, and drawing people from surrounding regions to repopulate the Colorado Desert. Ceramic wares, which were introduced centuries before in other areas, were brought into this region at that time (URS 2009). However, it has been argued that stable populations around the lake developed their own distinctive pottery formulas that became regional expressions of their families and locales (May ND). Although these groups each had specific approaches to the creation of ceramics, ceramic vessels were also traded along with subsistence resources and other items, infusing some uncertainty into the use of data from ceramics to associate one particular area with a particular tribal group or family. Therefore, it is unlikely that surface data could directly relate EBR-222 or the area surrounding it to a particular tribe.

Data gathered on ceramics in the area surrounding EBR-222 show evidence of a variety of ceramic types and techniques. Though paddle-and-anvil construction techniques were common among groups using this area, the tempers employed, vessel types manufactured, and decoration did vary between groups. The Diegueño used ground clay and did not add temper when manufacturing ceramics. They created a variety of vessels, including ollas, bowls, cooking pots, and pipes. The Kamia sometimes added rose quartz as temper and produced the greatest variety of ceramics among the Yuman bands, including ollas, jars, canteens, bowls, rattles, plates, scoops, cups, and parchers. Kamia ceramics were painted after firing with red and/or black designs. The Cocopah used ground and winnowed clay tempered with ground sherds to create a variety of vessels used for storage and cooking. Quechan vessel types include bowls, parchers, cooking pots, small figurines, and large storage vessels that were used to float goods across rivers (URS 2009).

The ceramic assemblage, although minimal in type and quantity, has the potential to provide data relative to research questions regarding use, manufacturing technologies and distribution of ceramics in the prehistoric Lake Cahuilla region.

This site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. Because this site contains artifacts with unique or temporally diagnostic characteristics, the material remains have the potential to be associated with a specific portion of prehistory. EBR-222 is located within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation (URS 2009). As a result there is a very low to moderate likelihood for subsurface deposition. Nonetheless, though this area does demonstrate some potential for (shallowly) buried preserved surfaces, there is a high likelihood these deposits will represent the same constituents recorded on the surface.

Because of the nature of potentially informative and diagnostic characteristics of artifacts found at EBR-222, the recordation of all potential data that might be derived from them requires the work of a ceramics specialist. It is recommended that the ceramics at EBR-222 be studied by such a specialist, so it can be determined if they do provide any additional data potential, and, if so, such data can be recorded.

Due to the presence of temporally diagnostic artifacts (ceramics), further data is necessary to determine if this site, as a stand-alone or individual resource, should be recommended as eligible or not eligible for the National Register, and if it is or is not a historic property pursuant to the National Register or a historical resource per the California Register under the criteria for eligibility. In addition, results of additional data are necessary to determine if EBR-222 is considered a contributor to an existing and/or proposed archaeological district or landscape

JF-005

JF-005 is an amorphous-shaped lithic scatter that covers a total surface area of 193.5 square meters. The site is located within the western portion of the 450 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of an open, elevated, very old fan surface covered by intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote, burrowbush and bunch grass.

This lithic scatter site measures 18 meters north to south by 21 meters east to west, and contains a total of 74 prehistoric artifacts. It consists of 3 concentrations interpreted to be 3 single reduction loci, with 70 artifacts plus 4 additional artifacts that were observed outside the loci. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at JF-005 is low, with a calculated distribution of 1 artifact per 2.61 square meters. The site is bound by 2 ephemeral gullies to the north and south that flow in a westward direction into a large ephemeral gully running in a north northeast by south southwest direction. The overall condition of the site is good, with minor alterations due to natural erosion.

The site contains 3 lithic reduction loci and a total of 74 artifacts (70 associated with the loci), which include 36 metavolcanic flakes (4 primary, 20 secondary, and 12 tertiary), 33 cryptocrystalline silicate chert flakes (12 primary, 13 secondary, and 8 tertiary), 2 cryptocrystalline silicate chert shatter, 1 quartz hammerstone, 1 quartzite hammerstone, and 1 metavolcanic uni-directional core.

Locus 1 is located at the south center of the site and measures 2 meters east to west by 3 meters north to south. Artifacts observed within Locus 1 include: 15 green metavolcanic flakes (3 primary, 9 secondary, and 3 tertiary), 1 green metavolcanic uni-directional core, and 1 quartz hammerstone.

Locus 2 is located 11 meters northwest from Locus 1 and measures 2 meters east to west by 3 meters north to south. Artifacts observed within Locus 2 include 21 green metavolcanic flakes (1 primary, 11 secondary, and 9 tertiary).

Locus 3 is located 11 meters east from locus 2 and measures 7 meters east to west by 6 meters north to south. Artifacts observed within locus 3 include: 29 brown cryptocrystalline silicate chert flakes (9 primary, 12 secondary, and 8 tertiary), 2 brown cryptocrystalline silicate chert shatter, and 1 quartzite hammerstone.

Located outside the loci and within 30 meters are 4 individual brown cryptocrystalline silicate chert flakes (3 primary and 1 secondary).The further character of artifacts associated with JF-005 is unreported.

The more particular physical context for JF-005, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists primarily of secondary flakes, a uni-directional core and 2 hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the 2 primary stone materials reduced in this lithic scatter (green metavolcanic and brown cryptocrystalline silicate chert) are typical constituents of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 3 single reduction localities or episodes, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. JF-005 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area there is very low likelihood for subsurface archaeological deposits, therefore data potential is considered exhausted through recordation of JF-005.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, JF-005 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

CA-IMP-3752/3753/8731 (JM-001)

This is an update to previously recorded sites CA-IMP-3752/3753/8731, which have been combined due to the presence of sparse assemblages of artifacts within 30 meters of one another. CA-IMP-3752/3753/8731 is an oblong-shaped lithic and ceramic scatter that covers a total surface area of 1,117.08 square meters. The site is located within the eastern portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within a younger fan (formed in the Late Holocene) fan apron/skirt geomorphic landform, which was formed in the Late Pleistocene/Early Holocene (URS, 2009). The site is situated atop an intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles overlaying coarse sands and fine gravels. The site is partially located in an ephemeral gully. Vegetation species on the site include creosote and bunch grass.

This lithic and ceramic scatter site measures 29 meters north to south by 58 meters east to west, and contains a total of 24 prehistoric artifacts. It consists of 1 concentration interpreted to be a single reduction locus, with 16 artifacts. Eight additional artifacts were observed outside the locus. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at JM-001 is low, with a calculated distribution of 1 artifact per 46.55 square meters. The overall condition of the site is fair with some alterations due to off-highway vehicles.

The artifact types and materials present at the site include: 19 metavolcanic flakes (8 primary, 5 secondary, 6 tertiary), 1 white cryptocrystalline silicate secondary flake, 1 metavolcanic hammerstone, 1 yellow-brown cryptocrystalline silicate core, and 2 ceramic Tizon brownware rim sherds.

Locus 1 is located in the western central portion of the site and measures 1 meter north to south by 0.3 meters east to west. Artifacts observed within Locus 1 include 16 green metavolcanic flakes (8 primary, 5 secondary and 3 tertiary).

Those artifacts observed within 30 meters and outside of the locus consist of 3 green metavolcanic tertiary flakes, 1 white cryptocrystalline silicate secondary flake, 1 metavolcanic hammerstone, 1 yellow-brown cryptocrystalline silicate core and 2 ceramic Tizon brownware rim sherds. The further character of artifacts associated within CA-IMP-3752/3753/8731 is unreported.

The more particular physical context for CA-IMP-3752/3753/8731, extrapolating information from Data Response 112 Figure 4 (URS 2009), to the location of the site, appears to be within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. Large fan aprons dominate the central portion of the project area and enter the basin floor up to 3 kilometers from the Lake Cahuilla high shoreline, and extend up to, and in some places, past that line. The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan “aprons” which do not individually fully cover the entire area, and which intermingle and partially bury one another and piedmont remnants. The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeology on that surface. However, the site is located on a younger fan which was likely formed in the late Holocene, which would increase that potential. None the less, though this area does demonstrate the potential for (shallowly) buried preserved surfaces, there is a high likelihood these deposits will represent the same constituents recorded on the surface.

The primary constituents of the artifact assemblage at CA-IMP-3752/3753/8731 are flaked stone debitage. Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret the lithic component of this site as representing expedient tool technology (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists of primary, secondary, and tertiary flakes, cores, and hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this site are of 2 primary stone materials (metavolcanic and cryptocrystalline silicate) that are constituents of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 2 single reduction localities or episodes, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time

Ceramic sherds such as the 2 present at CA-IMP-3752/3753/8731 that are identified as Tizon brownware can possibly provide information ceramic production technology and the ethnic origin of the vessels they can from. The presence of ceramics at this site place it in the Late Prehistoric period. Currently, the primary ethnic groups known to have occupied region surrounding CA-IMP-3752/3753/8731 include the Diegueño and Tipai (Kamia). Other groups known to have used/traveled/inhabited the area include the Cocopa, Kumeyaay, Ipai, Quechan, Paipai and Cahuilla (Luomala 1978; Schaefer and Laylander 2007, URS 2009). In approximately AD 1200, the course of the Colorado River changed, refilling Lake Cahuilla and providing a stable water source and drawing people from surrounding regions to repopulate the Colorado Desert. Ceramic wares which were introduced centuries before in other areas were brought into this region at that time (URS 2009). However, it has been argued that stable populations around the lake developed their own distinctive pottery formulas that became regional expressions of their families and locales (May ND). Although these groups each had specific approaches to the creation of ceramics, ceramic vessels were also traded along with subsistence resources and other items, infusing some uncertainty into the use of data from ceramics to associate one particular area with a particular tribal group or family.

Therefore, it is unlikely that surface data could directly relate CA-IMP-3752/3753/8731 or the area surrounding it to a particular tribe.

Data gathered on ceramics in the area surrounding CA-IMP-3752/3753/8731 show evidence of a variety of ceramic types and techniques. Though paddle-and-anvil construction techniques were common among groups using this area, the tempers employed, vessel types manufactured, and decoration did vary between groups. The Diegueño used ground clay and did not add temper when manufacturing ceramics. They created a variety of vessels including ollas; bowls, cooking pots, and pipes. The Kamia sometimes added rose quartz as temper and produced the greatest variety of ceramics among the Yuman bands, including ollas, jars, canteens, bowls, rattles, plates, scoops, cups, and parchers. Kamia ceramics were painted after firing with red and/or black designs. The Cocopah used ground and winnowed clay tempered with ground sherds to create a variety of vessels used for storage and cooking. Quechan vessel types include bowls, parchers, cooking pots, small figurines, and large storage vessels that were used to float goods across rivers. (URS 2009).

The analysis necessary to derive all possible data from these sherds is best accomplished by a specialist and therefore beyond the scope of typical fieldwork. Therefore it is recommended that the 4 ceramic sherds present at CA-IMP-3752/3753/8731 be further analyzed prior to making a final determination of eligibility.

Based on currently available data, this site, with the exception of ceramics (discussed below), lacks artifacts with unique or temporally diagnostic characteristics; therefore the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. CA-IMP-3752/3753/8731 is located within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The lack of soil development within the capped alluvial unit suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time, thus reducing the potential for extensive buried archaeological deposits. As a result, there is a very low to moderate likelihood for subsurface deposition. Nonetheless, though this area does demonstrate some potential for (shallowly) buried preserved surfaces, there is a high likelihood these deposits will represent the same constituents recorded on the surface.

Due to the presence of temporally diagnostic artifacts (ceramics) further data is necessary to determine if this site, as a stand-alone or individual resource, should be recommended as eligible or not eligible for the National Register and if it is or is not a historic property pursuant to the National Register or a historical resource per the California Register under the criteria for eligibility. In addition, results of additional data are necessary to determine if JM-001 is considered a contributor to an existing and/or proposed archaeological district or landscape.

JM-005

JM-005 is an amorphous-shaped lithic scatter that covers a total surface area of 98 square meters. The site is located within the eastern portion of the 450 MW area of the

Proposed Solar Two Project. The site is situated on a slightly elevated, older remnant surface of the piedmont within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Vegetation species on the site include creosote, burroweed and salt bush.

This lithic reduction site measures 32 meters northeast to southwest by 13 meters northwest to southeast, and contains a total of 11 prehistoric artifacts. It consists of a single concentration interpreted to be a single reduction locus with 8 artifacts and 3 additional artifacts observed outside the locus. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at JM-005 is low, with a calculated distribution of 1 artifact per 8.9 square meters. The overall condition of the site is fair due to off-highway vehicle activity and alluvial scouring.

This site consists of 1 single reduction locus and a total of 11 artifacts, which include: 8 metavolcanic flakes (3 primary, 3 secondary and 2 tertiary), 1 unifacial quartz mano and 2 metavolcanic multi-directional cores.

Locus 1 is located within the southern boundary of the site and measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 1 include 7 metavolcanic flakes (2 primary, 3 secondary and 2 tertiary) and 1 metavolcanic multi-directional core. Those artifacts observed within 30 meters and outside of the locus consist of: 1 green metavolcanic primary flake, 1 quartz unifacial mano and 1 battered core. The further character of artifacts found within JM-005 is unreported.

The more particular physical context for JM-005, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be on an older fan remnant mantled by a younger fan apron within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan “aprons” which do not individually fully cover the entire area, and which interfinger and partially bury one another and piedmont remnants. The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units, suggests this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeology on that surface. Nonetheless, this area does demonstrate the potential for (shallowly) buried preserved surfaces, but there is a high likelihood these deposits will represent the same constituents recorded on the surface. As a result, there is a very low to moderate likelihood for subsurface deposition.

The desert pavement consists of small to large, sub-rounded to sub-angular metavolcanic, basalt, quartz, quartzite and granite gravels and cobbles overlaying coarse sands and fine gravels.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature; debitage consists primarily of primary, secondary, and tertiary flakes, and 2 cores. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone material (metavolcanic) that is a constituent of the surrounding area, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent a single reduction locality or episode; but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Archaeologists for the applicant interpret that ground stone tools such as the single mano present at this site were made by grinding, abrading, pecking, pounding, and polishing rather than chipping and flaking. Manos were smaller, soap and loaf-shaped stones that were moved in a circular motion against a metate or grinding slab in order to grind small seeds and other food resources. Manos are associated with subsistence procurement and/or processing (Chartkoff and Chartkoff 1984). However, the particular mano present at this site shows no visible characteristics that might provide additional information regarding regional subsistence activities.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. JM-005 is located within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The lack of soil development within the capped alluvial unit suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time, thus reducing the potential for extensive buried archaeological deposits. As a result, there is a very low to moderate likelihood for subsurface deposition. Nonetheless, though this area does demonstrate some potential for (shallowly) buried preserved surfaces, there is a high likelihood these deposits will represent the same constituents recorded on the surface. Therefore, due to the low density of artifacts and low probability for significant subsurface artifacts, the data potential is considered exhausted through recordation of JM-005.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, JM-005 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

JM-008

JM-008 is a circular-shaped lithic scatter that covers a total surface area of 16 square meters. The site is located within the northern portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation (URS 2009). Portions of the surface area of the site consist of intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels. The desert pavement once covering other portions of the site has since been disturbed. The landform appears to be an older remnant that is heavily deflated and bound on all sides by active seasonal drainages. Vegetation species on the site include creosote and burroweed.

This lithic scatter site measures 5 meters north to south by 6 meters east to west, and contains a total of 9 prehistoric artifacts. Artifact density at JM-008 is low, with a calculated distribution of 1 artifact per 1.74 square meters. The overall condition of the site is good with recent disturbance from ephemeral gullies, off-highway vehicle activity and alluvial erosion.

This site consists of 9 green metavolcanic flakes (1 primary flake, 5 secondary flakes, 2 tertiary flakes, and 1 piece of angular waste/shatter). The further character of artifacts found within JM-008 is unreported.

The more particular physical context for JM-008, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan "aprons" which do not individually fully cover the entire area, and which interfinger and partially bury one another and piedmont remnants. The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units, suggests this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeology on that surface. Nonetheless, this area does demonstrate the potential for (shallowly) buried preserved surfaces, but there is a high likelihood these deposits will represent the same constituents recorded on the surface. As a result, there is a very low to moderate likelihood for subsurface deposition. The desert pavement consists of small to large, sub-rounded to sub-angular metavolcanic, basalt, quartz, quartzite and granite gravels and cobbles overlaying coarse sands and fine gravels.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists of metavolcanic flakes. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because all the lithic materials reduced in this lithic scatter are of the same primary stone material (metavolcanic) that is a constituent of the surrounding area, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent a single reduction locality or episode; but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. JM-008 is located within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The lack of soil development within the capped alluvial unit suggests this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time, thus reducing the potential for extensive buried archaeological deposits. As a result there is a very low to moderate likelihood for subsurface deposition. Nonetheless, though this area does demonstrate some potential for (shallowly) buried preserved surfaces, there is a high likelihood these deposits will represent the same constituents recorded on the surface. Therefore, due to the low density of artifacts and low probability for significant subsurface artifacts, the data potential is considered exhausted through recordation of JM-008.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, JM-008 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

CA-IMP-2083 (JM-009)

This record is an update to a previously recorded site CA-IMP-2083. CA-IMP-2083 was originally recorded by Howard Pritchett in January of 1978. Pritchett described the site as a "chipping station with core, chopper, and debitage." He further described the debitage as consisting of 4 large pieces and 4 small pieces and described the core as a "good core." Pritchett gave no further details about the characteristics of artifacts found at the site.

CA-IMP-2083 is an oblong-shaped lithic scatter that covers a total surface area of 375.5 square meters. The site is located within the eastern portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation (URS 2009). The surface area of the site consists of open elevated older fan remnants mantled by younger fan surfaces covered by disturbed desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Vegetation species on the site include creosote, burrow bush, and saltbush.

This lithic scatter site measures 40 meters northeast to southwest by 13 meters northwest to southeast, and contains a total of 52 prehistoric artifacts. It consists of 2 concentrations interpreted to be 2 single reduction loci, with 50 artifacts and 2 additional artifacts observed outside the loci. The prevailing cultural constituents within this site consist of prehistoric lithic debitage. Artifact density at CA-IMP-2083 is low, with a calculated distribution of 1 artifact per 7.2 square meters. The overall condition of the site is fair with alterations from off-highway vehicles observed.

CA-IMP-2083 consists of 2 single reduction loci and a total of 50 artifacts, which include: 47 gray metavolcanic flakes (12 Primary, 18 secondary, 13 tertiary and 5 shatter), 1 gray metavolcanic multi-directional core, 1 gray metavolcanic tested cobble and 2 yellow chert flakes (1 tertiary and 1 shatter).

Locus 1 is located in the northeastern portion of the site and measures 6 meters north to south by 3 meters east to west. Artifacts observed within Locus 1 include 18 gray metavolcanic flakes (7 primary flakes, 7 secondary flakes, 3 tertiary flakes and 1 shatter) and 1 gray metavolcanic multi-directional core.

Locus 2 is located 32 meters southwest of Locus 1 and measures 4 meters north to south by 5 meters east to west. Artifacts observed within Locus 2 include 29 gray metavolcanic flakes (5 primary flakes, 10 secondary flakes, 10 tertiary flakes, and 4 shatter) and 2 yellow cryptocrystalline silicate chert flakes (1 tertiary flake and 1 shatter).

Those artifacts observed within 30 meters and outside of the loci consist of 1 gray metavolcanic secondary flake and 1 gray metavolcanic tested cobble. The further character of artifacts found within CA-IMP-2083 is unreported.

The more particular physical context for CA-IMP-2083, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan "aprons" which do not individually fully cover the entire area, and which intermingle and partially bury one another and piedmont remnants. The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units, suggests this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeological deposits. Nonetheless, this area does demonstrate the potential for (shallowly) buried preserved surfaces, but there is a high likelihood these deposits will represent the same constituents recorded on the surface. As a result, there is a very low to moderate likelihood for subsurface deposition. The desert pavement consists of small to large, sub-rounded to sub-angular metavolcanic, basalt, quartz, quartzite and granite gravels and cobbles overlaying coarse sands and fine gravels.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, and debitage consists primarily of metavolcanic primary, secondary, tertiary flakes, a single metavolcanic multi-directional core, and angular waste/shatter. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone (metavolcanic) material that is a constituent of the surrounding area, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 2 single reduction localities or episodes; but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. CA-IMP-2083 is located within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The lack of soil development within the capped alluvial unit suggests this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeological deposits. As a result, there is a very low to moderate likelihood for subsurface deposition. Nonetheless, though this area does demonstrate some potential for (shallowly) buried preserved surfaces, there is a high likelihood these deposits will represent the same constituents recorded on the surface. Therefore, due to the low density of artifacts and low probability for significant subsurface archaeological deposits, the data potential is considered exhausted through recordation of CA-IMP-2083.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, CA-IMP-2083 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

JM-020

JM-020 is an oblong-shaped archaeological deposit that covers a total surface area of 315.4 square meters. The site is located within the northern portion of the waterline 100-foot buffer of the Proposed Solar Two Project. The site is situated within the older fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposing granitic gravels and cobbles. Vegetation species on the site include creosote.

This lithic scatter and historic refuse deposit site measures 63 meters northwest to southeast by 7 meters northeast to southwest, and contains a total of 97 prehistoric and 2 historic artifacts. The prehistoric component consists of 5 concentrations interpreted to be 5 single reduction loci, with 93 artifacts. Four additional prehistoric artifacts were observed outside the loci. The historic component consists of 2 artifacts. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at JM-020 is low, with a calculated distribution of 1 artifact per 3.22 square meters. The overall condition of the site is good though there are several off-road vehicle tracks in the area.

The artifact types and materials present at the site include: 49 metavolcanic flakes (23 primary, 20 secondary and 6 shatter), 43 quartz flakes (12 primary, 23 secondary and 8 shatter), 1 cryptocrystalline silicate chert secondary flake, 2 metavolcanic multi-directional cores, 1 quartzite hammerstone, 1 quartz tested cobble, 1 broken colorless glass jar with 25 fragments including the base with an Owens-Illinois maker's mark, and 1 hole-in-top milk can (3.9375 inches by 2.9375 inches).

Locus 1 is located 10.5 meters north of the site datum and measures 2 meters east to west by 1 meter north to south. Artifacts observed within Locus 1 include 43 quartz flakes (12 primary, 23 secondary and 8 shatter) and 1 quartz tested cobble.

Locus 2 is located 22 meters north of Locus 1 and measures 1 meter east to west by 1 meter north to south. Artifacts observed within Locus 2 include 8 metavolcanic flakes (6 primary and 2 secondary).

Locus 3 is located 45 meters east of Locus 2 and measures 2 meters east to west by 1 meter north to south. Artifacts observed within Locus 3 include 12 metavolcanic flakes (5 primary, 6 secondary and 1 shatter).

Locus 4 is located 2 meters northeast of Locus 3 and measures 2 meters east to west by 0.5 meters north to south. Artifacts observed within Locus 4 include 5 metavolcanic flakes (2 primary and 3 secondary).

Locus 5 is located 17 meters southeast of Locus 4 and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 5: include 22 metavolcanic flakes (9 primary, 8 secondary and 5 shatter), 1 metavolcanic multi-directional core and 1 quartzite hammerstone.

Those artifacts observed within 30 meters and outside the loci include: 2 metavolcanic flakes (1 primary and 1 secondary), 1 cryptocrystalline silicate chert secondary flake, 1 metavolcanic multi-directional core, 1 broken colorless glass jar with 25 fragments including the base with an Owens Illinois maker's mark, and 1 hole-in-top milk can (3.9375 inches by 2.9375 inches). The further character of artifacts associated with JM-020 is unreported.

The more particular physical context for JM-020, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. Large fan aprons dominate the central portion of the Project area and enter the basin floor up to 3 kilometers from the Lake Cahuilla high shoreline, and extend up to, in some places, past that line. The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan “aprons” which do not individually fully cover the entire area, and which interfinger and partially bury one another and piedmont remnants. The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units, suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeology on that surface. Nonetheless, this area demonstrates the potential for (shallowly) buried preserved surfaces, but there is a high likelihood these deposits will represent the same constituents recorded on the surface. As a result, there is a very low to moderate likelihood for subsurface deposition. The desert pavement consists of small to large, sub-rounded to sub-angular metavolcanic, basalt, quartz, quartzite and granite gravels and cobbles overlaying coarse sands and fine gravels.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret the lithic component of this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists primarily metavolcanic and quartz flakes, with 2 metavolcanic cores and 1 quartzite hammerstone. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced at this site are of 2 primary stone materials (metavolcanic and quartz) that are constituents of the surrounding area, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 5 single reduction localities or episodes. It should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Deposits of historic artifacts such as these typically represent episodes of refuse disposal after initial discard and/or loss of individual articles in-situ. In the case of JM-020, the small number of artifacts and artifact types present would more likely have resulted from in-situ disposal rather than dumping of the wide range of artifact types that would be expected in an assemblage of common household refuse. Though dates of manufacture can be determined for some of the artifacts present at JM-020, the time between the initial use/consumption of the artifacts and their ultimate disposal cannot be known; so the specific date of their disposal cannot be reliably determined. Hole-in-cap cans such as the lap-seam cans present at this site were initially introduced in the mid-19th century, were common in the late 19th to early 20th century, and fell out of favor in the 1920s when most manufacturers switched to sanitary cans (Goodman 2002). The single bottle base present bears an Owens-Illinois maker's mark with a date code of "0" indicating that it was manufactured in 1930 or 1940. Two digit date codes were not in use at Owens-Illinois until the 1950s, so the exact year cannot be known (Lockwood 2004). Based on this data it would follow that the deposition of historic artifacts at JM-020 occurred sometime after1930.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. JM-020 is located within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. As a result, there is a very low to moderate likelihood for subsurface deposition. Nonetheless, though this area does demonstrate some potential for (shallowly) buried preserved surfaces, there is a high likelihood these deposits will represent the same constituents recorded on the surface. Therefore, due to the low density of artifacts and low probability for significant subsurface artifacts, the data potential is considered exhausted through recordation of JM-020.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, JM-020 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

JM-026

JM-026 is an amorphous-shaped archaeological deposit that covers a total surface area of 14,335 square meters. The site is located within the northeastern portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation (URS 2009). The surface area of the site consists of moderately developed intact desert pavement with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Much of the site is situated atop an older, relatively stable piedmont remnant, with portions of the southern margin eroding into an adjacent wash. Throughout the site, particularly in the south and east, are shallow, ephemeral gullies and drainages. Vegetation species on the site include: creosote, ocotillo, burrobush/burroweed and bunch grass.

This archaeological deposit measures 305 meters north to south by 306 meters east to west, and contains a total of 1,319 prehistoric and 676 historic artifacts. The prehistoric component consists of 2 possible deflated hearth features and 69 concentrations interpreted to be 49 single lithic reduction loci and 20 multiple lithic reduction loci. The historic component consists of 1 rock collection pile and 3 artifact concentrations interpreted to be historic refuse disposal (dumping) loci. The prevailing cultural constituents within this site consist of prehistoric lithic reduction debitage and historic household refuse. Artifact density at JM-026 is low, with a calculated distribution of 1 artifact per 7.19 square meters. The overall condition of the site is fair due to several off-highway vehicle tracks that cross the site.

The artifact types and materials that comprise the prehistoric component of JM-026 include: 428 metavolcanic flakes (148 primary, 182 secondary, 60 tertiary and 38 angular waste/shatter), 500 quartz flakes (112 primary, 217 secondary, 98 tertiary and 73 angular waste/shatter), 88 quartzite flakes (52 primary, 33 secondary, 1 tertiary and 2 angular waste/shatter), 100 chert flakes (49 primary, 43 secondary, 6 tertiary and 2 angular waste/shatter), 30 cryptocrystalline flakes (6 primary, 17 secondary and 7 tertiary), 12 chalcedony (8 primary, 1 secondary, 2 tertiary and 1 angular waste/shatter), 24 petrified wood flakes (13 primary, 9 secondary and 2 tertiary), 13 rhyolite flakes (7 primary, 5 secondary and 1 tertiary), 5 wonderstone flakes (2 primary, 2 secondary and 1 tertiary), 1 basalt primary flake, 51 tested cobbles (19 quartz, 12 quartzite, 13 metavolcanic, 5 chert, 1 chalcedony and 1 petrified wood), 10 uni-directional cores (5 metavolcanic, 3 quartz, 1 quartzite and 1 chert), 10 bi-directional cores (5 metavolcanic, 3 quartz, 1 quartzite and 1 chert), 16 multi-directional cores (6 metavolcanic, 4 quartz, 3 quartzite, 2 chert and 1 wonderstone), 2 exhausted cores (1 metavolcanic and 1 quartz), 10 hammerstones (2 metavolcanic and 8 quartzite), 3 choppers (2 metavolcanic and 1 quartzite), 6 edge-modified flakes (2 metavolcanic and 4 quartz), 7 bifaces (1 metavolcanic, 2 quartz, 1 quartzite and 3 chert) and 3 core tools (2 metavolcanic and 1 chert).

The artifact types and materials that comprise the historic component of JM-026 include: 426 cans/can fragments, 212 whole glass fragments, 29 miscellaneous metal artifacts, 7 historic ceramic sherds (including terracotta, white hardpaste earthenware and porcelain), 1 duct tape fragment, 1 bundle of finely braided wire and several organic items, including milled lumber, burned faunal bone and eggshell.

Feature 1 is located at the eastern edge of the site and measures 2 meters north to south by 1 meter east to west. Feature 1 consists of 29 granitic, quartzite and metavolcanic cobbles that are embedded in a semi-circular pattern and appear to be fire-affected. Feature 1 is interpreted to be a deflated hearth feature.

Feature 2 is located approximately 100 meters southwest of Feature 1 and measures 2 meters north to south by 140 centimeters east to west. Feature 2 consists of 35 irregular-shaped granitic and quartzite cobbles, which appear to be fire-affected and are eroding out of a gentle slope above an ephemeral drainage. Feature 2 is interpreted to be a deflated hearth feature.

Feature 3 is located approximately 51 meters southwest of Feature 2 and measures 75 centimeters north to south by 60 centimeters east to west. Feature 3 is a collection of rocks piled and embedded under a small creosote bush. The rocks include: 31 petrified wood cobbles, 2 chalcedony cobbles, 1 tested low grade chert cobble and 1 fossilized oyster shell. The rock pile contains 1 prehistoric artifact. Feature 3 is interpreted to be a collection location or cache where lithic materials were aggregated prior to use.

Also present at JM-026 are 69 concentrations of prehistoric artifacts interpreted to be loci that are described as follows:

Locus 1 is located near the western boundary of the site and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 1 include 5 quartzite flakes (2 secondary, 1 tertiary and 2 quartzite angular waste/shatter) and 3 tested quartzite cobbles.

Locus 2 is located 5 meters northeast of Locus 2 and measures 48 centimeters north to south by 38 centimeters east to west. Artifacts observed within Locus 2 include 11 low-grade chert flakes (8 primary and 3 secondary).

Locus 3 is located 27 meters west of Locus 2 and measures 2 meters northeast to southwest by 1 meter northwest to southeast. Artifacts observed within Locus 3 include 19 green porphyritic metavolcanic flakes (7 primary, 9 secondary and 3 tertiary) and 1 green porphyritic metavolcanic multi-directional core.

Locus 4 is located 56 meters southeast of Locus 3 and measures 1 meter northeast to southwest by 1 meter northwest to southeast. Artifacts observed within Locus 4 include 8 green porphyritic metavolcanic flakes (2 primary, 3 secondary and 3 angular waste/shatter) and 2 green porphyritic metavolcanic tested cobbles.

Locus 5 is located 19 meters north of Locus 4 and measures 1 meter north to south by 14 centimeters east to west. Artifacts observed within Locus 5 include: 2 green porphyritic metavolcanic primary flakes, 1 green chert secondary flake and 1 green porphyritic metavolcanic bi-directional core.

Locus 6 is located 9 meters east of Locus 5 and measures 1 meter northeast to southwest by 1 meter northwest to southeast. Artifacts observed within Locus 6 include 24 quartz crystal flakes (2 primary, 15 secondary and 7 tertiary).

Locus 7 is located 22 meters north of Locus 6 and measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 7 include 20 quartz crystal flakes (3 primary, 5 secondary and 12 tertiary).

Locus 8 is located 21 meters east of Locus 7 and measures 4 meters east to west by 2 meters north to south. Artifacts observed within Locus 8 include 18 green porphyritic metavolcanic flakes (4 primary, 12 secondary and 2 shatter) and 1 quartzite hammerstone.

Locus 9 is located 23 meters southeast of Locus 8 and measures 1 meter northwest to southeast by 1 meter northeast to southwest. Artifacts observed within Locus 9 include: 16 quartz flakes (2 primary, 9 secondary, 1 tertiary and 4 angular waste/shatter), 1 tested quartz cobble and 1 tested chert cobble.

Locus 10 is located 8 meters northeast of Locus 9 and measures 1 meter northwest to southeast by 1 meter northeast to southwest. Artifacts observed within Locus 10 include 13 quartzite flakes (7 primary and 6 secondary) and 1 green porphyritic metavolcanic uni-directional core.

Locus 11 is located 4 meters north of Locus 10 and measures 1 meter east to west by 58 centimeters north to south. Artifacts observed within Locus 11 include 12 green porphyritic metavolcanic flakes (4 primary and 8 secondary).

Locus 12 is located 5 meters northeast of Locus 11 and measures 1 meter northeast to southwest by 26 centimeters northwest to southeast. Artifacts observed within Locus 12 include 14 quartz flakes (2 primary, 5 secondary, 3 tertiary and 4 angular waste/shatter).

Locus 13 is located 14 meters southeast of Locus 12 and measures 40 centimeters northwest to southeast by 22 centimeters northeast to southwest. Artifacts observed within Locus 13 include 1 quartzite primary flake and 1 quartzite tested cobble.

Locus 14 is located 11 meters east of Locus 13 and measures 4 meters north to south by 3 meters east to west. Artifacts observed within Locus 14 include: 17 white cryptocrystalline flakes (2 primary, 10 secondary and 5 tertiary), 9 quartzite flakes (6 primary and 3 secondary), 1 green porphyritic metavolcanic tested cobble, 1 quartzite multi-directional core and 1 quartzite hammerstone.

Locus 15 is located 41 meters south of Locus 14 and measures 2 meters northwest to southeast by 1 meter northeast to southwest. Artifacts observed within Locus 15 include 17 quartz flakes (2 primary, 10 secondary, 3 tertiary and 2 angular waste/shatter) and 1 quartz multi-directional core.

Locus 16 is located 54 meters north of Locus 15 and measures 2 meters east to west by 1 meter north to south. Artifacts observed within Locus 16 include 5 green porphyritic metavolcanic flakes (2 primary and 3 secondary).

Locus 17 is located 5 meters southeast of Locus 16 and measures 48 centimeters east to west by 25 centimeters north to south. Artifacts observed within Locus 17 include 2 green porphyritic metavolcanic primary flakes and 1 green porphyritic metavolcanic tested cobble.

Locus 18 is located 16 meters east of Locus 17 and measures 6 meters north to south by 6 meters east to west. Artifacts observed within Locus 18 include: 28 green porphyritic metavolcanic flakes (15 primary, 11 secondary and 2 angular waste/shatter), 3 green porphyritic metavolcanic tested cobbles, 1 green porphyritic metavolcanic multi-directional core, 6 brown chert flakes (3 primary and 3 secondary), 1 tested brown chert cobble, 1 chert core tool, 8 quartzite flakes (5 primary and 3 secondary), 2 tested quartzite cobbles, 1 quartzite multi-directional core, 2 petrified wood flakes (1 primary and 1 secondary) and 1 tested petrified wood cobble.

Locus 19 is located 10 meters south of Locus 18 and measures 1 meter northeast to southwest by 27 centimeters northwest to southeast. Artifacts observed within Locus 19 include: 1 primary chert flake, 1 chert biface, 1 quartz tested cobble, 1 exhausted quartz core and 1 quartzite hammerstone.

Locus 20 is located 10 meters northwest of Locus 19 and measures 2 meters northeast to southwest by 1 meter northwest to southeast. Artifacts observed within Locus 20 include 5 quartzite flakes (2 primary and 3 secondary).

Locus 21 is located 26 meters southeast of Locus 20 and measures 1 meter northwest to southeast by 48 centimeters northeast to southwest. Artifacts observed within Locus 21 include 11 quartz flakes (6 primary, 3 secondary and 2 tertiary) and 2 tested quartz cobbles.

Locus 22 is located 16 meters southeast of Locus 21 and measures 1 meter northwest to southeast by 1 meter northeast to southwest. Artifacts observed within Locus 22 include: 12 chalcedony flakes (8 primary, 1 secondary, 2 tertiary and 1 angular waste/shatter), 11 petrified wood flakes (8 primary and 3 secondary) and 4 chert flakes (3 primary and 1 secondary).

Locus 23 is located 4 meters south of Locus 22 and measures 2 meters northeast to southwest by 1 meter northwest to southeast. Artifacts observed within Locus 23 include 9 brown chert flakes (7 primary and 2 secondary).

Locus 24 is located 15 meters east of Locus 23 and measures 2 meters northeast to southwest by 20 centimeters northwest to southeast. Locus 24 consists of a single lithic reduction locus. Artifacts observed within Locus 24 include 4 quartz flakes (2 primary, 1 secondary and 1 angular waste/shatter) and 1 tested quartz cobble.

Locus 25 is located 39 meters southwest of Locus 24 and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 25 include 17 quartz flakes (3 primary, 10 secondary, 2 tertiary and 2 angular waste/shatter).

Locus 26 is located 32 meters northwest of Locus 25 and measures 50 centimeters north to south by 39 centimeters east to west. Artifacts observed with Locus 26 include 11 quartzite flakes (7 primary and 4 secondary) and 1 quartzite uni-directional core.

Note: There is no Locus 27. In the process of data collection this number was inadvertently skipped.

Locus 28 is located 26 meters southwest of Locus 26 and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 28 include 13 quartz flakes (5 primary, 6 secondary, 1 tertiary and 1 angular waste/shatter) and 1 tested quartz cobble.

Locus 29 is located 44 meters northeast of Locus 28 and measures 3 meters east to west by 3 meters north to south. Artifacts observed within Locus 29 include: 20 brown chert flakes (8 primary, 7 secondary, 3 tertiary and 2 angular waste/shatter), 2 quartzite flakes (1 primary and 1 secondary) and 2 tested quartzite cobbles.

Locus 30 is located 51 meters northeast of Locus 29 and measures 2 meters east to west by 1 meter north to south. Artifacts observed within Locus 30 include: 37 green porphyritic metavolcanic flakes (13 primary, 11 secondary, 4 tertiary and 9 angular waste/shatter), 1 green porphyritic metavolcanic uni-directional core and 1 green porphyritic metavolcanic hammerstone.

Locus 31 is located 9 meters southeast of Locus 30 and measures 1 meter northwest to southeast by 42 centimeters northeast to southwest. Artifacts observed within Locus 31 include 5 wonderstone flakes (2 primary, 2 secondary and 1 tertiary) and 1 wonderstone multi-directional core.

Locus 32 is located 9 meters east of Locus 31 and measures 4 meters east to west by 94 centimeters north to south. Artifacts observed within Locus 32 include: 9 quartz flakes (3 primary, 5 secondary and 1 shatter), 1 quartz uni-directional core, 2 tested quartz cobbles, 5 quartzite flakes (3 primary and 2 secondary), 8 green porphyritic metavolcanic flakes (3 primary, 2 secondary and 3 shatter) and 1 green porphyritic metavolcanic bi-directional core.

Locus 33 is located 18 meters north of Locus 32 and measures 2 meters east to west by 1 meter north to south. Artifacts observed within Locus 33 include: 17 quartz flakes (3 primary, 11 secondary and 3 shatter), 1 basalt primary flake and 1 quartz bi-directional core.

Locus 34 is located 2 meters north of Locus 33 and measures 30 centimeters north to south by 18 centimeters east to west. Artifacts observed within Locus 34 include 1 brown chert primary flake and 1 brown chert bi-directional core.

Locus 35 is located 7 meters northeast of Locus 34 and measures 1 meter east to west by 30 centimeters north to south. Artifacts observed within Locus 35 include: 4 green porphyritic metavolcanic primary flakes, 1 green porphyritic metavolcanic bi-directional core and 1 quartzite hammerstone.

Locus 36 is located 36 meters northwest of Locus 35 and measures 56 centimeters northwest to southeast by 38 centimeters northeast to southwest. Artifacts observed within Locus 36 include 3 quartz primary flakes and 2 tested quartz cobbles.

Locus 37 is located 11 meters west of Locus 36 and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 37 include: 9 quartz flakes (5 primary, 3 secondary and 1 shatter), 1 quartz tested cobble and 1 quartz edge-modified flake.

Locus 38 is located 3 meters north of Locus 37 and measures 3 meters north to south by 1 meter east to west. Artifacts observed within Locus 38 include 6 green porphyritic metavolcanic flakes (2 primary and 4 secondary) and 1 green porphyritic metavolcanic multi-directional core.

Locus 39 is located 2 meters west of Locus 38 and measures 50 centimeters east to west by 44 centimeters north to south. Artifacts observed within Locus 39 include 3 quartzite flakes (2 primary and 1 secondary) and 1 quartzite multi-directional core.

Locus 40 is located 8 meters north of Locus 39 and measures 3 meters northeast to southwest by 2 meters northwest to southeast. Artifacts observed within Locus 40 include 25 green porphyritic metavolcanic flakes (8 primary, 16 secondary and 1 shatter).

Locus 41 is located 5 meters west of Locus 40 and measures 52 centimeters north to south by 48 centimeters east to west. Artifacts observed within Locus 41 include 6 low-grade chert flakes (3 primary and 3 secondary) and 1 low-grade chert multi-directional core.

Locus 42 is located 30 meters southwest of Locus 41 and measures 2 meters northeast to southwest by 1 meter northwest to southeast. Artifacts observed within Locus 42 include: 30 chert flakes (9 primary, 18 secondary and 3 tertiary), 1 chert multi-directional core, 16 quartz flakes (3 primary, 7 secondary and 6 shatter), 4 quartzite flakes (3 primary and 1 secondary) and 1 tested quartzite cobble.

Locus 43 is located 1 meter northeast of Locus 42 and measures 1 meter northeast to southwest by 1 meter northwest to southeast. Artifacts observed within Locus 43 include 11 petrified wood flakes (4 primary, 5 secondary and 2 tertiary) and 1 green porphyritic metavolcanic secondary flake.

Locus 44 is located 65 meters northeast of Locus 43 and measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 44 include: 9 black porphyritic metavolcanic flakes (2 primary, 4 secondary, 1 tertiary and 2 shatter), 1 green porphyritic metavolcanic primary flake, 1 green porphyritic metavolcanic tested cobble, 1 quartzite primary flake and 1 tested quartzite cobble.

Locus 45 is located 18 meters southeast of Locus 44 and measures 3 meters northeast to southwest by 1 meter northwest to southeast. Artifacts observed within Locus 45 include: 51 quartz flakes (5 primary, 24 secondary, 8 tertiary and 14 shatter), 1 tested quartz cobble, 1 quartz multi-directional core and 9 rhyolite flakes (3 primary, 5 secondary and 1 tertiary).

Locus 46 is located 6 meters north of Locus 45 and measures 1 meter northwest to southeast by 1 meter northeast to southwest. Artifacts observed within Locus 46 include 7 rose quartz flakes (4 primary and 3 secondary).

Locus 47 is located 4 meters east of Locus 46 and measures 2 meters east to west by 1 meter north to south. Artifacts observed within Locus 47 include 5 rose quartz flakes (3 primary and 2 secondary).

Locus 48 is located 29 meters southeast of Locus 47 and measures 2 meters northwest to southeast by 72 centimeters northeast to southwest. Artifacts observed within Locus 48 include 33 green porphyritic metavolcanic flakes (12 primary, 12 secondary, 7 tertiary and 2 shatter) and 1 green porphyritic metavolcanic bi-directional core.

Locus 49 is located 1 meter west of Locus 48 and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 49 include 5 green porphyritic metavolcanic flakes (3 primary and 2 secondary).

Locus 50 is located 12 meters east of Locus 49 and measures 1 meter east to west by 1 meter north to south. Artifacts observed within Locus 50 include 8 fine grain quartzite flakes (6 primary and 2 secondary).

Locus 51 is located 30 meters northeast of Locus 50 and measures 6 meters northeast to southwest by 4 meters northeast to southwest. Artifacts observed within Locus 51 include: 70 quartz crystal flakes (9 primary, 23 secondary, 28 tertiary and 10 shatter), 3 green porphyritic metavolcanic flakes (2 secondary and 1 tertiary), 1 tested green porphyritic metavolcanic cobble and 1 quartzite hammerstone.

Locus 52 is located 81 meters west of Locus 51 and measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 52 include: 71 quartz flakes (9 primary, 30 secondary, 20 tertiary and 12 shatter), 1 quartz multi-directional core and 1 quartzite hammerstone.

Locus 53 is located 28 meters west of Locus 52 and measures 11 meters northeast to southwest by 4 meters northwest to southeast. Artifacts observed within Locus 53 include: 11 quartz flakes (3 primary, 7 secondary and 1 quartz shatter), 1 quartz multi-directional core, 1 quartz biface, 1 quartz edge-modified flake, 57 green porphyritic metavolcanic flakes (12 primary, 18 secondary, 19 tertiary and 8 shatter), 1 green porphyritic metavolcanic multi-directional core, 1 green porphyritic metavolcanic chopper, 1 green porphyritic metavolcanic edge-modified flake and 1 fine grain quartzite biface (in 3 pieces).

Locus 54 is located 27 meters south of Locus 53 and measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 54 include 29 green porphyritic metavolcanic flakes (11 primary, 10 secondary, 5 tertiary and 3 shatter) and 1 quartz tertiary flake.

Locus 55 is located 1 meter southwest of Locus 54 and measures 5 meters northeast to southwest by 3 meters northwest to southeast. Artifacts observed within Locus 55 include: 26 quartz flakes (8 primary, 8 secondary, 2 tertiary and 8 shatter), 3 tested quartz cobbles, 1 green porphyritic metavolcanic primary flake and 1 green porphyritic metavolcanic bi-directional core.

Locus 56 is located 11 meters west of Locus 55 and measures 3 meters north to south by 2 meters east to west. Artifacts observed within Locus 56 include 27 green porphyritic metavolcanic flakes (12 primary, 14 secondary and 1 tertiary) and 1 green porphyritic metavolcanic uni-directional core.

Locus 57 is located 9 meters northwest of Locus 56 and measures 1 meter northwest to southeast by 1 meter northeast to southwest. Artifacts observed within Locus 57 include 4 green porphyritic metavolcanic flakes (1 primary, 2 secondary and 1 tertiary).

Locus 58 is located 176 meters southwest of Locus 57 and measures 48 centimeters east to west by 34 centimeters north to south. Artifacts observed within Locus 58 include 6 quartz flakes (3 primary and 3 secondary) and 1 quartz uni-directional core.

Locus 59 is located 214 meters northeast of Locus 58 and measures 1 meter east to west by 1 meter north to south. Artifacts observed within Locus 59 include: 10 green porphyritic metavolcanic flakes (4 primary, 5 secondary and 1 tertiary), 1 green porphyritic metavolcanic tested cobble and 1 green porphyritic metavolcanic hammerstone.

Locus 60 is located 3 meters southeast of Locus 59 and measures 28 centimeters north to south by 24 centimeters east to west. Artifacts observed within Locus 60 include: 3 low-grade chert flakes (1 primary and 2 secondary), 1 low-grade chert tested cobble and 1 fine grain quartzite chopper.

Locus 61 is located 57 meters north of Locus 60 and measures 2 meters east to west by 2 meters north to south. Artifacts observed within Locus 61 include: 4 cryptocrystalline flakes (2 primary and 2 secondary), 1 green porphyritic metavolcanic secondary flake, 1 tested green porphyritic metavolcanic cobble, 1 green porphyritic metavolcanic chopper and 1 tested chalcedony cobble.

Locus 62 is located 23 meters northwest of Locus 61 and measures 4 meters northeast to southwest by 2 meters northwest to southeast. Artifacts observed within Locus 62 include: 47 green porphyritic metavolcanic flakes (13 primary, 15 secondary, 17 tertiary and 2 shatter), 1 green porphyritic metavolcanic biface and 1 green porphyritic metavolcanic core tool.

Locus 63 is located 2 meters south of Locus 62 and measures 4 meters north to south by 2 meters east to west. Artifacts observed in Locus 63 include 13 green porphyritic metavolcanic flakes (5 primary and 8 secondary) and 1 exhausted green porphyritic metavolcanic core.

Locus 64 is located 13 meters west of Locus 63 and measures 5 meters northwest to southeast by 4 meters northeast to southwest. Artifacts observed within Locus 64 include: 7 green porphyritic metavolcanic flakes (1 primary, 5 secondary and 1 shatter), 1 green porphyritic metavolcanic edge-modified flake, 1 quartz primary flake, 1 quartzite primary flake and 1 tested quartzite cobble.

Locus 65 is located 23 meters southeast of Locus 64 and measures 2 meters east to west by 86 centimeters north to south. Artifacts observed within Locus 65 include 38 quartz flakes (12 primary, 18 secondary, 6 tertiary and 2 quartz shatter) and 1 quartz bi-directional core.

Locus 66 is located 80 centimeters southwest of Locus 65 and measures 1 meter northeast to southwest by 1 meter northwest to southeast. Artifacts observed within Locus 66 include 9 black cryptocrystalline flakes (2 primary, 5 secondary and 2 tertiary).

Locus 67 is located 42 meters west of Locus 66 and measures 1 meter northeast to southwest by 48 centimeters northwest to southeast. Artifacts observed within Locus 67 include: 7 brown chert flakes (5 primary and 2 secondary), 1 tested brown chert cobble, 1 chert bi-directional core and 1 quartzite hammerstone.

Locus 68 is located 35 meters south of Locus 67 and measures 1 meter northeast to southwest by 50 centimeters northwest to southeast. Artifacts observed within Locus 68 include 4 quartz flakes (3 primary and 1 secondary).

Locus 69 is located 37 meters south of Locus 68 and measures 1 meter east to west by 1 meter north to south. Artifacts observed within Locus 69 include 15 quartz flakes (5 primary, 7 secondary, 2 tertiary and 1 shatter) and 1 tested quartz cobble.

Locus 70 is located 14 meters west of Locus 69 and measures 2 meters northeast to southwest by 1 meter northwest to southeast. Artifacts observed within Locus 70 include: 9 fine grain quartzite flakes (5 primary and 4 secondary), 1 fine grain quartzite bi-directional core and 1 quartzite hammerstone.

Those prehistoric artifacts observed within 30 meters and outside of the loci and features consist of: 6 green porphyritic metavolcanic flakes (4 primary and 2 secondary), 1 tested green porphyritic metavolcanic cobble, 2 green porphyritic metavolcanic uni-directional cores, 1 green porphyritic metavolcanic multi-directional core, 1 black porphyritic metavolcanic core tool, 3 quartzite flakes (2 primary and 1 secondary), 1 tested quartzite cobble, 4 rhyolite primary flakes, 4 quartz flakes (3 primary and 1 secondary), 3 tested quartz cobbles, 1 quartz biface, 1 quartz uni-directional core, 1 quartz spall with a modified edge, 1 quartz edge-modified flake, 1 rose quartz bi-directional core, 1 brown chert biface, 1 highly weathered chert biface, 1 chert secondary flake, 1 tested chert cobble and 1 chert uni-directional core.

The historic component of JM-026 contains 3 concentrations interpreted to be loci that are described as follows:

Locus 71 is located 100 meters south of Locus 70 and measures 6 meters east to west by 3 meters north to south and consists of a deposit of household trash. A total of 313 artifacts were observed within Locus 71 including: 149 tin can and can fragments, approximately 133 glass fragments, 4 whole glass artifacts, 24 miscellaneous metal artifacts, 2 fragments of a porcelain plate with a scalloped edge, several fragments of milled lumber, 1 bundle of finely braided wire and several fragments of burned faunal bone. The organic artifacts and a few of the glass artifacts appear burned, but overall the deposit does not appear to have burned in-situ.

A total of 149 cans and can fragments were identified in Locus 71 including: 14 church key-opened hole-in-top cans with a diameter of 2 and 15/16 inches and a height of 3 and 15/16 inches, 38 church key-opened beverage cans with a diameter 2 and 11/16 inches and a height of 6 and 4/16 inches, 43 rotary-opened sanitary cans (3 with a diameter of 2 and 12/16 inches and a height of 4 inches, 9 with a diameter of 2 and 10/16 inches and a height of 3 and 4/16 inches, 7 with a diameter of 2 and 11/16 inches and a height of 2 and 10/16 inches, 6 with a diameter of 3 inches and a height of 4 and 6/16 inches, 8 with a diameter of 3 and 6/16 inches and a height of 1 and 13/16 inches, 1 with a diameter of 3 and 2/16 inches and a height of 4 and 6/16 inches, 4 with a diameter of 3 and 4/16 inches and a height of 4 and 6/16 inches, 1 with a diameter of 4 inches and a height of 6 and 2/16 inches, 1 with a diameter of 2 and 12/16 inches and a height of 2 and 12/16 inches, 2 with a diameter of 2 and 13/16 inches and a height of 4 and 14/16 inches and 1 with a diameter of 3 and 5/16 inches and a height of 4 and 9/16 inches), 9 rotary removed sanitary can lids, 1 sanitary can with an unknown opening that has a diameter of 2 and 11/16 inches and a height of 4 and 14/16 inches, 28 crushed sanitary cans, 1 aerosol can with a diameter of 2 and 12/16 inches and an approximate height of 5 and 4/16 inches, 1 rectangular key wind and strip can with a length of 3 inches a width of 2 and 4/16 inches and an approximate height of 3 and 8/16 inches, 1 key wind and strip can with a diameter of 2 and 12/16 inches and a height of 1 and 14/16 inches, 1 key wind and strip can with a diameter of 2 and 14/16 inches and an unknown height, 1 rectangular key wind and strip removed lid with an approximate width of 5 inches and an unknown length, 1 key wind and strip removed deviled ham lid with an approximate width of 6 inches and an approximate length of 9 and 4/16 inches, 7 key wind and strips, 1 fragment of an external friction seal can, 1 internal friction seal coffee can lid fragment with a diameter of 5 and 4/16 inches that is embossed with REGULAR GRIND and COFFEEPOT and 1 cardboard tube lid with a diameter of 2 and 2/16 inches.

Of the 133 glass fragments in Locus 71, approximately 100 are colorless glass from an estimated minimum of 19 bottles or jars, 10 are aquamarine window pane glass, 13 are green glass from 1 beverage bottle, 1 is a screw top bottle neck from a brown glass chemical bottle, 9 are colorless glass bottle or jar bases (one with the marks Revlon in cursive and 1, one with the marks 1063-S, MG and 32, one with the marks of an H over an A, 6590, and 4, one with the marks of an H over A and 5298, one with the marks C, a G interconnected with a C, 5, 3656 and 5, one with the marks M-25B78, D-9, 101, an I inside an O, 57 and 4A, one with the marks 101, an I inside an O, 56, D-9, 25, B and 9, one with the marks DIXIE and 8 and one with the marks 3502 an I in a square 56 and C). Of the 4 whole glass artifacts 1 is a colorless glass open mouth jar with the base marks C-4139, 9, an I inside an O, 7 and 2, one is a colorless glass jar with no base mark, one is a colorless glass tumbler with the base mark of an H over an A and one is a colorless cosmetic or medicine jar with the base mark 3.

Twenty-four miscellaneous metal artifacts were identified in Locus 71 including: 17 crown caps, 1 metal wire spool that has a diameter of 2 and 6/16 inches and a height of 10/16 inches, 1 aluminum battery with a wire connection for a battery pack, 3 battery cores, 1 fragment of galvanized steel pipe and 1 fragment of a decorative unknown metal object.

Locus 72 is located 180 meters northeast of Locus 71. Locus 72 measures 6 meters northwest to southeast by 3 meters northeast to southwest and consists of a deposit of household trash. A total of 101 artifacts were observed within Locus 72 including: 94 cans and can fragments, 1 external friction jar lid with a diameter of 2 and 6/16 inches, 4 whole glass artifacts and 2 white porcelain tableware fragments. Of the 94 can and can fragments, 60 are sanitary cans (buried), 2 are beverage cans with an unknown opening that have a diameter of 2 and 11/16 inches and a height of 6 and 4/16 inches, one is a church key-opened sanitary can with a diameter of 4 and 4/16 inches and an unknown height, one is a church key-opened beverage can (buried), 6 are beverage cans (buried), one is a key wind and strip can with a diameter of 5 and 2/16 inches and an unknown height, one is a hole-in-top can with a diameter of 2 and 5/16 inches and a height of 3 and 15/16 inches, 7 are hole-in-top cans (buried), 4 are crushed beverage cans, one is a rotary-opened sanitary can with a diameter of 2 and 11/16 inches and a height of 2 and 10/16 inches, 4 are crushed sanitary cans, one is a crushed hole-in-top can, one is a crushed large external friction can, one is a deviled ham lid fragment, one is an internal friction seal lid with a diameter of 3 and 13/16 inches and 2 are key wind and strip removed coffee lid fragments (1 embossed REGULAR and 1 embossed with GRIND and PERCOLATOR).

A total of 25 artifacts were observed in a dispersed scatter around Locus 72 including: 1 crushed rectangular can, 23 whole glass or glass fragments and 1 white porcelain plate fragment with a gold band. Of the 23 whole glass or glass fragments, 7 are colorless glass jars, 3 are colorless glass medicine or liquor bottles, 2 are colorless glass bottles or jars marked on the base with 0-9, 3 are colorless glass jars marked on the base with BALL, one is a colorless glass bottle or jar marked on the base with an I in an O, 2 are brown glass household chemical bottles, one is a brown glass medicine or liquor bottle, 2 are brown glass bottles or jars marked on the base with LM and 2 are green glass beverage bottles.

Locus 73 is located 88 meters southwest of Locus 72. Locus 73 measures 3 meters northwest to southeast by 2 meters northeast to southwest and consists of a deposit of household trash, primarily food related. A total of approximately 180 artifacts were observed within Locus 73 including: 57 cans and 50 to 100 can fragments, 19 glass fragments, 4 miscellaneous artifacts (1 cone shaped terracotta flower pot with a diameter of 3 and 6/16 inches and a height of 3/16 inches, 1 duct tape fragment, 1 screw top jar lid with a diameter of 2 and 8/16 inches and 1 external friction jar lid with a diameter of 2 and 1/16 inches) and several eggshell fragments. Of the 57 cans and 50 to 100 can fragments, one is a lid (buried), 32 are sanitary cans (buried), one is an external friction can with lid with a diameter of 5 and 2/16 inches and a height of 6 and 4/16 inches, one is an external friction lid with a diameter of 5 and 4/16 inches, 17 are beverage cans (buried), 4 are hole-in-top cans (buried), one is a rectangular spice can (buried), and 50 to 100 are small fragments of rusted tin cans. Of the 19 whole glass or glass fragments, 2 are colorless glass condiment jars, one is a colorless glass cosmetic or medicine bottle, 5 are colorless glass beverage bottles, 3 are colorless glass baby food jars, 3 are colorless glass fragments with the base mark I inside an O, one is a colorless glass bottle with the base mark BEST FOODS, one is a colorless glass bottle with the base mark of 2 interlocking diamonds, one is a colorless glass bottle with the base mark DES. POT. 94824, 2 are green glass beverage bottles and one is a brown glass Clorox bottle with the base marks I inside an O, 80, CLOROX in a diamond and 28.

Those historic artifacts observed within 30 meters and outside of the concentrations and features consist of: 9 hole-in-top cans with a diameter of 2 and 15/16 inches and a height of 3 and 15/16 inches, 3 sanitary cans (one with a crimp seam and rotary opened that has a diameter of 2 and 11/16 inches and a height of 2 and 10/16 inches, one with a 3-inch diameter and a height of 4 and 4/16 inches and one with a diameter of 3 and 2/16 inches and a height of 4 and 6/16 inches), 1 pull-tab beverage can with a diameter of 2 and 8/16 inches and a height of 4 and 13/16 inches, 1 coffee can with a diameter of 5 inches and a height of 6 and 8/16 inches, 1 coffee can with a height of 7 inches and an unknown diameter, 1 aluminum top can with a diameter of 2 and 8/16 inches and a height of 6 and 7/16 inches, 1 beverage can, 1 buried beverage can, 1 meat/fish can with a diameter of 3 and 7/16 inches and a height of 1 and 5/16 inches, 1 meat can lid, 1 internal friction seal lid with a diameter of 4 and 10/16 inches, 1 external friction seal lid with a diameter of 5 and 6/16 inches, 1 key wind removed lid with a diameter of 3 inches, 2 coffee cans with a diameter of 6 inches and a height of 3 and 7/16 inches, 27 fragments of an aqua colored cup and mold bottle with the base mark ROOT, 2 colorless glass condiment jars with the base marks M-25B75, D-9, 101, I inside an O, 57 and 2A, 1 blue glazed white hardpaste earthenware cup and 1 aluminum wash tub.

The further character of artifacts associated with JM-026 is unreported.

The more particular physical context for JM-026, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. Large fan aprons dominate the central portion of the Project area and enter the basin floor up to 3 kilometers from the Lake Cahuilla high shoreline, and extend up to, and in some places, past that line. The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan “aprons” which do not individually fully cover the entire area, and which interfinger and partially bury one another and piedmont remnants. The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units, suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeological deposits beneath that surface. Additionally, much of the site is situated atop an older, relatively stable piedmont remnant, the surface of which is mostly intact and moderately developed desert pavement, which further reduces the likelihood of buried surfaces. Nonetheless, this area does demonstrate the potential for (shallowly) buried preserved surfaces, but there is a high likelihood these deposits will represent the same constituents recorded on the surface. As a result, there is a very low to moderate likelihood for significant subsurface deposition.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret the prehistoric component of JM-026 as primarily an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, with debitage consisting of primary, secondary and tertiary flakes, uni-directional, bi-directional and multi-directional cores, angular waste/shatter and 10 hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same 3 primary stone materials (quartz, metavolcanic and quartzite) that are constituents of the surrounding area, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 97 single reduction localities or episodes. It should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

The presence of flaked stone tools such as the edge-modified flakes and bifaces found at JM-026 is evidence of resource procurement and/or processing of faunal or floral resources. The creation of flaked stone tools requires additional lithic technologies, possibly including bifacial thinning and pressure flaking to shape and refine cutting edges.

Furthermore, archaeologists for the applicant interpret the presence of the hearth features or fire-affected rock as further evidence of resource processing and/or other activities. Hearth features found in association with lithic debitage could be evidence of more complex lithic resource processing activities. Lithic materials intended for flaked tool production were sometimes heat treated using open hearths in order to improve the flaking characteristics of the stone. Feature 2 may be one such hearth feature and may have been constructed to heat treat the chert found in nearby Locus 67. Additionally, open hearths were used in prehistory for various other purposes, such as parching seeds and grains, cooking and to provide personal warmth. Such features may also represent sacred/ritualistic activities associated with cremating the deceased and/or animals, although no calcined bone of any kind was found in association with these features. The conspicuous absence of any evidence of carbon residue and the paucity of artifacts would support the hypothesis that the hearth features associated with JM-026 are surface phenomenon that each resulted from a single episode of use.

Additionally, based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret that deposits of historic artifacts such as the ones found in the historic component of JM-026 typically represent episodes of refuse disposal (dumping). Though dates of manufacture can be determined for some of the artifacts present at JM-026, the time between the initial use/consumption of the artifacts and their ultimate disposal cannot be known, so the specific date of their disposal cannot be reliably determined.

Temporally diagnostic maker’s marks were identified on 23 glass artifacts including: 3 with a Hazel-Atlas Glass Company mark that was used between 1920 and 1964 (Goodman 2002), 1 with Maywood Glass Company mark that was used between 1930 and 1961 (Goodman 2002), 2 with a Latchford-Marble Glass Company mark that was used between 1939 and 1957 (Goodman 2002), 2 with a Glass Containers mark that was in use between 1945 and circa 1971 (Goodman 2002), 4 with a Ball Brothers mark that has been in use since 1888 up though current times and 11 with an Owens-Illinois mark that has been in use since 1954. One of the Owens Illinois maker’s marks carried a date code of “57” indicating it was manufactured in 1957, and another had a date code of “7” indicating that it was made in 1937 or 1947 (Owens Illinois did not change to two-digit date codes until the 1950s) (Lockhart 2004).

Other artifacts present at the site can be attributed to general date ranges. For example, hole-in-top cans such as the lap-seam cans present at this site were initially introduced in the mid-19th century, were common in the late 19th to early 20th century, and fell out of favor in the 1920s when most manufacturers switched to sanitary cans. In the western United States, sites such as this, where sanitary cans outnumber hole-in-cap cans, typically date to post 1922 (Goodman 2002). Also identified were glass bottle shards of a particular aqua color that was common between 1880 and 1920 (Goodman 2002). Additionally, there are beverage cans and hole-in-top cans that were opened with a large (3/4”) church key, reflecting a date of consumption sometime between 1935 and the 1950s.

The combination of these maker's marks and artifact types indicate that the trash was likely deposited sometime after 1957. Additionally, there is virtually no refuse that can be attributed to the 1960s or after, so it seems likely that the time of disposal for all 3 refuse piles was soon after 1957.

Even though this site has artifacts with temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history.

Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. JM-026 is located within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The lack of soil development within the capped alluvial unit suggests this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeological deposits. As a result, there is a very low to moderate likelihood for subsurface deposition. Nonetheless, though this area does demonstrate some potential for (shallowly) buried preserved surfaces, there is a high likelihood these deposits will represent the same constituents recorded on the surface. Therefore, due to the low density of artifacts and low probability for significant subsurface artifacts, the data potential is considered exhausted through recordation of JM-026.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, JM-026 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

JM-029

JM-029 is an oblong shaped prehistoric site that covers a total surface area of 59.37 square meters. The site is located within the southeastern portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan piedmont remnant geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of desert pavement that is moderate to well-developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote and bunch grass.

This lithic scatter site measures 20 meters northwest to southeast by 3 meters northeast to southwest and contains a total of 28 prehistoric artifacts. It consists of 2 concentrations interpreted to be 2 single reduction loci. The areas between the loci are void of artifacts. The prevailing cultural constituents within this site consist of prehistoric lithic debitage. Artifact density at JM-029 is low, with a calculated distribution of 1 artifact per 2.12 square meters. The overall condition of the site is good.

The site contains 2 lithic reduction loci and a total of 28 artifacts, which include: 22 green metavolcanic flakes (5 primary, 12 secondary and 5 tertiary), 3 green metavolcanic cores (2 multi-directional and 1 bi-directional) and 3 hammerstones (1 green metavolcanic, 1 gray metavolcanic and 1 granitic).

Locus 1 is located at the southeast edge of the site approximately 6 meters southeast of the site datum and measures 2 meters east to west by 1 meter north to south. Artifacts observed within Locus 1 include 1 gray metavolcanic hammerstone, 1 granitic hammerstone, 2 green metavolcanic multi-directional cores, and 7 green metavolcanic flakes (2 primary, 3 secondary and 2 tertiary).

Locus 2 is located 16 meters northwest of Locus 1 and measures 2 meters southwest to northeast by 1 meter northwest to southeast. Artifacts observed within Locus 2 consist of 1 gray/green metavolcanic bi-directional core, 1 green metavolcanic hammerstone, and 15 gray/green metavolcanic flakes (3 primary, 9 secondary and 3 tertiary).

The area outside the 2 loci is devoid of artifacts and features. The further character of artifacts associated with JM-029 is unreported.

The more particular physical context for JM-029, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont remnant landform. The fan piedmont remnant landform is an isolated exposure surrounded by the fan apron landform that has been determined to have the same geomorphological characteristics as the fan piedmont (URS 2009: CUL-6). The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007); therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature; debitage consists of primary, secondary and tertiary flakes, multi-directional and bi-directional cores, with hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone (metavolcanic) material that is a constituent of the surrounding area, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 2 single reduction localities or episodes; but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history.

Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. JM-029 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area there is very low likelihood for subsurface archaeological deposits. Therefore, data potential is considered exhausted through recordation of JM-029.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, JM-029 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

JM-030

JM-030 is a circular-shaped prehistoric lithic scatter site that covers a total surface area of 3.1 square meters. The site is located within the southeastern portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan piedmont remnant geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial silts and sands comprised of decomposing metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote, desert trumpet and bunch grasses.

This lithic scatter site measures 1 meter east to west by 1 meter north to south, and contains a total of 27 prehistoric artifacts. The site is 1 concentration interpreted to be a single lithic reduction locus. The prevailing cultural constituents within this site consist of prehistoric lithic reduction debitage. Artifact density at JM-030 is medium, with a calculated distribution of 1 artifact per 0.11 square meter. The overall condition of this site is good with minor natural erosion due to an adjacent ephemeral gully.

The site is a single lithic reduction locus that includes 26 green metavolcanic flakes (6 primary, 12 secondary and 8 tertiary) and 1 green metavolcanic bi-directional core. The further character of artifacts found within site JM-030 is unreported.

The more particular physical context for JM-030, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont remnant geomorphic landform. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont remnant. The moderately consolidated or developed pavement is subject to natural erosion due to its proximity to an ephemeral gully.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature; debitage consists of primary, secondary, and tertiary flakes, and a single core. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this site are of the same primary stone material (metavolcanic) that is a constituent of the surrounding area, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent a single reduction locality or episode. It should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. JM-030 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands comprised of decomposing metavolcanic and granitic gravels and cobbles within the fan piedmont remnant geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation, and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits; therefore, data potential is considered exhausted through recordation of JM-030.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, JM-030 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

JM-042

JM-042 is an amorphous-shaped lithic scatter that covers a total surface of 7,179 square meters. The site is located within the southwest portion of the 450 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of relatively flat, disturbed desert pavement with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote, bunch grass and mesquite.

This lithic scatter site measures 90 meters north to south by 160 meters east to west, and contains a total of 200 prehistoric artifacts. It consists of 9 concentrations interpreted to be single reduction loci, with no artifacts observed outside the loci. The prevailing cultural constituents within this site consist of prehistoric lithic artifacts. Artifact density at JM-042 is low, with a calculated distribution of 1 artifact per 24 square meters. The site also includes segments of a prehistoric trail (T-52). The overall condition of the site is fair.

The artifact types and materials present at JM-042 include: 157 green metavolcanic flakes (63 primary, 60 secondary, 34 tertiary), 22 quartz flakes, 13 cryptocrystalline silicate chert flakes, 2 green metavolcanic cores, 2 metavolcanic hammerstones, 2 cryptocrystalline silicate chert hammerstones, 1 quartz hammerstone, and 1 metavolcanic tested cobble.

Locus 1 is located within the southwest portion of the site boundary and is situated atop disturbed desert pavement. Locus 1 measures 6 meters north to south by 5 meters east to west. Artifacts observed within Locus 1 include 23 metavolcanic flakes (11 primary, 11 secondary and 1 tertiary) and 1 cryptocrystalline silicate core tool.

Locus 2 is located 38 meters west of Locus 1. Locus 2 measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 2 include 22 quartz flakes (8 primary, 8 secondary and 6 tertiary).

Locus 3 is located 33 meters west of Locus 2. Locus 3 measures 3 meters north to south by 3 meters east to west. Artifacts observed within Locus 3 include 20 metavolcanic flakes (8 primary, 7 secondary and 5 tertiary) and 1 core tool.

Locus 4 is located 13 meters west of Locus 3. Locus 4 measures 3 meters north to south by 4 meters west to east. Artifacts observed within Locus 4 include 55 metavolcanic flakes (14 primary, 22 secondary, 19 tertiary).

Locus 5 is located 17 meters southwest from Locus 4. Locus 5 measures 3 meters north to south by 4 meters east to west. Artifacts observed within Locus 5 include 13 cryptocrystalline silicate chert flakes (4 primary, 5 secondary, 4 tertiary) and 1 quartz hammerstone.

Locus 6 is located 88 meters northeast of Locus 5. Locus 6 measures 6 meters north to south by 2 meters east to west. Artifacts observed within Locus 6 include 37 metavolcanic flakes (17 primary, 14 secondary, 6 tertiary) and 1 green metavolcanic core tool.

Locus 7 is located 16 meters northeast of Locus 6. Locus 7 measures 7 meters north to south by 5 meters east to west. Artifacts observed within Locus 7 include 7 metavolcanic flakes (6 primary, 1 secondary) and 1 metavolcanic tested cobble.

Locus 8 is located 34 meters northeast of Locus 7. Locus 8 measures 3 meters north to south by 3 meters east to west. Artifacts observed within Locus 8 include 8 metavolcanic flakes (4 primary, 1 secondary, 3 tertiary) and 2 metavolcanic bi-directional cores.

Locus 9 is located 3 meters northeast of Locus 6. Locus 9 measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 9 include 7 metavolcanic flakes (3 primary, 4 secondary) and 1 metavolcanic uni-directional core tool.

No artifacts were observed outside the loci. The further character of artifacts associated with JM-042 is unreported.

The more particular physical context for JM-042, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007); therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature; debitage consists primarily of primary and secondary flakes with unifacial cores, core tools, angular waste/shatter, and a hammerstone. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of 3 primary stone materials (green metavolcanic, quartz, and cryptocrystalline silicate) that are constituents of the surrounding area, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 9 single reduction localities or episodes; but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. This geomorphic landform indicates a Pleistocene (or older) period of formation, and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits; therefore, data potential is considered exhausted through recordation of JM-042.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, JM-042 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

JMR-004

JMR-004 is an oval-shaped, fire-altered rock feature and a single prehistoric core that covers a total surface area of 14 square meters. The site is located within the southeastern portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan piedmont remnant geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of well developed, intact pavement comprised of small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils at this site contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include: creosote, burrowbush, bunch grass, and desert trumpet.

This site measures 5 meters northwest to southeast by 5 meters northeast to southwest and contains a total of 1 feature and 1 prehistoric artifact. The prevailing cultural constituents within this site consist of a cluster of fire-affected rock interpreted to be a hearth feature, and a single uni-directional core. Artifact density at JMR-004 is low, with a calculated distribution of 1 artifact per 14 square meters. The overall condition of the site is good with no visible alterations.

Feature 1 is a fire affect rock/deflated hearth feature that is partially disarticulated but retains a rough circular pattern. Feature 1 measures approximately 5 meters northwest to southeast by 5 meters northeast to southwest. It is comprised of over 40 small granitic and metavolcanic cobbles, which measure 5 centimeters to 8 centimeters in diameter and show evidence of being fire-affected. A single green cryptocrystalline silicate uni-directional core was observed in association with Feature 1. The further character of artifacts associated with Feature 1 is unreported.

The more particular physical context for JMR-004, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont remnant land form. The fan piedmont remnant land form is an isolated exposure surrounded by the fan apron land form that has been determined to have the same geomorphological characteristics as the fan piedmont (URS 2009:CUL-6). The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007); therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret the presence of a hearth feature or fire-affected rock as evidence of resource processing and/or other activities. Hearth features found in association with lithic debitage could be evidence of more complex lithic resource processing activities. Lithic materials intended for flaked tool production were sometimes heat treated using open hearths in order to improve the flaking characteristics of the stone. Additionally, open hearths were used in prehistory for various other purposes such as parching seeds and grains, cooking, and to provide personal warmth. Such features may also represent sacred/ritualistic activities associated with cremating the deceased and/or animals. The conspicuous absence of any evidence of carbon residue and the paucity of artifacts would support the hypothesis that JM-004 is a surface phenomenon that likely resulted from a single episode of use.

This site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. JMR-004 is situated atop a subordinate landform characterized as a very old fan surface within the fan piedmont remnant landform. The fan piedmont remnant landform is an isolated exposure surrounded by the fan apron landform that has been determined to have the same geomorphological characteristics as the fan piedmont (URS 2009: CUL-6). In addition, there is no visible charcoal or staining on the surface, so no carbon-14 sample can be extracted for chronometric dating, given the high deflation rate of the hearth situated atop the piedmont remnant removes subsurface potential. This geomorphic landform indicates a Pleistocene (or older) period of formation, and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits; therefore, data potential is considered exhausted through recordation of JMR-004.

As a result, JMR-004 is recommended not eligible for the National Register and is not a historical resource pursuant to National Register and California Register under any of the criteria for eligibility. In addition, JMR-004 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

JMR-008

JMR-008 is a circular-shaped prehistoric lithic scatter that covers a total surface area of 2.62 square meters. The site is located within the south central portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan piedmont remnant geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is well developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote and bunch grass.

This lithic scatter site measures 3 meters east to west by 1 meters north to south, and contains a total of 16 prehistoric artifacts. The prevailing cultural constituents within this site consist of lithic reduction debitage. Artifact density at JMR-008 is low, with a calculated distribution of 1 artifact per 0.19 square meters. The overall condition of the site is good.

The artifact types and materials present at the site include: 14 quartz flakes (4 primary, 7 secondary and 3 tertiary), 1 uni-directional quartz core and 1 bi-directional quartz core. The further character of artifacts associated with JMR-008 is unreported.

The more particular physical context for JMR-008, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface mantled by a younger fan apron within the fan piedmont remnant landform. The fan piedmont remnant land form is an isolated exposure surrounded by the fan apron landform that has been determined to have the same geomorphological characteristics as the fan piedmont (URS 2009: CUL-6). The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for Early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007); therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont. However, areas of active erosion, such as the younger fan where this site is located, do have a slightly greater potential for the presence of subsurface deposits where recent alluvium has been deposited. Given the highly erosive nature of the fan piedmont remnant landform, it seems unlikely that such subsurface deposits would have been preserved. Furthermore, if subsurface cultural deposits were to be preserved under such isolated inset pediments, they will most likely be similar in quality and quantity of artifacts to those sites found on the surface in nearby remnant portions of the fan piedmont (URS 2009: CUL-8).

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists primarily of secondary flakes and cores. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone quartz material that is a constituent of the surrounding area, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 1 single reduction locality or episode. It should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. JMR-008 is situated atop a subordinate landform characterized as a very old fan surface mantled by a younger fan apron within the fan piedmont remnant landform. This geomorphic landform indicates a Pleistocene (or older) period of formation, and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits. The presence of a younger fan such as where this site is located increases that likelihood slightly. If shallowly buried archaeological deposits are present, it is unlikely that they would have been preserved; therefore, data potential is considered exhausted through recordation of JMR-008.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, JMR-008 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

JMR-012

JMR-012 is an oblong-shaped lithic scatter that covers a total surface area of 59 square meters. The site is located within the south central portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan piedmont remnant geomorphic landform, cut through by a gully/active wash, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is well developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote.

This lithic scatter site measures 22 meters northeast to southwest by 4 meters northwest to southeast, and contains a total of 42 prehistoric artifacts. It consists of 1 concentration interpreted to be a single reduction locus, with 41 artifacts and 1 additional artifact observed outside the locus. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at JMR-0 12 is low, with a calculated distribution of 1 artifact per 1.4 square meters. The overall condition of the site is fair due to off-highway vehicle tracks running in a north to south direction, located 10 meters north.

The artifact types and materials present at the site include 41 quartz flakes (7 primary, 17 secondary, 17 tertiary) and 1 unifacially retouched edge-modified quartz flake.

Locus 1 is located in the northeast portion of the site and measures 3 meters east to west by 2 meters north to south. Artifacts observed within Locus 1 include 41 quartz flakes (7 primary, 17 secondary and 17 tertiary).Those artifacts observed within 30 meters and outside of the locus consists of 1 unifacially retouched edge-modified quartz flake. The further character of artifacts within JMR-012 is unreported.

The more particular physical context for JMR-012, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont remnant landform. The fan piedmont remnant land form is an isolated exposure surrounded by the fan apron landform that has been determined to have the same geomorphological characteristics as the fan piedmont (URS 2009: CUL-6). The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature; debitage consists primarily of secondary and tertiary flakes. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the lithic materials reduced in JMR-012 are of the same primary stone (quartz) material that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent a single reduction localities or episodes. It should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

The presence of flaked stone tools such as the unifacially retouched flake found within JMR-012 represents resource procurement and/or processing of faunal or floral resources. The creation of flaked stone tools requires additional lithic technologies, possible including bifacial thinning and pressure flaking to shape and refine cutting edges, but this particular tool was expediently produced such that it is likely little time was spent modifying it to increase its efficiency.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. JMR-012 is situated atop a subordinate landform characterized as a very old fan surface within the fan piedmont remnant landform. The fan piedmont remnant landform is an isolated exposure surrounded by the fan apron land form that has been determined to have the same geomorphological characteristics as the fan piedmont (URS 2009: CUL-6). This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits, therefore data potential is considered exhausted through recordation of JMR-012.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, JMR-012 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

LL-018

LL-018 is an amorphous-shaped lithic scatter that covers a total surface of 200 square meters. The site is located within the eastern portion 450 MW area of the Proposed Solar Two Project. The site is situated within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation (URS 2009). Most of the site is on older fan remnant with a small portion of the site being located on recent alluvium within an active wash. The portions of the site that are on older fan surfaces are covered by intact desert pavement that is well developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. The portions of the site which are located on the active wash have no desert pavement. Vegetation species on the site include creosote, bunch grass and mesquite.

This lithic scatter site measures 31 meters north to south by 26 meters east to west, and contains a total of 26 prehistoric artifacts. It consists of 3 concentrations interpreted to be lithic scatters, containing 21 artifacts and 5 additional artifacts observed outside the loci. The prevailing cultural constituents within this site consist of prehistoric lithic debitage. Artifact density at LL-018 is low, with a calculated distribution of 1 artifact per 8 square meters. The overall condition of the site is good, with minor alterations from wash/road on the western edge of the site and evidence of modern human activity on site.

The site contains 3 lithic scatters and a total of 26 artifacts, which include: 8 quartz flakes (7 secondary and 1 tertiary), 14 cryptocrystalline silicate chert flakes (1 primary, 6 secondary and 7 tertiary), 2 cryptocrystalline silicate chert cores and 1 quartzite secondary flake.

Locus 1 is located in the southwestern portion of the site and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 1 include 3 quartzite secondary flakes and 1 uni-directional cryptocrystalline silicate gray chert core.

Locus 2 is located 14 meters northeast of Locus 1, and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 2 include 4 quartz flakes (3 secondary and 1 tertiary).

Locus 3 is located 7 meters northeast of Locus 2 and measures 1 meter north to south by 3 meters east to west. Artifacts observed within Locus 3 include 12 cryptocrystalline silicate chert flakes (5 secondary and 7 tertiary) and 1 quartzite secondary flake.

Those artifacts observed within 30 meters and outside the loci consist of 2 cryptocrystalline silicate chert flakes (1 primary and 1 secondary), 1 green cryptocrystalline silicate chert scraper, 1 gray cryptocrystalline silicate chert core and 1 quartz secondary flake. The further character of artifacts found within LL-018 is unreported.

The more particular physical context for LL-018, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, the majority of the site appears to be on an older fan surface within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan "aprons," which do not individually fully cover the entire area, and which interfinger and partially bury one another and piedmont remnants. The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeological deposits. Nonetheless, this area does demonstrate the potential for (shallowly) buried preserved surfaces, but there is a high likelihood these deposits will represent the same constituents recorded on the surface. As a result there is a very low to moderate likelihood for subsurface deposition. The western margin of the site has been cut through by an ephemeral wash. Areas of active erosion such as this do have a slightly greater potential for the presence of subsurface deposits such as would occur where recent alluvium was deposited. Given the highly erosive nature of active and ephemeral washes, it seems unlikely that such subsurface deposits within those contexts would have been preserved. The desert pavement for the majority of the site is intact and well-developed, consisting of small to large, sub-rounded to sub-angular metavolcanic, basalt, quartz, quartzite and granite gravels and cobbles overlaying coarse sands and fine gravels. The western margin of the site is composed of recent alluvium with no desert pavement present.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists primarily secondary and tertiary flakes with 3 chert cores. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the 2 primary stone materials (chert and quartz) that are constituents of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 2 single reduction localities or episodes. It should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. LL-018 is located within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The lack of soil development within the capped alluvial unit suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time, thus reducing the potential for extensive buried archaeological deposits. The western margin of this site extends into an ephemeral wash. As a result, there is a very low to moderate likelihood for subsurface deposition. Nonetheless, though this area does demonstrate some potential for (shallowly) buried preserved surfaces, there is a high likelihood these deposits will represent the same constituents recorded on the surface, or the context of the artifacts is likely to be disturbed. Therefore, due to the low density of artifacts and low probability for significant subsurface artifacts, the data potential for this site is considered exhausted through recordation.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, LL-018 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

LL-019

LL-019 is an oval-shaped prehistoric lithic scatter site that covers a total surface of 11,417 square meters. The site is located within the eastern portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan piedmont remnant geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of disturbed desert pavement with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote and burrobush.

This lithic scatter site measures 150 meters east to west by 98 meters north to south, and contains a total of 200 prehistoric artifacts. It consists of 2 rock cluster features and 4 concentrations interpreted to be 3 single reduction loci and 1 lithic scatter locus with 160 artifacts. There were an additional 7 artifacts associated with Feature 1 and another 33 artifacts observed outside the loci and features. The prevailing cultural constituents within this site consist of prehistoric artifacts and features. Artifact density at LL-019 is low, with a calculated distribution of 1 artifact per 57 square meters. The overall condition of the site is fair with disturbances caused by off road vehicle tracks.

Artifact types and materials present at the site include: 112 metavolcanic flakes (31 primary, 45 secondary, 36 tertiary), 8 metavolcanic cores (2 uni-directional, 2 multi-directional); 62 quartz flakes (33 primary, 23 secondary, 6 tertiary), 2 tested cobbles, 5 uni-directional quartz cores, and 1 quartzite hammerstone; 7 cryptocrystalline silicate brown chert flakes (3 primary, 4 secondary), 1 chert core, tested cobble, as well as 1 cryptocrystalline silicate chalcedony primary flake.

Feature 1 is located in the southwest corner of the site boundary. Feature 1 consists of a prehistoric rock cluster measuring 1 meter north to south by 2 meters east to west by 0.25 meters high and is constructed of approximately 50 angular rocks of metavolcanic material. Artifacts associated with this feature consist of 1 chalcedony primary flake and 6 quartz flakes (2 primary, 4 secondary).

Feature 2 is located 59 meters north of Feature 1 within Locus 2. Feature 2 consists of a prehistoric rock cluster measuring 2 meters north to south by 1 meter east to west by 28 centimeters high and is constructed of approximately 50 angular rocks of metavolcanic material. Artifacts associated with this feature consist of sparse concentrations of metavolcanic and quartzite flakes.

Locus 1 is located 45 meters north from Feature 1 and measures 3 meters north to south by 3 meters east to west. Artifacts observed within Locus 1 include 23 green metavolcanic flakes (6 primary, 13 secondary, 4 tertiary).

Locus 2 is located 20 meters northwest of Locus 1 and measures 8 meters north to south by 17 meters east to west. Artifacts observed within Locus 2 include: 37 total artifacts consisting of 8 green metavolcanic flakes (5 primary, 3 tertiary), 25 quartz flakes (11 primary, 8 secondary, 6 tertiary), 3 uni-directional quartz cores and 1 uni-directional metavolcanic core.

Locus 3 is located 9 meters east of Locus 2 and measures 6 meters east to west by 3 meters north to south. Artifacts observed within Locus 3 include: 28 total artifacts consisting of 14 green metavolcanic flakes (4 primary, 4 secondary, 6 tertiary), 5 quartz flakes (4 primary, 1 secondary), 6 brown chert flakes (3 primary and 3 secondary), 1 green metavolcanic multi-directional core, 1 brown chert uni-directional core and 1 quartz hammerstone.

Locus 4 is located 45 meters west of Locus 3 and measures 11 meters north to south by 10 meters east to west. Artifacts observed within Locus 4 include: 72 total artifacts consisting of 47 green metavolcanic flakes (5 primary, 22 secondary, 20 tertiary), 8 black metavolcanic flakes (2 primary, 5 secondary, 1 tertiary), 14 quartz flakes (7 primary, 7 secondary), 2 green metavolcanic multi-directional cores and 1 green metavolcanic uni-directional core.

Those artifacts observed outside the loci consist of 33 artifacts including 12 green metavolcanic flakes (9 primary, 1 secondary, 2 tertiary), 12 quartzite flakes (9 primary, 3 secondary), 1 cryptocrystalline silicate chert secondary flake, 3 metavolcanic cores, 2 quartzite cores, 2 quartz tested cobbles and 1 chert tested cobble. The further character of artifacts associated with LL-019 is unreported.

The more particular physical context for LL-019, extrapolating information from Data Response 112 Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont remnant landform. The fan piedmont remnant landform is an isolated exposure surrounded by the fan apron landform that has been determined to have the same geomorphological characteristics as the fan piedmont (URS 2009:CUL-6). The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists primarily of primary, secondary, and tertiary flakes, cores, and a single hammerstone. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic reduction site are of the same primary stone materials (metavolcanic, quartz, and cryptocrystalline silicate) that are constituents of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 3 single reduction localities or episodes and 1 lithic scatter, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Also present at LL-019 are 2 rock cluster features. Though neither cluster has any temporally diagnostic characteristics, evidence seems to support the hypothesis that they are prehistoric in age. Both clusters are spatially associated with lithic debitage and both clusters are predominantly made up of the same stone material (metavolcanic) that also predominates in the greater artifact assemblage at EBR-019. Therefore, it seems likely that the 2 rock cluster features present at EBR-019 are localities where lithic raw material was collected in order to increase the efficiency of stone tool manufacture.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. LL-019 is situated atop a subordinate landform characterized as a very old fan surface within the fan piedmont remnant landform. The fan piedmont remnant land form is an isolated exposure surrounded by the fan apron landform that has been determined to have the same geomorphological characteristics as the fan piedmont (URS 2009: CUL-6). This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits. Therefore data potential is considered exhausted through recordation of LL-019.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, LL-019 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

RAN-005

RAN-005 is a triangular-shaped historic site containing a US General Land Office (GLO) survey benchmark that covers a total surface of 145 square meters. The site is located within the northwest portion of the 450 MW area of the Proposed Solar Two Project. The site is within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site largely consists of alluvial sediments bound to the east and west by intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote, desert trumpet and bunch grass.

This historic site measures 26 meters north to south by 11 meters east to west, and contains a total of 1 historic artifact and 1 historic feature. The prevailing cultural constituents within this site consist of a single historic artifact and a single historic feature. Artifact density at RAN-005 is low, with a calculated distribution of 1 artifact per 72.2 square meters. The overall condition of the site is good.

The site contains a single historic feature and 1 historic artifact. The historic artifact is located approximately 25 meters north of the feature and is a tobacco can made of ferrous metal with a curved base shape and no diagnostic marks. The base of the tobacco can measures 3 inches by 1 inch. Modern wooden lathe stake fragments and bailing wire were also observed. The further character of the artifacts associated with RAN-005 is unreported.

Feature 1 is a United State General Land Office corner section benchmark. It consists of a single metal pipe extending vertically from the ground surface approximately 1 foot and topped with a brass cap that measures 3.5 inches in diameter. The brass cap is stamped with the words, "US GENERAL LAND OFFICE SURVEY 1912," "PENALTY $250 FOR REMOVAL," "T16S," R10E," "S12/S13," "R11E" and "S17/S18."

The more particular physical context for RAN-005, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Because the surface of the site is situated within the fan piedmont and consists of a single episode of installing a US GLO benchmark there is a very low likelihood for subsurface deposition.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret that General Land Office cadastral benchmarks such as the one found in RAN-005 were placed by surveyors as a part of the Public Lands Survey System (PLSS). That system divided public lands into sections of 1 square mile (640 acres) and into quarter sections of 160 acres. The PLSS was created by the Land Ordinance of 1785, which declared that lands outside the then-existing states could not be sold, otherwise distributed, or opened for settlement prior to being surveyed (Stewart 1935). Along with the Homestead Act of 1862 and the Desert Land Act of 1877, the PLSS helped facilitate the U.S. expansion westward in the late 19th and early 20th centuries. Destruction is still prohibited under federal law; therefore, it is recommended that the US GLO benchmark be left undisturbed during construction activities.

The single upright oval-shaped tobacco can present shows no temporally diagnostic characteristics. Such cans began being manufactured around 1913 and continued into production until at least 1988 when R.J. Reynolds abandoned tin packaging in favor of paper pouches (Rock 1988).

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. Therefore, data potential is considered exhausted through recordation of RAN-005.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, RAN-005 is not considered a contributor to an existing and/or proposed archaeological district or landscape. However, destruction of US GLO benchmarks is still prohibited by law and therefore it is recommended that this benchmark be left undisturbed.

RAN-006

RAN-006 is an oblong-shaped historic refuse deposit site that covers a total surface area of 1,300 square meters. The site is located within the northwest portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within an active gully (wash) surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of disturbed desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles. Vegetation on the site include creosote and bunch grass.

This historic refuse deposit site measures 70 meters east to west by 38 meters north to south, and contains a total of 113 historic artifacts. It consists of 1 concentration interpreted to be 1 locus, with 44 artifacts plus 69 additional artifacts observed outside the locus. The prevailing cultural constituents within this site consist of historic artifacts. Artifact density at RAN-006 is low, with a calculated distribution of 1 artifact per 40.63 square meters. The overall condition of the site is fair.

This site contains a total of 113 historic artifacts, which includes: 21 historic cans (1 Eastside cone top beer, 17 church key, 1 roll top and 2 sanitary food), 23 colorless glass fragments, 2 colorless "White Magic" bottle fragments (1 base and 1 top), 52 brown Owens-Illinois Duraglas bottle fragments (including base and neck), 2 aqua bottle fragments (base and neck), 1 colorless coke bottle base from El Centro, California, 1 colorless Parsons Ammonia bottle base, 17 colorless "Double Cola" bottle glass fragments, and 1 braided cable. Also noted, but not included in the total artifact count, are 3 modern pull tab cans.

Locus 1 is located at the head of an ephemeral gully immediately adjacent to the wash near the southern central boundary of the site and measures 14 meters north to south by 7 meters east to west. Artifacts observed within Locus 1 include: 15 historic cans (13 church key-opened cans and 2 sanitary food tins) and 29 colorless glass fragments of 1 or more bottles (including a "White Magic" bottle base and neck). Three modern "Budweiser" pull tab cans are also noted within Locus 1.

Those artifacts observed within 30 meters, outside of the loci and feature consist of 2 historic beverage cans (1 Eastside cone top beer can and 1 roll top can), 66 glass fragments belonging to an estimated minimum of 6 bottles (including 1 brown Owens-Illinois Duraglas bottle base and neck, 1 colorless "Parsons Ammonia" bottle base, 1 "Coca-Cola" bottle base and associated fragments embossed with "El Centro, CA," 15 fragments from 2 “Double Cola" 16 oz. bottles with a red and white applied color label and 1 aqua bottle base and neck), and 1 braided cable (0.75-inch diameter by approximately 20 inches in length).

The more particular physical context for RAN-006, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be within an active wash surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont. Areas of active erosion within the fan piedmont, such as where this site is located, do have a slightly greater potential for the presence of subsurface deposits such as would occur where recent alluvium was deposited. Given the highly erosive nature of the fan piedmont it seems unlikely that such subsurface deposits would have been preserved. Furthermore, if subsurface cultural deposits were to be preserved under such isolated inset pediments, they will most likely be similar in quality and quantity of artifacts to those sites found on the surface in nearby remnant portions of the fan piedmont (URS 2009: CUL-8).

Specific maker's marks found on artifacts at RAN-006 include 2 “Double Cola" clear glass bottles with a red and white applied color label and a "Parsons Ammonia" bottle base manufactured by the Owens-Illinois Glass Company post-1954. A brown Duraglas bottle base and neck also manufactured by Owens-Illinois dates from 1940 to 1971. A "White Magic" bleach bottle base and neck manufactured by Glass Containers dates from 1945 to 1971 (Goodman 2002). Cone top beer cans such as the one present at RAN-006 were first introduced in 1935 and continued being produced into the 1950s (Goodman 2002).

Deposits of historic artifacts, such as the one found at RAN-006, typically represent episodes of refuse disposal and/or loss of individual articles in situ. In the case of RAN-006, the relatively large number of artifact types present would more likely have resulted from dumping of a wide range of artifact types that would be expected in an assemblage of common household refuse rather than in-situ disposal. Though approximate dates of manufacture can be determined for some of the artifacts present at RAN-006, the time between the initial use/consumption of the artifacts and their ultimate disposal cannot be known so the specific date of their disposal cannot be reliably determined. Based on the datable material it is plausible that this historic refuse deposit date between the 1940s and 1950s.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. RAN-006 is situated within an active wash within the fan piedmont. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area there is very low likelihood for subsurface archaeological deposits. Areas of active erosion within the fan piedmont such as where this site is located do have a slightly greater potential for the presence of subsurface archaeological deposits such as might occur where recent alluvium was deposited. Given the highly erosive nature of active washes within the fan piedmont, it seems unlikely that such subsurface deposits would have been preserved. Furthermore, if subsurface cultural deposits were to be preserved under such isolated inset pediments, they will most likely be similar in quality and quantity of artifacts to those sites found on the surface in nearby remnant portions of the fan piedmont (URS 2009:CUL-8). Therefore, data potential is considered exhausted through recordation of RAN-006.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, RAN-006 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

RAN-008

RAN-008 is an historic oblong-shaped site containing a US General Land Office (GLO) benchmark feature that covers a total surface of 17.5 square meters. The site is located within the western portion of the 450 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands composed of decomposed metavolcanic and granitic gravels and cobbles. No vegetation species were observed on the site.

This site measures 6 meters east to west by 4 meters north to south, and contains 1 feature with no associated historic artifacts. Also present are 3 modern lathe stakes. The overall condition of the site is fair due to alterations by off highway vehicle tracks.

Feature 1 is a United States Government Land Office survey quarter benchmark. It is a single metal pipe that extends vertically 6.5 inches from the ground surface and is topped with a brass cap that measures 1.5 inches in diameter. The brass cap is stamped with the words, "US GENERAL LAND OFFICE SURVEY 19__," "PENALTY $250 FOR REMOVAL," and "1/4 S14/S13." The further character of artifacts associated with Feature 1 is unreported.

The more particular physical context for RAN-008, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009).

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret that General Land Office cadastral benchmarks such as the one found in RAN-008 were placed by surveyors as a part of the Public Lands Survey System (PLSS). That system divided public lands into sections of 1 square mile (640 acres) and into quarter sections of 160 acres. The PLSS was created by the Land Ordinance of 1785, which declared that lands outside the then-existing states could not be sold, otherwise distributed, or opened for settlement prior to being surveyed (Stewart 1935). Along with the Homestead Act of 1862 and the Desert Land Act of 1877, the PLSS helped facilitate the U.S. expansion westward in the late 19th and early 20th centuries. The date stamp on this benchmark was left blank. Based on observations of similar benchmarks in the project area that are dated 1912, it seems likely that this benchmark was placed during that same survey effort and therefore also dates back to 1912.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. RAN-008 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform and historic feature (single episode activity) have a very low likelihood for subsurface archaeological deposits, therefore data potential is considered exhausted through recordation of RAN-008.

As a result, this site as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, RAN-008 is not considered a contributor to an existing and/or proposed archaeological district or landscape. However, destruction of US GLO benchmarks is prohibited by law and therefore it is recommended that this benchmark be left undisturbed.

RAN-012

RAN-012 is an amorphous-shaped archaeological deposit that includes both prehistoric and historic components and covers a total surface of 1,569 square meters. The site is located within the northwestern portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within an active wash surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of an east facing slope of a dissected fan piedmont covered by intact desert pavement that is heavily disturbed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote and salt bush.

This archaeological deposit measures 53 meters north to south by 88 meters east to west and contains a total of 229 prehistoric and 7 historic artifacts. The prehistoric component consists of 3 concentrations interpreted to be 3 single reduction loci, with 42 artifacts and 187 additional prehistoric artifacts observed outside the loci, including ceramic sherds, which are interpreted to be flaked stone and ceramic scatters. The historic component consists of 6 rock cluster features and 7 historic/modern artifacts interpreted to be historic period refuse discard and mining/clearing push piles. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at RAN-012 is low, with a calculated distribution of 1 artifact per 7.44 square meters. The overall condition of the site is fair; additionally, the site is eroding downslope into a large ephemeral gully that runs through the south margin of the site.

The artifact types and materials present at RAN-012 include 153 metavolcanic flakes (55 primary, 49 secondary and 49 tertiary), 5 red rhyolite flakes (3 secondary and 2 tertiary), 4 tertiary cryptocrystalline silicate flakes, 2 primary chert flakes, 9 quartzite flakes (4 primary, 2 secondary and 3 tertiary), 12 quartz flakes (6 primary, 3 secondary and 3 tertiary), 9 basalt flakes (4 primary and 5 secondary), 11 metavolcanic cores, 1 cryptocrystalline silicate core, 2 quartzite cores, 4 quartz cores, 1 basalt core, 1 petrified wood core, 1 unspecified material core, 6 metavolcanic tested cobbles, 1 quartzite tested cobble, 1 quartz tested cobble, 1 basalt tested cobble and 5 Colorado buffware (fire affected) body sherds. Also present were 7 historic/modern artifacts, including 1 oil can, 1 aluminum pull tab beer can, 1 unidentified metal can body fragment, 2 pieces of weathered cut large mammal bone, 1 modern continuous thread "Budweiser" brown glass bottle and 1 bullet casing.

Feature 1 is a pile of small white quartz pebbles located in the western part of the central portion of the site approximately 30 meters away from a sandy wash. Feature 1 measures 1 meter north to south by 2 meters east to west and is partially deflated. The feature is comprised of approximately 100 sub-rounded to sub-angular weathered quartz pebbles that range between 3 centimeters and 10 centimeters in size and contains 1 green metavolcanic secondary flake.

Feature 2 is a low cluster of rounded to sub-angular pebbles that measures 1 meter north to south by 1 meter east to west and is located 48 meters east of Feature 1. Feature 2 is made up of approximately 60 pebbles that range in size from 9 centimeters to 15 centimeters. Feature 2 is located near the northern boundary of the site and appears to be related to gravel mining.

Feature 3 is a cluster of cobbles that measures approximately 2 meters north to south by 1 meter east to west by 15 centimeters high and is located 56 meters south of Feature 2. Feature 3 is made up of approximately 60 pebbles that range in size from 9 centimeters to 15 centimeters.

Feature 4 is a pile of cobbles that have been widely scattered. Feature 4 measures approximately 2 meters north to south by 2 meters east to west and is located 4 meters south of Feature 3.

Feature 5 is a cluster of cobbles that measures approximately 1 meter in diameter and is located 5 meters south of Feature 4. Feature 5 is roughly circular in plan and is made up of approximately 60 pebbles that range in size from 9 centimeters to 15 centimeters.

Feature 6 is a scatter of sub-angular to sub-rounded quartz pebbles that measures approximately 2 meters north to south by 2 meters east to west and is located 82 meters east of Feature 5. The scatter is made up of approximately 100 pebbles that range in size from 2 centimeters to 7 centimeters.

Locus 1 is 27 meters is located in the southwestern portion of the site and measures 90 centimeters north to south by 50 centimeters east to west. Artifacts observed within Locus 1 include: 6 gray metavolcanic flakes (4 primary, 1 secondary and 1 tertiary) and 1 uni-directional core.

Locus 2 is located 29 meters northeast of Locus 1 and measures 3 meters east to west by 2 meters north to south. Artifacts observed within Locus 2 include: 26 green metavolcanic flakes (5 primary, 6 secondary and 15 tertiary) and 1 red rhyolite tertiary flake.

Locus 3 is located 23 meters southwest of Locus 2 and measures 2 meters northeast to southwest by 40 centimeters northwest to southeast. Locus 3 has a total of 8 green metavolcanic flakes (3 primary, 1 secondary and 4 tertiary).

Those artifacts observed outside the loci and within 30 meters consist of 187 prehistoric artifacts and 7 historic/modern artifacts including 113 metavolcanic flakes (43 primary, 41 secondary and 29 tertiary), 4 red rhyolite flakes (3 secondary and 1 tertiary), 4 tertiary cryptocrystalline silicate, 2 primary chert flakes, 9 quartzite flakes (4 primary, 2 secondary and 3 tertiary), 12 quartz flakes (6 primary, 3 secondary and 3 tertiary), 9 basalt flakes (4 primary and 5 secondary), 11 metavolcanic cores, 1 cryptocrystalline silicate core, 2 quartzite cores, 4 quartz cores, 1 basalt core, 1 petrified wood core, 6 metavolcanic tested cobbles, 1 quartzite tested cobble, 1 quartz tested cobble, 1 basalt tested cobble and 5 Colorado buffware (fire affected) body sherds. Potentially modern artifacts include 1 oil can, 1 aluminum pull tab beer can, 1 unidentified metal can body fragment, 2 pieces of weathered cut large mammal bone, 1 modern continuous thread "Budweiser" brown glass bottle and 1 bullet casing. The further character of artifacts associated with RAN-012 is unreported.

The more particular physical context for RAN-012, extrapolating information from Data Response 112 Figure 4 (URS 2009), to the location of the site, appears to be along the slope of a large erosional gully (active wash) surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and redeposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont. Areas of active erosion within the fan piedmont, such as where this site is located, do have a slightly greater potential for the presence of subsurface deposits such as would occur where recent alluvium was deposited. Given the highly erosive nature of the fan piedmont it seems unlikely that such subsurface deposits would have been preserved. Furthermore, if subsurface cultural deposits were to be preserved under such isolated inset pediments, they will most likely be similar in quality and quantity of artifacts to those sites found on the surface in nearby remnant portions of the fan piedmont (URS 2009: CUL-8).

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret the lithic component of this site primarily as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists of primary, secondary and tertiary flakes, cores and hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this site are of the same primary stone material (metavolcanic), that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 3 single reduction localities or episodes, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

The presence of flaked stone tools (2 edge-modified flakes) within RAN-012 represents resource procurement and/or processing of faunal or floral resources. The creation of flaked stone tools requires additional lithic technologies, possibly including bifacial thinning and pressure flaking to shape and refine cutting edges. Additionally, there is 1 core tool and 1 utilized flake present, which would have been expedient tools, with little energy spent on them to modify their forms for greater effectiveness.

Ceramic sherds such as the 5 Colorado buffware found at this site result from the accidental or intentional fracture of a ceramic vessel. Analysis of artifacts such as these may have the potential to provide data pertinent to research questions regarding prehistoric ceramic production technology, and/or the regional ceramic ware information. The presence of ceramics indicates a Late Prehistoric era site. Currently, the primary ethnic groups known to have occupied region surrounding RAN-012 include the Diegueño and Kamia. Other groups known to have used/traveled/inhabited the area include the Tipai, Cocopa, Kumeyaay, Ipai, Quechan, Paipai and Cahuilla (Luomala 1978; Schaefer and Laylander 2007; URS 2009). In approximately AD 1200, the course of the Colorado River changed, refilling Lake Cahuilla and providing a stable water source that drew people from surrounding regions to repopulate the Colorado Desert. Ceramic wares which were introduced centuries before in other areas were brought into this region at that time (URS 2009). However, it has been argued that stable populations around the lake developed their own distinctive pottery formulas that became regional expressions of their families and locales (May ND). Although these groups each had specific approaches to the creation of ceramics, ceramic vessels were also traded along with subsistence resources and other items, infusing some uncertainty into the use of data from ceramics to associate one particular area with a particular tribal group or family (May ND). Therefore, it is unlikely that surface data could directly relate RAN-012 or the area surrounding it, to a particular tribe.

Data gathered on ceramics in the area surrounding RAN-012 shows evidence of a variety of ceramic types and techniques. Though paddle-and-anvil construction techniques were common among groups using this area, the tempers employed, vessel types manufactured, and decoration did vary between groups. The Diegueño used ground clay and did not add temper when manufacturing ceramics. They created a variety of vessels including ollas; bowls, cooking pots, and pipes (Rogers 1973:18; URS 2009). The Kamia sometimes added rose quartz as temper and produced the greatest variety of ceramics among the Yuman bands, including ollas, jars, canteens, bowls, rattles, plates, scoops, cups, and parchers. Kamia ceramics were painted after firing with red and/or black designs (Gifford 193; Rogers 1973; URS 2009; Van Camp 1979:57). The Cocopah used ground and winnowed clay tempered with ground sherds to create a variety of vessels used for storage and cooking (Alvarez de Williams 1983:99; URS 2009). Quechan vessel types include bowls, parchers, cooking pots, small figurines, and large storage vessels that were used to float goods across rivers (Bee 1983:10; McGuire 1982; URS 2009).

The rock clusters present (Features 1 through 6) are somewhat anomalous. None of the features have any characteristics or associated artifacts that could provide evidence of their antiquity or lack thereof, therefore; they cannot be definitively associated with the prehistoric, historic or modern eras. It also seems unlikely that the features contains cultural materials, given the structure of the rock clusters (size-sorted stones that have become tightly packed and evidence of sand accumulation/deposition amongst stones).

Features 2 through 5 all appear to be similar, in that they are made up of stones that are of similar size and materials. The general appearance of the clusters seems consistent with that which would be expected, if they were remainder piles left over from small-scale gravel mining and sorting operations. The desert pavement on the surface of the site appears to have been disturbed in the past by mechanical scraping, which would support that hypothesis. The features present show no discernable alignment or intentional spatial relationship to each other so it seems unlikely that they are prehistoric trail markers or resulted from ritual practices. Native American monitors Clint Linton and Gabe Kitchen were present on site and voiced agreement.

Features 1 and 6 are similar to each other in that the majority of stones of which they are comprised are small quartz stones or pebbles. The uniformity of the materials employed seems to reflect intentional selection but no additional evidence was noted to allow the discernment of that original intention. Clint Linton and Gabe Kitchen, the Native American monitors present, gave no opinion regarding possible interpretations of these 2 features.

It may be important to note that off-highway vehicle trails are present along the eastern edge of the site, so it is possible that some or all of the rock clusters present at this site could have once served to mark the course.

Archaeologists for the applicant interpret that deposits of historic or potentially modern artifacts, such as the ones found at RAN-0 12, typically represent episodes of refuse disposal/discard and/or loss of individual articles in-situ. In the case of RAN-012, the small number of historic artifacts and artifact types present would more likely have resulted from in-situ disposal rather than dumping. Though precise dates of manufacture cannot be determined for the artifacts present at RAN-012, temporally diagnostic refuse artifacts present at RAN-012 (such as an aluminum pull-top can and a continuous thread finish Budweiser beer bottle) have modern characteristics.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, with the exception of the ceramics (discussed below), the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction and analysis of artifact distribution has been accounted for during the recordation process. RAN-012 is situated within an active wash within the fan piedmont. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area there is very low likelihood for subsurface archaeological deposits. Areas of active erosion within the fan piedmont such as where this site is located do have a slightly greater potential for the presence of subsurface archaeological deposits such as might occur where recent alluvium was deposited. Given the highly erosive nature of active washes within the fan piedmont, it seems unlikely that such subsurface deposits would have been preserved. Regardless, because there remains a slight possibility that subsurface deposits may have become buried by recent alluvium within the wash due to erosional processes, and given the presence of temporally diagnostic artifacts limited subsurface testing is recommended for this site.

Ceramics present at RAN-012 could provide additional data pertinent to studies of prehistory. The analysis necessary to derive all possible data from the sherds at this site, requires the services of a ceramics specialist, therefore, it is recommended that further studies of the ceramic artifacts present be conducted by such a specialist before a final determination of eligibility can be made.

Due to the presence of temporally diagnostic artifacts (ceramics) further data is necessary to determine if this site, as a stand-alone or individual resource, should be recommended as eligible or not eligible for the National Register and if it is or is not a historic property pursuant to the National Register or a historical resource per the California Register under the criteria for eligibility. In addition, results of additional data are necessary to determine if RAN-012 is considered a contributor to an existing and/or proposed archaeological district or landscape.

RAN-015

RAN-015 is an oblong-shaped historic site that covers a total surface area of 300 square meters. The site is located within the northwest portion of the 450 MW area of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of an intact desert pavement that is poorly to moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Moderate off highway vehicle use has disturbed the desert pavement within the site. Vegetation species on the site includes creosote and bunch grass.

This historic refuse scatter measures 37 meters east to west by 11 meters north to south and contains a total of 170 historic artifacts. It consists of 2 concentrations interpreted to be 2 historic refuse disposal loci. The site also includes additional refuse scattered throughout the site that lacked temporally diagnostic information. The prevailing cultural constituents within this site consist of historic artifacts. Artifact density at RAN-015 is low, with a calculated distribution of 1 artifact per 1.76 square meters. The overall condition of the site is fair due to off-road vehicle use.

The site contains 2 historic refuse scatters (loci) and a total of 170 historic artifacts (all associated with the loci), which include 101 glass shards (65 colorless, 25 brown, 7 Purex/colorless, 3 aqua glass fragments, 1 milk jar fragment), 7 brown bottle body shards (6 Clorox bottle fragments and 1 amber bottle fragment), 10 flat colorless glass fragments, 9 finish glass fragments (2 jugs with small handles, 1 jar, 4 mason jars, 2 glass bottle fragments with threading), 26 metal cans (2 spam, 1 tobacco, 6 condensed milk, 14 sanitary, 2 coffee, 1 paint thinner), 4 screw cap/lids, 1 rubber fragment, 2 plastic fragments, 1 shoe sole, 3 bottle bases (1 colorless base with stippling, 1 green hexagonal base, 1 colorless circular base with stippling), 1 rectangular wire fragment, 1 bandage spool and 4 coat hanger wires. Six of the artifacts are temporally diagnostic artifacts consisting of cans and bottle fragments.

Locus 1 is located in the western portion of the site and measures 4 meters north to south by 4 meters east to west. Artifacts observed within Locus 1 consists of 10 shards of colorless window glass, 35 colorless bottle body shards, 6 brown bottle shards, 1 amber bottle shard, 1 mason jar rim, 1 colorless glass jug with small finger handle, 1 colorless bottle with continuous external thread, 2 spam cans, 12 sanitary cans, 1 matchstick filler can, 1 double hinged tobacco can and a metal clothes hanger.

Locus 2 is located 27 meters east of Locus 1 and measures 8 meters north to south by 6 meters east to west. Artifacts observed within Locus 2 include approximately 30 unidentifiable shards of colorless glass, 25 shards of brown glass, 7 shards of colorless Pyrex glass, 3 shards of aqua glass, 1 colorless milk jug shard, 1 colorless glass tumbler body fragment (drinking glass), 3 colorless mason jar shards (with rim external continuous thread), 1 colorless jug with small finger handle, 8 sanitary cans, 2 coffee cans, 1 bandage spool, 4 metal coat hangers, 1 complete paint thinner can labeled "RADIENT," 3 jar screw top lids, 1 small screw cap, 1 piece desiccated rubber, 2 pieces desiccated plastic, 1 shoe sole, 1 colorless bottle base with stippling, 1 green hexagonal bottle base and 1 colorless circular bottle base with stippling.

The further character of artifacts found within RAN-015 is unreported.

The more particular physical context for RAN-015, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Because the nature of the land surface and absence of evidence of any subsurface deposition, there is a very low likelihood that buried archaeological deposits will be present within this site or the fan piedmont.

Deposits of historic artifacts such as these typically represent episodes of refuse disposal after initial discard and/or loss of individual articles in situ. In the case of RAN-015, the large number of artifacts and the diversity of household products represented are consistent with what would be expected of a household refuse dumping episode or episodes. Though dates of manufacture can be determined for some of the artifacts present at RAN-015, the time between the initial use/consumption of the artifacts and their ultimate disposal cannot be known, so the specific date of their disposal cannot be reliably determined.

Artifacts present for which approximate dates of manufacture could be determined include: tobacco tin with hinge - 1910-1919; sanitary cans - 1922 to present; amber bottle fragment with maker's mark indicating it was manufactured by Maywood Glass Company between 1932-1942; 1 clear base with stippling and maker's mark "LM/Purex/Des. Pat. App. For" indicating that it was manufactured by Latchford-Marble Glass Company between 1939 to 1957; 1 Duraglas bottle base 1940-1963 with a maker's mark indicating that it was manufactured by the Hazel Atlas Glass Company between 1920 to 1964, mason jars dating back to post 1900, Clorox bottle neck with cork which would have been manufactured before 1920 (Goodman 2002). Also present was 1 amber bottle base, unstippled, with an Owens Illinois maker's mark that exhibits a sans serif "I" within an oval overlaid onto a diamond. Based on that maker's mark configuration, the date code "5" that appears to the right of the diamond would indicate a manufacturing date of 1935 (Lockhart 2004). This site also contains modern trash scattered throughout the site. Based on the dates listed above it can be determined that the episode of deposition occurred sometime after 1940.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. RAN-015 is situated atop a subordinate landform not conclusive for significant sub surface deposits within the fan piedmont geomorphic landform. And due to the absence of any surface evidence that would indicate buried historic refuse there appears to be a very low likelihood for subsurface archaeological deposits, therefore data potential is considered exhausted through recordation of RAN-0 15.

As a result, this site as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, RAN-015 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

RAN-018

RAN-018 is a circular-shaped historic aerial marker site that covers a total surface area of 342 square meters. The site is located within the eastern portion of the 450MW area of the Proposed Solar Two Project. The site is situated within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation (URS 2009). The surface area of the site consists of an open, elevated fan surface covered by intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. The site is bound by ephemeral gullies to the north, south, and west and there is evidence of occasional off highway vehicle use. Vegetation species on the site include creosote, cholla and bunch grass.

This historic aerial marker site measures 6 meters north to south by 6 meters east to west, and contains a total of 1 historic aerial marker feature and 13 historic (modern) artifacts. It consists of 1 concentration, interpreted to be a single feature. The cultural constituents within this site consist of a single historic feature and historic (modern) artifacts. The overall condition of the site is fair with alterations due to weathering and deterioration over time.

The artifact assemblage present includes 5 round nails, 7 pieces of lathe, and fragments of white plastic.

Feature 1 is the remnants of a cross-shaped surface construction consisting of 7 pieces of wood lathe and plastic lined with small rocks, apparently to hold the lathe and plastic in place. The assemblage of associated artifacts include 5 round nails (5.5 inches long, 0.25-inch diameter), 7 pieces of lathe (1.375 inches by 0.375 inches) and fragments of white plastic material. No artifacts were observed within 30 meters or outside of the feature. The further character of artifacts found within RAN-018 is unreported.

The more particular physical context for RAN-01 8, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan “aprons” which do not individually fully cover the entire area, and which interfinger and partially bury one another and piedmont remnants. The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeology on that surface. Nonetheless, this area demonstrates the potential for (shallowly) buried preserved surfaces, but there is a high likelihood these deposits will represent the same constituents recorded on the surface. As a result, there is a very low to moderate likelihood for subsurface deposition. The desert pavement consists of small to large, sub-rounded to sub-angular metavolcanic, basalt, quartz, quartzite and granite gravels and cobbles overlaying coarse sands and fine gravels.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this feature as an aerial photography target. Such targets are used in order to parallax correct and geo-reference aerial photographs. No temporally diagnostic artifacts are present to determine if this particular target dates to the historic era. In addition, based on the presence of fragments of plastic it seems possible that this target is modern.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. RAN-018 is located within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The lack of soil development within the capped alluvial unit suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time, thus reducing the potential for extensive buried archaeological deposits. As a result there is a very low to moderate likelihood for subsurface deposition. Nonetheless, though this area demonstrates some potential for (shallowly) buried preserved surfaces, there is a high likelihood these deposits will represent the same constituents recorded on the surface. Therefore, due to the low density of artifacts and low probability for significant subsurface artifacts, the data potential is considered exhausted through recordation of RAN-018.

As a result, RAN-018 as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, RAN-018 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

RAN-034

RAN-034 is a circular-shaped archaeological deposit that includes both prehistoric and historic components and covers a total surface area of 30,958 square meters. The site is located within the northwestern portion of the 450 MW of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface of the site consists of intact desert pavement that is poorly developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. The desert pavement in parts of the site has been disturbed. Soils contain alluvial sands made up of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote and smoketree.

This multicomponent historic refuse prehistoric scatter site measures 181 meters north to south by 171 meters east to west, and contains an estimated minimum of 400 historic and prehistoric artifacts. It consists of 6 concentrations interpreted to be 5 historic refuse scatters and 1 historic refuse and prehistoric lithic scatters. Within the loci there is a minimum of 350 artifacts and approximately 50 additional artifacts were observed outside the loci. The prevailing cultural constituents within this site consist of historic artifacts. Artifact density at RAN-034 is low, with a calculated distribution of 1 artifact per 77.4 square meters. The overall condition of the site is fair with some alterations caused by prospect mining, natural erosion and by off-highway vehicle activity as is evidenced by a single off highway vehicle track which runs through the site.

The site contains 5 historic refuse scatters and 1 multi-component locus (historic refuse and lithic scatter) with an estimated minimum of 400 artifacts (approximately 350 associated with loci), which include approximately 100 cans (church key-opened beverage, tobacco tins, hole-in-top, milk, coffee, kerosene, sanitary, fruit juice, paint, pepper, fish, meat, 1 spice tin). An estimated 25 ceramic fragments (plates, cups, 1 stoneware bowl, 1 tea pot), fragments from 2 “Clorox" bottles, 1 "Best Foods" bottle, 1

"Purex" bottle, 1 "Heinz" bottle, a minimum of 100 fragments from several liquor bottles, several soda bottles, around 25 fragments of "Vencill Dairy" milk bottles, a minimum of 100 fragments of thick pane glass, various other glass fragments from miscellaneous bottles and/or jars (colorless, brown, green, aqua, pink, manganese decolorized), 1 large rubber tire fragment, and tile fragments. Prehistoric artifacts include: 1 petrified wood secondary flake, 1 white cryptocrystalline silicate chalcedony secondary flake, and 4 nodules of fire affected sandstone. In addition 7 marine shells (5 Pismo clam shells, 1 abalone shell, and 1 conch shell) were observed within the historic refuse deposit. Based on the condition and variety, these shells are interpreted to be apart of the historical period refuse and are not prehistoric.

Locus 1 is located 198 feet southeast from the datum and measures 321 feet north to south by 27 feet east to west. Artifacts observed within Locus 1 include a glass scatter consisting of fragments from 2 “Clorox" bottles, 1 "Purex" bottle, 4 liquor bottles, 1 "Heinz" bottle, 1 "Best Foods" bottle, and various other fragments of green glass, colorless glass, pink glass and brown glass.

Locus 2 is located 46 feet south from Locus 1 and measures 37 feet north to south by 18 feet east to west. Artifacts observed within Locus 2 include: crushed and fragmentary metal cans (fish, meat, coffee, condensed milk, kerosene, pepper, and food), glass fragments (green glass, milk bottle, colorless glass, aqua glass, and manganese decolorized) and ceramic stoneware fragments.

Locus 3 is located 43 feet southeast from Locus 2 and measures 29 feet east to west by 20 feet north to south. Artifacts observed within Locus 3 include: crushed and fragmentary metal cans (milk, coffee, kerosene, tobacco, cocoa, beverages and food cans), fragments of ceramic dinnerware (cups, plates, bowls), 1 ceramic stoneware tea pot spout, 1 "Dixie Peach" pomade glass jar, and glass fragments (beverage glasses, dinnerware and window glass).

Locus 4 is located 141 feet southeast from Locus 3 and measures 37 feet north to south by 35 feet east to west. Artifacts observed within Locus 4 include whole and fragmentary metal cans (milk, fruit juice, meat, tobacco tin A14 and paint), 25 glass fragments of "Vencill Dairy" milk bottles, glass fragments (condiments, liquor bottles and beverage bottles) and ceramics (whiteware faux porcelain and a stoneware bowl).

Locus 5 is located 33 feet northwest from Locus 1 and measures 52 feet east to west by 10 feet north to south. Artifacts observed within Locus 5 include mostly thick pane glass fragments, crushed and fragmentary cans, and condiment bottle fragments, including 1 “Best Foods" bottle fragment.

Locus 6 is located 119 feet southwest from Locus 5 and measures 17 feet north to south by 13 feet east to west. Locus 6 is a multi-component locus with both historic and prehistoric artifacts which include a concentration of large shells (5 pismo clams, 1 abalone shell and a small conch shell), 4 nodules of fire affected sandstone, 1 large rubber tire fragment, tile fragments, 1 white cryptocrystalline silicate chalcedony secondary flake, and 1 petrified wood secondary flake.

Those artifacts observed within 30 meters and outside the loci consist of approximately 50 can and glass fragments. The further character of artifacts found within RAN-034 is unreported.

The more particular physical context for RAN-034, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene is apparent. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret that deposits of historic artifacts such as the ones found at RAN-034 typically represent episodes of refuse dumping after initial discard and/or loss of individual articles in situ. In the case of RAN-034, the large number of artifacts and artifact types would more likely have resulted from dumping of the wide range of artifact types that would be expected in an assemblage of common household refuse. Though dates of manufacture can be determined for some of the artifacts present at RAN-034, the time between the initial use/consumption of the artifacts and their ultimate disposal cannot be known so the specific date of their disposal cannot be reliably determined.

Beginning circa 1880 manganese was added to glass to change its natural aqua color to clear. That addition had the unintended effect of turning the glass a particular amethyst color when exposed to ultraviolet light for extended periods of time. Such glass is termed "sun-colored-amethyst" glass (SCA) (Goodman 2002:1) and its manufacture predates 1920 when the practice of adding manganese ended. Hole-in-cap cans such as the lap-seam cans present at this site were initially introduced in the mid-19th century, were common in the late 19th to early 20th century, and fell out of favor in the 1920s when most manufacturers switched to sanitary cans (Goodman 2002). Also present is a colorless glass bottle base with a maker's mark that was used by the Knox Glass Company from 1932 to 1951 (Goodman 2002). Two other bottle bases bear the Owens Illinois maker's mark with a date code of "4" which indicates that it was manufactured in 1934 or 1944 (Owens Illinois did not switch to two-digit date codes until the 1950s). Yet another clear bottle had an Owens Illinois maker's mark and a date code of "0" dating its manufacture to 1930 or 1940 (Lockhart 2004). A tobacco tin present is of a style that was common beginning just after the turn of the 19th to 20th century and continued in production until R.J. Reynolds switched from cans to paper and plastic pouches in 1988 (Rock 1988). Based on this data, it would follow that the deposition of historic artifacts at RAN-034 would have taken place sometime after 1934.

The prehistoric component of RAN-034 consists of lithic flakes. Characteristics of this locus seem to support the interpretation that this is a modern dump of historic material collected from the area or historic refuse that has been deposited atop a prehistoric isolate. The most telling evidence is the vehicle tracks that enter the site from the south and stop at the locus. Additionally, the marine shells present seem far too well preserved to have remained on the surface since prehistoric times in this harsh environment. The shells show no patina and retain their original surfaces when the glossy surfaces of historic era glass artifacts found nearby have been sandblasted to a matte finish. Therefore, it would seem spurious to interpret the marine shells present at RAN-034 as prehistoric.

The lithic flakes present are of materials readily available in the surrounding area and display evidence of expedient methods of reduction, it might be possible to interpret the lithic component of the site as an expedient lithic reduction episode or locality (Jones and Klar 2007). However, the fact that these 2 flakes appear in such an isolated and historic context, and their proximity to the likely modern marine shells described above supports the interpretation that the site does not represent a single reduction locality or episode, but rather a more recent deposition of residential trash that included these 2 lithic artifacts, or that these artifacts were present on the surface at the time of refuse disposal and are merely coincidental.

Although this site has artifacts with temporally diagnostic characteristics, the material remains cannot definitively be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. Therefore, data potential is considered exhausted through recordation of RAN-034.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, RAN-034 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

RAN-057

RAN-057 is an amorphous-shaped prehistoric lithic and ceramic scatter that covers a total surface of 222 square meters. The site is located within the eastern portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation (URS 2009). The surface area of the site consists of a younger fan apron cut by ephemeral gullies and covered by intact desert pavement poorly developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Vegetation species on the site include creosote and ocotillo.

This lithic and ceramic scatter site measures 51 meters north to south by 20 meters east to west, and contains a total of 24 prehistoric artifacts. It consists of 1 concentration of lithic and ceramic artifacts, interpreted to be a ceramic scatter with a lithic component, with 15 artifacts. Nine additional artifacts were observed outside the locus.

The prevailing cultural constituents within this site consist of prehistoric ceramic sherds. Artifact density at RAN-057 is low, with a calculated distribution of 1 artifact per 9.2 square meters. The overall condition of the site is fair, due to alterations caused by the presence of ephemeral gullies within the site location.

Locus 1 is a ceramic scatter with a lithic component measuring 6 meters northeast to southwest by 4 meters northwest to southeast. Locus 1 is located within the northern-most portion of the site boundary. Artifacts observed within Locus 1 include: 10 Tizon brownware sherds, 1 Tizon brownware rim sherd, 1 lower Colorado buffware sherd, 1 petrified wood multi-directional core and 2 petrified wood secondary flakes. Those artifacts observed within 30 meters and outside the locus consist of 8 lower Colorado buffware sherds and 1 quartz tertiary flake. The further character of artifacts found within the site is unreported.

The more particular physical context for RAN-057, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan “aprons” which do not individually fully cover the entire area, and which interfinger and partially bury one another and piedmont remnants (URS 2009). The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units suggest that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeology on that surface (URS 2009). Nonetheless, this area does demonstrate the potential for (shallowly) buried preserved surfaces, but there is a high likelihood these deposits will represent the same constituents recorded on the surface. As a result there is a very low to moderate likelihood for significant subsurface deposition.

Currently, the primary ethnic groups known to have occupied the region surrounding RAN-057 include the Diegueño and Kamia. Other groups known to have used/traveled/inhabited the area include the Tipai, Cocopa, Kumeyaay, Ipai, Quechan, Paipai and Cahuilla (Luomala 1978; Schaefer and Laylander 2007; URS 2009). In approximately AD 1200, the course of the Colorado River changed, refilling Lake Cahuilla and providing a stable water source that drew people from surrounding regions to repopulate the Colorado Desert. Ceramic wares which were introduced centuries before in other areas were brought into this region around this time (URS 2009). However, it has been argued that stable populations around the lake developed their own distinctive pottery formulas that became regional expressions of their families and locales (May ND). Although these groups each had specific approaches to the creation of ceramics, ceramic vessels were also traded along with subsistence resources and other items, infusing some uncertainty into the use of data from ceramics to associate one particular area with a particular tribal group or family (May ND). Therefore, it is unlikely that surface data could directly relate RAN-057 or the area surrounding it to a particular tribe/band.

Data gathered on ceramics in the area surrounding RAN-057 show evidence of a variety of ceramic types and techniques, but do frequently appear to be displaced and exhibit signs of water abrasion. Though paddle-and-anvil construction techniques were common among groups using this area, the tempers employed, vessel types manufactured, and decoration did vary between groups. The Diegueño used ground clay and did not add temper when manufacturing ceramics. They created a variety of vessels including ollas; bowls, cooking pots, and pipes (Rogers 1973:18; URS 2009). The Kamia sometimes added rose quartz as temper and produced the greatest variety of ceramics among the Yuman bands, including ollas, jars, canteens, bowls, rattles, plates, scoops, cups, and parchers. Kamia ceramics were painted after firing with red and/or black designs (Gifford 1931; Rogers 1973; URS 2009; Van Camp 1979:57). The Cocopah used ground and winnowed clay tempered with ground sherds to create a variety of vessels used for storage and cooking (Alvarez de Williams 1983:99). Quechan vessel types include bowls, parchers, cooking pots, small figurines, and large storage vessels that were used to float goods across rivers (Bee 1983:10; McGuire 1982; URS 2009).

The ceramics on this site appear to be heavily weathered (water abraded), displaced, and fragmentary making specific identification of paste and temper difficult without further analysis. These specimens appear to represent similar types of wares found in situ elsewhere within the project area. Further information regarding these ceramics was unreported.

The lithic component of this site is interpreted as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists primarily of secondary flakes and multi-directional cores. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone (petrified wood and quartz) materials that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 2 single reduction localities or episodes, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret sites such as RAN-057 with richer assemblages containing ceramics in association with lithic debitage to most likely represent subsistence procurement and processing activities.

This site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. Because this site contains ceramics which is temporally diagnostic, analysis of these artifacts can provide additional information regarding the temper and source of clay, as well as, the method of construction and type of vessel. Analysis of these types of artifacts requires a controlled environment and comparative sample in order to identify unique morphological characteristics and regional ware type. Because RAN-057 is located within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation, there is a very low to moderate likelihood for subsurface deposition.

As a result, because of the presence of temporally diagnostic ceramics, additional data is needed to determine if this site, as a stand-alone or individual resource, should be recommended eligible for the National Register as a historic property pursuant to the National Register or as a historical resource per the California Register for eligibility. In addition, results of additional data are necessary to determine if RAN-057 is considered a contributor to an existing and/or proposed archaeological district or landscape.

RAN-061

RAN-061 is an amorphous-shaped lithic scatter that covers a total surface of 840 square meters. The site is located within the central portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan piedmont remnant geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of an open and elevated, very old, fan surface covered by intact desert pavement that is well developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site includes creosote and ocotillo.

This lithic scatter site measures 180 meters northeast to southwest by 25 meters northwest to southeast, and contains a total of 335 prehistoric artifacts. It consists of 12 concentrations interpreted to be 12 single reduction loci, with 334 artifacts, and 1 additional artifact was observed outside the loci. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at RAN-061 is low, with a calculated distribution of 1 artifact per 2.5 square meters. The overall condition of the site is good, though there have been alterations caused by off-highway vehicle activity.

The site contains 12 lithic reduction loci and a total of 335 artifacts which include: 257 metavolcanic flakes (61 primary, 113 secondary and 83 tertiary), 12 cryptocrystalline silicate chert flakes (4 primary, 5 secondary and 3 tertiary), 44 quartz flakes (9 primary, 13 secondary and 22 tertiary), 1 basalt secondary flake, 9 metavolcanic cores (6 uni-directional, 2 bi-directional and 1 multi-directional), 3 cryptocrystalline silicate chert cores (1 uni-directional and 2 bi-directional), 2 uni-directional quartz cores, 1 uni-directional basalt core, 3 quartz hammerstones, 2 metavolcanic hammerstones, and 1 granite anvil.

Locus 1 is located at the north end of the site and measures 6 meters northeast to southwest by 3 meters northwest to southeast. Artifacts observed within Locus 1 include 35 black porphyritic metavolcanic flakes (21 primary, 13 secondary and 1 tertiary) and 1 point provenienced quartz hammerstone.

Locus 2 is located 17 meters south of Locus 1 and measures 4 meters northeast to southwest by 2 meters northwest to southeast. Artifacts observed within Locus 2 include 15 gray-black porphyritic metavolcanic flakes (7 primary and 8 secondary), 1 basalt secondary flake, and 1 point provenienced uni-directional gray-green porphyritic core.

Locus 3 is located 18 meters southwest of Locus 2 and measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 3 include: 11 green porphyritic metavolcanic flakes (2 primary, 7 secondary and 2 tertiary), 1 point provenienced uni-directional green metavolcanic core, and 1 point provenienced black metavolcanic hammerstone.

Locus 4 is located 5 meters west of Locus 3 and measures 10 meters north to south by 4 meters east to west. Artifacts observed within Locus 4 include: 175 gray-green porphyritic metavolcanic flakes (20 primary, 75 secondary and 80 tertiary), 2 point provenienced green porphyritic metavolcanic cores (1 uni-directional and 1 bi-directional), 1 point provenienced uni-directional black porphyritic metavolcanic core, and 1 point provenienced gray-black porphyritic metavolcanic hammerstone.

Locus 5 is located 19 meters west of Locus 4 and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 5 include: 8 gray-green metavolcanic flakes (3 primary and 5 secondary), 1 point provenienced uni-directional gray-black metavolcanic core, and 1 point provenienced multi-directional gray-green metavolcanic core.

Locus 6 is located 27 meters southwest of Locus 5 and measures 3 meters north northeast to south southwest by 2 meters west northwest to east southeast. Artifacts observed within Locus 6 include: 33 translucent white quartz flakes (5 primary, 8 secondary and 20 tertiary), 1 point provenienced uni-directional rose quartz core, and 1 point provenienced quartz hammerstone.

Locus 7 is located 88 meters northeast of Locus 6 and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 7 include: 3 green porphyritic metavolcanic flakes (2 primary and 1 secondary) and 1 point provenienced bi-directional green porphyritic metavolcanic core.

Locus 8 is located 10 meters southwest of Locus 7 and measures 8 meters northeast to southwest by 1 meter northwest to southeast. Artifacts observed within Locus 8 include 5 clear quartz flakes (1 primary and 4 secondary).

Locus 9 is located 37 meters southwest of Locus 8 and measures 2 meters northeast to southwest by 1 meter northwest to southeast. Artifacts observed within Locus 9 include 5 gray porphyritic metavolcanic flakes (2 primary and 3 secondary), and 1 point provenienced granite anvil.

Locus 10 is located 52 meters northeast of Locus 9 and measures 1 meter east to west by 1 meter north to south. Artifacts observed within Locus 10 include: 5 green porphyritic metavolcanic flakes (4 primary and 1 secondary), 1 point provenienced uni-directional black porphyritic metavolcanic core, and 1 point provenienced uni-directional basalt core.

Locus 11 is located 24 meters southwest of Locus 10 and measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 11 include: 6 quartz flakes (3 primary, 1 secondary and 2 tertiary), 1 point provenienced uni-directional smoky quartz core, and 1 point provenienced quartz hammerstone.

Locus 12 is located 17 meters west of Locus 11 and measures 6 meters north to south by 1 meter east to west. Artifacts observed within Locus 12 include 12 orange-brown cryptocrystalline silicate chert flakes (4 primary, 5 secondary and 3 tertiary), and 2 point provenienced bi-directional orange-brown cryptocrystalline silicate chert cores.

Those artifacts observed within 30 meters and outside of the loci consist of 1 point provenienced uni-directional red cryptocrystalline silicate chert core. The further character of artifacts associated with the site is unreported.

The more particular physical context for RAN-061, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be a very old fan surface within the fan piedmont remnant landform. The fan piedmont remnant landform is an isolated exposure surrounded by the fan apron land form that has been determined to have the same geomorphological characteristics as the fan piedmont (URS 2009:CUL-6). The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists primarily of secondary and tertiary flakes and uni-directional cores, with hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone (metavolcanic) material, that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 12 single reduction localities or episodes. It should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. RAN-061 is situated atop a subordinate landform characterized as a very old fan surface within the fan piedmont remnant landform. The fan piedmont remnant landform is an isolated exposure surrounded by the fan apron land form that has been determined to have the same geomorphological characteristics as the fan piedmont (URS 2009: CUL-6). This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits, therefore data potential is considered exhausted through recordation of RAN-061.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, RAN-061 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

RAN-081

RAN-081 is an amorphous-shaped lithic scatter that covers a total surface area of 12,045 square meters. The site is located within the eastern portion of the 450 MW area of the Proposed Solar Two Project and is situated atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of gently undulating surface covered by intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation species on the site include creosote, desert sunflower, burroweed and bunchgrass.

This site measures 220 meters north to south by 125 meters east to west, and contains a total of 648 prehistoric artifacts. It consists of 38 concentrations interpreted to be 32 lithic reduction and 6 lithic scatter loci, with a total of 600 artifacts plus 48 additional artifacts observed outside the loci. The prevailing cultural constituents within this site consist of prehistoric lithic artifacts. Artifact density at RAN-081 is medium, with a calculated distribution of 1 artifact per 18.59 square meters. The overall condition of the site is fair with some alterations due to off-highway vehicle use.

The artifact types and materials present at RAN-081 include 345 metavolcanic flakes (183 primary, 130 secondary and 32 tertiary), 17 metavolcanic cores, 10 metavolcanic tested cobbles, 1 metavolcanic hammerstone, 98 quartz flakes (46 primary, 38 secondary and 14 tertiary), 3 quartz cores (2 uni-directional and 1 multi-directional), 61 quartzite flakes (19 primary, 19 secondary, 9 tertiary and 14 shatter), 1 quartzite multi-directional core, 1 quartzite tested cobble, 1 quartzite hammerstone, 40 rhyolite flakes (21 primary, 15 secondary and 4 tertiary), 1 rhyolite multi-directional core, 47 cryptocrystalline silicate flakes (26 primary, 15 secondary and 6 tertiary), 6 cryptocrystalline silicate cores (including 2 uni-directional and 3 multi-directional), 14 basalt flakes (10 primary and 4 secondary) 1 basalt uni-directional core and 1 basalt hammerstone.

Locus 1 is located in the southwestern portion of the site and measures 3 meters northeast to southwest by 2 meters northwest to southeast. Artifacts observed within Locus 1 include 9 green metavolcanic flakes (2 primary, 6 secondary and 1 tertiary).

Locus 2 is located 11 meters northeast of Locus 1 and measures 2 meters northeast to southwest by 2 meters northwest by southeast. Artifacts observed within Locus 2 include 13 rhyolite flakes (5 primary, 5 secondary and 3 tertiary) and 1 multi-directional core.

Locus 3 is located 12 meters southeast of Locus 2 and measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 3 include 8 green metavolcanic flakes (5 primary, 1 secondary and 2 tertiary) and 1 uni-directional core.

Locus 4 is located 6 meters northeast of Locus 3 and measures 2 meters north to south by 4 meters east to west. Artifacts observed within Locus 4 include 25 green metavolcanic flakes (12 primary, 11 secondary and 2 tertiary) and 1 uni-directional core.

Locus 5 is located 5 meters northeast of Locus 4 and measures 1 meter north to south by 2 meters east to west. Artifacts observed within Locus 5 include 6 green metavolcanic flakes (5 primary and 1 secondary).

Locus 6 is located 11 meters northeast of Locus 5 and measures 4 meters north to south by 2 meters east to west. Artifacts observed within Locus 6 include 6 green metavolcanic primary flakes and 1 bi-directional core.

Locus 7 is located 17 meters to the northeast of Locus 6 and measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 7 include 3 green metavolcanic primary flakes, 1 uni-directional core and 1 bi-directional core.

Locus 8 is located 21 meters southeast of Locus 7 and measures 3 meters north to south by 4 meters east to west. Artifacts observed within Locus 8 include 13 green metavolcanic flakes (9 primary and 4 secondary), 2 fine grained green metavolcanic secondary flakes, 6 quartz flakes (4 primary, 1 secondary and 1 tertiary), 1 quartz uni-directional core, 3 metavolcanic bi-directional cores and 1 hammerstone.

Locus 9 is located 18 meters southeast of Locus 8 and measures 3 meters northwest to southeast by 2 meters northeast to southwest. Artifacts observed within Locus 9 include 18 green metavolcanic flakes (9 primary and 9 secondary) and 1 uni-directional core.

Locus 10 is located 56 meters northeast of Locus 9 and measures 2 meters north to south by 3 meters east to west. Artifacts found in Locus 10 include 10 cryptocrystalline silicate flakes (2 primary, 7 secondary and 1 tertiary) and 4 quartz flakes (3 primary and 1 secondary).

Locus 11 is located 19 meters northeast of Locus 10 and measures 2 meters northeast to southwest by 1 northwest to southeast. Artifacts observed in Locus 11 include 7 basalt flakes (5 primary and 2 secondary) and 1 hammerstone.

Locus 12 is located 12 meters northeast of Locus 11 and measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 12 include 6 green metavolcanic flakes (5 primary and 1 tertiary).

Locus 13 is located 17 meters southeast of Locus 12 and measures 5 meters north to south by 7 meters east to west. Artifacts observed within Locus 13 include 25 green metavolcanic flakes (19 primary and 6 secondary) and 3 fine grained metavolcanic primary flakes.

Locus 14 is located 31 meters southeast of Locus 13 and measures 1 meter north to south by 0.4 meters east to west. The artifacts found within Locus 14 include 3 white cryptocrystalline silicate flakes (2 primary and 1 secondary) and 1 multi-directional core.

Locus 15 is located 5 meters southeast of Locus 14 and measures 1 meter north to south by 2 meters east to west. Artifacts observed within Locus 15 consist of 14 pieces of quartzite shatter.

Locus 16 is located 14 meters northeast of Locus 15 and measures 2 meters northwest to southeast by 0.3 meters northeast to southwest. Artifacts observed within Locus 16 include 4 brown cryptocrystalline silicate primary flakes and 1 uni-directional core.

Locus 17 is located 22 meters northeast of Locus 16 and measures 3 meters northeast to southwest by 2 meters northwest to southeast. Artifacts observed within Locus 17 include 25 quartz flakes (10 primary, 11 secondary and 4 tertiary) and 1 uni-directional core.

Locus 18 is located 5 meters south of Locus 17 and measures 3 meters northeast to southwest by 2 meters northwest to southeast. Artifacts found within Locus 18 include 36 quartz flakes (19 primary, 13 secondary and 4 tertiary) and 1 multi-directional core.

Locus 19 is located 6 meters northwest of Locus 18 and measures 4 meters north to south by 2 meters east to west. Artifacts observed within Locus 19 include 44 green metavolcanic flakes (15 primary, 27 secondary and 2 tertiary).

Locus 20 is located 84 meters northwest of Locus 19 and measures 1 meters north to south by 3 meters east to west. Artifacts observed within Locus 20 include 15 green metavolcanic flakes (6 primary, 7 secondary and 2 tertiary).

Locus 21 is located 8 meters north of Locus 20 and measures 4 meters northeast to southwest by 3 meters northeast to southeast. Artifacts observed within Locus 21 include 26 green metavolcanic flakes (16 primary, 9 secondary and 1 tertiary) and 1 multi-directional core.

Locus 22 is located 38 meters north of Locus 21 and measures 3 meters northeast to southwest by 2 meters northwest by southeast. Artifacts observed within Locus 22 include 27 rhyolite flakes (16 primary, 10 secondary and 1 tertiary).

Locus 23 is located 19 meters northeast of Locus 22 and measures 5 meters northwest to southeast by 3 meters northeast to southwest. Artifacts observed within Locus 23 include 27 quartz flakes (10 primary, 12 secondary and 5 tertiary), and 4 black metavolcanic primary flakes.

Locus 24 is located 9 meters north of Locus 23 and measures 5 meters north to south by 2 meters east to west. Artifacts observed within Locus 24 include 34 black metavolcanic flakes (17 primary, 11 secondary and 6 tertiary).

Locus 25 is located 7 meters southeast of Locus 24 and measures 1 meters north to south by 1 meter east to west. Artifacts observed within Locus 25 include 7 green metavolcanic flakes (3 primary, 3 secondary and 1 tertiary).

Locus 26 is located 60 meters southeast of Locus 25 and measures 2 meters northwest to southeast by 1 meter northeast to southwest. Artifacts observed within Locus 26 include 7 green metavolcanic flakes (4 primary and 3 secondary)

Locus 27 is located 7 meters south of Locus 26 and measures 3 meters northwest to southeast by 2 meters northeast to southwest. Artifacts observed within Locus 27 include 8 green metavolcanic flakes (3 primary, 3 secondary and 2 tertiary) and 1 uni-directional core.

Locus 28 is located 38 meters northeast of Locus 27 and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 28 include 6 white cryptocrystalline silicate flakes (3 primary, 2 secondary and 1 tertiary) and 1 multi-directional core.

Locus 29 is located 26 meters east of Locus 28 and measures 6 meters northwest to southeast by 3 meters northeast to southwest. Artifacts observed within Locus 29 include 14 green metavolcanic flakes (5 primary, 3 secondary and 6 tertiary), 2 cryptocrystalline silicate primary flakes, 1 primary basalt flake and 1 metavolcanic tested cobble.

Locus 30 is located 31 meters south of Locus 29 and measures 1 meter north to south by 5 meters east to west. Artifacts observed within Locus 30 include 6 basalt flakes (4 primary and 2 secondary), 4 green metavolcanic primary flakes and 1 basalt uni-directional core.

Locus 31 is located 13 meters southwest of Locus 30 and measures 6 meters northwest to southeast by 7 meters northeast to southwest. Artifacts observed within Locus 31 include 32 green metavolcanic flakes (12 primary, 17 secondary and 3 tertiary) and 8 quartzite flakes (3 primary, 2 secondary and 3 tertiary).

Locus 32 is located 21 meters southwest of Locus 31 and measures 2 meters northeast to southwest by 2 meters northwest to southeast. Artifacts observed within Locus 32 include 13 quartzite flakes (4 primary, 4 secondary and 5 tertiary).

Locus 33 is located 19 meters south of Locus 32 and measures 5 meters north to south by 1 meter east to west. Artifacts observed within Locus 33 include 6 quartzite flakes (4 primary and 2 secondary) and 1 multi-directional core.

Locus 34 is located 4 meters northwest of Locus 33 and measures 1 meter north to south by1 meter east to west. Artifacts observed within Locus 34 include 7 green metavolcanic flakes (4 primary and 3 secondary).

Locus 35 is located 9 meters southeast of Locus 34 and measures 1 meter northwest to southeast by 1 meter northeast to southwest. Artifacts observed within Locus 35 include 7 green metavolcanic flakes (2 primary, 2 secondary, and 3 tertiary) and 1 multi-directional core.

Locus 36 is located 2 meters southeast of Locus 35 and measures 1 meter north to south by 2 meters east to west. Artifacts observed within Locus 36 consist of 6 quartzite flakes (2 primary, 3 secondary and 1 tertiary).

Locus 37 is located 12 meters southwest of Locus 36 and measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 37 include 11 white cryptocrystalline silicate flakes (5 primary, 3 secondary and 3 tertiary) and 1 multi-directional core.

Locus 38 is located 15 meters south of Locus 37 and measures 1 meter northeast to southwest by 1 meter northwest to southeast. Artifacts observed within Locus 38 include 6 gray-white cryptocrystalline silicate flakes (3 primary, 2 secondary and 1 tertiary) and 1 uni-directional core.

Those artifacts observed within 30 meters and outside of the 38 loci consist of 12 green metavolcanic flakes (10 primary and 2 secondary), 4 green metavolcanic cores (including 1 uni-directional and 1 bi-directional), 1 black metavolcanic core, 9 metavolcanic tested cobbles, 14 quartzite flakes (6 primary, and 8 secondary), 1 quartzite tested cobble, 1 quartzite hammerstone, 5 cryptocrystalline silicate primary flakes (3 brown and 2 gray), and 1 white cryptocrystalline silicate core. The further character of artifacts associated with RAN-081 is unreported.

The more particular physical context for RAN-081, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, with debitage consisting of primary, secondary, and tertiary flakes, cores, angular waste/shatter, and hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary materials (green metavolcanic, cryptocrystalline silicate, quartz, basalt, and quartzite) that are constituents of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 38 reduction episodes/localities, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been

accounted for during the recordation process. RAN-081 is situated atop a subordinate landform characterized as an older fan surface with alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area there is very low likelihood for subsurface archaeological deposits, therefore data potential is considered exhausted through recordation of RAN-081.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, RAN-081 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

T-03

T-03 is a linear prehistoric/historic trail that covers a total length of 438 meters. The site is located within the central northern portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation (URS 2009). The surface area of the site consists of a fan apron with intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Vegetation species on the site include creosote, saltbush and ocotillo. The slope throughout the course of the trail is less than 1 degree with an aspect that ranges from north to northeast. The overall condition of the site is poor due to observable evidence of recent off-highway vehicle (OHV) disturbance.

T-03 is recorded in 3 separate segments, trending in an east to west direction. The trail has been cut into 3 segments by ephemeral gullies. All 3 segments are 40 centimeters wide and the total length of the segments combined is 438 meters. Segment A is approximately 232 meters in length, Segment B is approximately 64 meters in length, and Segment C is approximately 142 meters in length.

There are no artifacts directly associated with the trail. However, the trail does run through a group of 3 isolates and 3 sites that appear to be aligned with the east to west direction of this trail (EBR-095, EBR-097, EBR-102, EKJ-S2-014, EJK-ISO-013 and EJK-ISO-012).

Trails such as T-03 are likely surviving segments of a larger network of trails that once existed in the region. Trails were important to prehistoric people in that they appear to have helped fulfill an inherent human need for physical and spiritual security by providing safer and more reliable connections between territories and resource patches, and served the "socio-economic needs of settlement and exploitation patterns, migration, visitation, trade, war, quarrying, and making possible the location of central ceremonial areas" (von Werlhof 1988:52).

Trail T-03 and the immediate area around it have characteristics that may speak to the importance of trails to prehistoric people. The trail is evidenced as a narrow (approximately 40 centimeters) strip of land where larger stones are conspicuously absent from the desert pavement. Along the two sides of the trail are relatively higher concentrations of larger stones, supporting the interpretation that travelers would clear larger stones from the path, tossing them to the side. Not only would that practice have made foot travel easier by removing obstructions, but the resulting surface of the trail has a higher proportion of siliceous desert surface, which would reflect more moonlight, making night travel safer (von Werlhof 1988). Additionally, 3 sites and 3 isolated artifacts lie in close proximity to the trail and are in apparent alignment with the trail's direction, giving evidence to the possible use of the trail to facilitate resource procurement.

Trails can be important and relatively rare resources which can help facilitate interpretations of prehistory and prehistoric lifeways. Trails such as T-03 are rare because the evidence of them is often so faint and ephemeral that it is most often erased by natural erosion, soil development, mechanical disturbance, and bioturbation. Additionally, trails often follow the most efficient travel route through an area. Over time, subsequent travel routes such as horse trails, ox cart roads, and eventually modern roads and highways are designed to follow the same route and are overlaid on the trail such that its existence is only known through oral history. It is in arid, relatively unpopulated places such as the project area that trails can still be recognized as remnants of ancient pathways (Davis 1974). Because trails were used to connect resource areas, territories, habitations, and ceremonial sites, they can be important sources of information to recover the locations of unknown resources. Overall site integrity of trail T-03 is extremely poor, primarily due to heavy OHV use and gravel mining within the area, activities from the adjacent Plaster City, dirt roads, as well as erosional processes. The full extent of this trail has been mapped and portions have been destroyed by these intrusive elements, therefore data potential of T-03 is considered exhausted through recordation.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is a historic property pursuant to the National Register and a historical resource per the California Register under any of the criteria for eligibility. In addition, T-03 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

T-52

Site T-52 is a linear alignment of ground that appears to have been cleared of larger stones and cobbles, which is interpreted to be a surviving segment of a prehistoric trail. The site is 660 meters long. At its western terminus it lies approximately 15 meters north of and is parallel to a road (approximately east to west) for a distance of approximately 400 meters At that point it curves and extends in a north to south direction to a point approximately 290 meters north of another road. Site T-52 is located within the southeastern portion of the 450 MW area of the Proposed Solar Two Project. The site is situated within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation (URS 2009). The surface area of the site consists of an alluvial fan with intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Vegetation species on the site include smoketree, mesquite and bunch grass.

T-52 is recorded in one segment that trends east to west in its western portion and north to south in its eastern portion. The segment is approximately 660 meters long, 40 centimeters to 1 meter wide, and less than 5 centimeters deep. The western portion of the trail segment runs adjacent to a large ephemeral gully and is parallel to a road. The surface of the trail segment shows evidence indicating that its surface has been cleared by casting-off larger cobbles to either side of the trail. Overall condition of the trail is poor, with evidence of an expansion of the trail width caused by off-highway vehicle (OHV) motorcycle activity in the area. Two cultural resources are within close proximity: JM-041 and JM-042.

Trails such as T-52 may be surviving segments of a larger network of trails that once existed in the region. Trails were important to prehistoric people in that they helped fulfill an inherited human need for physical and spiritual security by providing safer and more reliable connections between territories and resource patches, and served the "socio-economic needs of settlement and exploitation patterns, migration, visitation, trade, war, quarrying, and making possible the location of central ceremonial areas" (von Werlhof 1988:52).

Trail T-52 does possess some characteristics that would support the interpretation of it as a prehistoric trail. The trail is evidenced as a narrow (approximately 40 to 100 centimeters wide) strip of land where larger stones are conspicuously absent from the desert pavement. Along the two sides of the trail are relatively higher concentrations of larger stones, supporting the interpretation that travelers would clear larger stones from the path, tossing them to the side. That practice of clearing stones would have made foot travel easier by removing obstructions. Additionally, the resulting trail would have a higher proportion of siliceous desert surface, which would reflect more moonlight, making night travel safer (von Werlhof 1988). Furthermore, T-52 crosses through 2 prehistoric archaeological sites; JM-041, which is a small lithic scatter, and JM-42, which is a dense lithic scatter and therefore may be associated with both those resources. If that is the case, trail T-52 may have been used for travel to or through resource procurement areas.

Trails can be important and relatively rare resources that can help facilitate interpretation of prehistory and prehistoric lifeways. Trails such as T-52 are rare because the evidence of them is so faint and ephemeral that it is most often erased by natural erosion, soils development, mechanical disturbance and bioturbation. Additionally, trails often follow the most efficient travel route through an area. Over time, subsequent travel routes such as horse trails, ox cart roads, and eventually modern roads and highways are constructed to follow the same route and thereby overlay the prehistoric trail such that its existence is only known through oral history. It is in arid, relatively unpopulated places such as the Project area that can still be recognized as remnants of ancient pathways (Davis 1974). Because trails were used to connect resource areas, territories, habitations and ceremonial sites, they can be important sources of information to recover the locations of unknown archaeological resources and possibly traditional cultural properties.

However, the overall condition of this particular trail segment is poor, with OHV tracks running both parallel and perpendicular to the trail segment. OHV activity also appears to have expanded the width of the trail, making it difficult to determine the original dimensions of the trail, therefore, degrading its integrity. Though this trail is interpreted by the archaeologists for the applicant to be prehistoric, deterioration caused by overlaid OHV trails make it difficult to discern and interpret. Therefore, it is possible that trail may actually be a result of modern OHV activity in the area rather than prehistoric use.

Therefore, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, T-52 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

ACCESS ROAD

T-05

T-05 is a linear trail that covers a total length of 380 meters. The site is located within the 100 foot-wide proposed access road corridor east of the 450 MW area of the Proposed Solar Two Project. The trail is situated atop ancient Lake Cahuilla Playa within the lower lake basin which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation (URS 2009). Observed profiles in this area indicate that the soils are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines flushed into the lake by streams and washes that once terminated nearby at the shoreline. The trail appears to have been cleared through use and possible cast-off of cobbles to either side, leaving only small gravels and sand within the trail. Vegetation species on the site include creosote. Adjacent to the trail there are well developed creosote bushes growing which might indicate that the path has not been used recently. The trail is dissected by ephemeral drainages. Sediments in the drainages consist of silt sand alluvium loam.

T-05 is recorded in 3 separate segments, trending in an east to west direction. Other segments are present that are discontinuous and erased from the surface by ephemeral gullies, which were not mapped but most likely connect with the mapped portions of this trail. All 3 mapped segments are 40 centimeters wide. The total length of the segments combined is 380 meters. Segment A is approximately 80 meters in length, Segment B is approximately 77 meters in length and Segment C is approximately 223 meters in length. It appears that the surface of the trail has been cleared through the use and possible maintenance of moving larger cobbles to either side. The overall condition of the site is poor due to observable evidence of recent off-road vehicle disturbance and erosion.

Trail segments are located within a highly disturbed context with both historic and OHV activity present in the area. Historic and/or OHV users may have generated these segments, making it difficult to differentiate prehistoric from historic due to the high level of surrounding background noise. The trail is conspicuously straight and aligned exactly east to west, making it seem unlikely that this is a prehistoric trail. It runs parallel and close to the southern boundary of site EBR-207, which is a historic refuse dump. The trail also appears to have been naturally eroded and therefore, has reduced integrity.

Because this site lacks unique or temporally diagnostic characteristics, it cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of the spatial configuration of the resource has been accounted for during the recordation process.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, T-05 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

LAYDOWN AREA

DRK-139

DRK-139 is an amorphous shaped prehistoric lithic scatter that is situated directly east of two roads. The site covers a total surface area of 9,845 square meters. The site is located in the eastern portion of the laydown area of the Proposed Solar Two Project within the lower lake basin geomorphic landform (URS 2009). Sediments observed within this site consist of silts, eolian and course sands with sandstone exposures occurring in graded/disturbed areas at the south end of the site. Vegetation species on the site include creosote scrub.

This lithic scatter site measures 149 meters north to south by 104 meters east to west, and contains a total of 126 prehistoric artifacts. It consists of 5 concentrations of lithic artifacts, interpreted to be 5 single reduction loci, with 65 artifacts plus 61 additional artifacts observed outside the loci. The prevailing cultural constituents within this site consist of prehistoric lithic reduction debitage artifacts. Artifact density is low with a calculated distribution of 1 artifact per 78.1 square meters. The overall condition of the site ranges from fair to poor. Primary disturbances are attributed to mechanical grading (i.e., appears to be a 7-meter-wide graded road alignment that bisects the southernmost portion of the site); off-highway vehicle (OHV) tracks (i.e., 4 narrow 2-tracks observed running roughly parallel to each other and trending north-south); modern refuse associated with commuter traffic and unpermitted dumping of residential repair/remodeling and/or landscape clipping refuse.

The site consists of 5 single reduction loci and a total of 126 artifacts, which include: 8 angular metavolcanic hammerstones, 13 metavolcanic cores (3 multi-directional, 3 bi-directional, 6 uni-directional and 1 cryptocrystalline silicate jasper uni-directional core fragment), 74 metavolcanic flakes (16 primary, 36 secondary, 22 tertiary and 1 shatter), 17 basalt flakes (2 primary, 8 secondary and 7 tertiary), 1 cryptocrystalline silicate chalcedony secondary flake and 13 tested cobbles (8 metavolcanic and 5 basalt).

Locus 1 is located in the northwest portion of the site and measures 1 meter north to south by 1 meter east to west. Artifacts observed within locus 1 include: 17 metavolcanic flakes (3 primary, 8 secondary and 6 tertiary).

Locus 2 is located 7 meters north of Locus 1 and measures 1 meter north to south by 1.5 meters east to west. Artifacts observed within Locus 2 include: 11 metavolcanic flakes (4 primary, 6 secondary and 1 tertiary) and 1 metavolcanic multi-directional core.

Locus 3 is located 34 meters east of Locus 2 and measures 32 centimeters north to south by 1 meter east to west. Artifacts observed within Locus 3 include: 4 metavolcanic flakes (1 primary, 1 secondary and 2 tertiary) and 1 metavolcanic uni-directional core.

Locus 4 is located 16 meters east of Locus 3 and measures 1 meter north to south by 1.5 meters east to west. Artifacts observed within Locus 4 include: 14 metavolcanic flakes (1 primary, 5 secondary and 8 tertiary) and 1 metavolcanic bi-directional core.

Locus 5 is located 50 meters southwest of Locus 4 and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 5 include: 15 basalt flakes (2 primary, 6 secondary and 7 tertiary) and 1 uni-directional basalt core.

Artifacts observed outside the identified loci and within 30 meters include: 30 flakes (7 primary, 18 secondary, and 5 tertiary), 1 piece of angular waste/shatter, 9 cores, 8 hammerstones, and 13 tested cobbles. The further character of artifacts associated with DRK-139 is unreported.

The more particular physical context for DRK-139, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be within the lower lake basin which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation. The lake basin geomorphic landform consists of two distinct components; the lower lake basin and the beach zone or interface between the lake basin and the fan apron. The surface of the lower lake basin is generally very flat to very gently sloping, with a thin mantle of latest Holocene alluvium and eolian silts overlaying silts and clays. Because older surfaces have been overlain with a thin layer of more recent materials that were deposited after human occupation began in the area, there is a moderate to high likelihood for subsurface deposition within the lower-lying lake basin portion. Because episodes of filling and emptying of Lake Cahuilla that have occurred at various times in prehistory would have moved and disturbed soils at or near the surface of the lake basin landform, archaeological features preserved there will likely be disturbed or fragmentary. Soils within the lower lake basin are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines flushed into the lake by streams and wash that once terminated nearby at the shoreline. Specifically, the subordinate landform characteristics observed within this site appear to be an older fan surface with well developed desert pavement covered surface which appears to be exposed within the lake basin deposits as a result of deflation and erosional processes.

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, with debitage consisting primarily of primary, secondary, and tertiary flakes, cores, angular waste/shatter and hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell

2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone material (metavolcanic) that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 5 single reduction localities or episodes; but it should not be discounted that artifacts within this site may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. DRK-139 is situated in primarily deflationary and minimally, in an erosional environment, primarily characterized by a desert pavement covered older fan surface interfacing with the lake basin. Because this lithic scatter site occurs atop an older fan surface that interfaces with the lake basin, there appears to be little to no potential for buried archaeological deposits beyond near surficial contexts where low to moderate energy sheet wash action and eolian sands have shallowly buried cultural deposits. This site does not appear to have the potential to yield important additional information about the past. Due to the low density of artifacts and the low probability for subsurface deposits, the data potential for this site is considered exhausted.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, DRK-132 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

DRK-140

DRK-140 is an amorphous/oval-shaped prehistoric site that covers a total surface area of 3,038 square meters. The site is located in the eastern portion of the laydown area of the Proposed Solar Two Project. The site is situated within the lower lake basin which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation (URS 2009). Sediments consist of silts and fines through very course, poorly sorted, sub-rounded sands, with small hummocks of accumulated eolian sands surrounding individual bushes. Poorly sorted gravels (range from 0.5 centimeters to 5 centimeters in maximum dimension) of sub-rounded metavolcanic, quartz, quartzite, and chert materials occur over the entire site area. Vegetation appears to be healthy; species observed include creosote, bunchgrass and burrow weed.

This lithic scatter measures 118 meters northeast to southwest by 44 meters northwest to southeast, and contains a total of 21 prehistoric artifacts. The prevailing cultural constituents within this site consist of lithic reduction debitage. Artifact density at DRK--140 is low, with a calculated distribution of 1 artifact per 144.6 square meters. The overall condition of the site is good to fair. Secondary disturbances are attributed to bioturbation, especially into hummocks surrounding vegetation.

This site contains a total of 21 artifacts that include: 1 weathered black metavolcanic edge-modified flake, 1 globular green metavolcanic multi-directional core/hammerstone, and 19 metavolcanic flakes (1 primary, 8 secondary, 10 tertiary). The further character of artifacts within DRK-140 is unreported.

The more particular physical context for DRK-140, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be within the lower lake basin which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation. The surface of the lower lake basin is generally very flat to very gently sloping, with a thin mantle of latest Holocene alluvium and eolian silts overlaying silts and clays. Because older surfaces have been overlain with a thin layer of more recent materials that were deposited after human presence began in the area, there is a moderate to high likelihood for subsurface deposition within the lower-lying lake basin portion. Because episodes of filling and emptying of Lake Cahuilla that have occurred at various times in prehistory would have moved and disturbed soils at or near the surface of the lake basin landform, archaeological features preserved there will likely be disturbed or fragmentary (URS 2009). Soils within the lower lake basin are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines flushed into the lake by streams and washes that once terminated nearby at the shoreline.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar, 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists of primary, secondary, and tertiary flakes, and a weathered edge-modified flake tool and single core that shows evidence of having been used as a hammerstone. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Nearly all flakes observed at this site are larger than the raw lithic material on site where only gravels of maximum dimension of approximately 5 centimeters occur. However, site DRK-139, recorded approximately 175 meters to the west of DRK-140, is a lithic scatter site situated on a patch of desert pavement and would appear to be the nearest source of suitable lithic material of the same basic types observed on DRK-140. It is quite possible, if not likely, then, that cobble materials of the pavement occurring at DRK-139 was the source of the materials reduced at DRK-140. Based on the constituents and relative proximity of primary stone materials DRK-140 appears to represent a single reduction locality or episode; but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. DRK-140 is situated within the lake basin, which has a moderate to high likelihood for subsurface deposition. However, the episodes of filling and emptying of Lake Cahuilla that have occurred at various times in prehistory have moved and disturbed soils at or near the surface of the site. Therefore, archaeological features preserved within this site are likely disturbed or fragmentary.

Due to the low density of artifacts and the low probability for intact, significant subsurface deposits, the data potential for this site is considered exhausted.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria. In addition, DRK-140 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

DRK-141

DRK-141 is an amorphous-shaped prehistoric lithic scatter with 1 hearth feature that covers a total surface area of 1,546.5 square meters. The site is located in the eastern portion of the laydown staging area of the Proposed Solar Two Project. The site is situated atop intact desert pavement that is moderately developed within the lower lake basin which is a geomorphic sublandform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation (URS 2009). Observed profiles in this area indicate that the soils are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines flushed into the lake by stream/wash that once terminated nearby at the shoreline. Vegetation species on the site include creosote.

This lithic scatter and fire affected rock/hearth site measures 59 meters north to south by 55 meters east to west and contains a total of 22 artifacts. The site consists of 1 hearth (Feature 1) and 1 concentration interpreted to be a single lithic reduction locus with 8 artifacts, plus 14 additional artifacts observed outside the locus and feature. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at DRK-141 is low with a calculated distribution of approximately 1 artifact per 67.24 square meters. The overall condition of the site is fair due to off-highway vehicle tracks which run through in a north-south direction.

The site contains 1 hearth feature, 1 lithic reduction loci and a total of 22 artifacts, which include: 19 metavolcanic flakes (8 primary, 8 secondary and 3 tertiary flakes), 2 metavolcanic cores, and 1 edge-modified metavolcanic flake.

Feature 1 is the site datum and is located in the southern portion of the site. It measures 4.5 meters north to south by 3.5 meters east to west. The feature is interpreted to be the remains of a hearth consisting of approximately 40 pieces of fire affected rock situated on a slightly raised mound. No artifacts are associated with the feature.

Locus 1 is located on the northeastern boundary of the site. Locus 1 measures 3 meters north to south by 1.5 meters east to west. Artifacts observed within Locus 1 include: 7 metavolcanic flakes (4 primary, 2 secondary and 1 tertiary) and 1 metavolcanic core.

Artifacts observed within 30 meters and outside the locus consist of: 12 metavolcanic flakes (4 primary, 6 secondary and 2 tertiary flakes), 1 metavolcanic core and 1 edge-modified metavolcanic flake. The further character of artifacts associated with DRK-141 is unreported.

The more particular physical context for DRK-141, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be within the lower lake basin which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation. The lake basin geomorphic landform consists of two distinct components: the lower lake basin and the beach zone or interface between the lake basin and the fan apron. The surface of the lower lake basin is generally very flat to very gently sloping, with a thin mantle of latest Holocene alluvium and eolian silts overlaying silts and clays. Because older surfaces have been overlain with a thin layer of more recent materials that were deposited after human occupation began in the area, there is a moderate to high likelihood for subsurface deposition within the lower-lying lake basin portion. Because episodes of filling and emptying of Lake Cahuilla have occurred at various times in prehistory that would ultimately have moved and disturbed soils at or near the surface of the lake basin landform, archaeological features preserved there will likely be disturbed or fragmentary. Soils within the lower lake basin are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines flushed into the lake by streams and washes that once terminated nearby at the shoreline.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists primarily primary flakes and metavolcanic cores. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic reduction site are of the same primary stone material (metavolcanic) that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 1 single-reduction locality or episode. It should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Archaeologists for the applicant interpret that the presence of a hearth feature or fire-affected rock is evidence of resource processing and/or other activities. Hearth features found in association with lithic debitage could be evidence of more complex lithic resource processing activities. Lithic materials intended for flaked tool production were sometimes heat-treated using open hearths in order to improve the flaking characteristics of the stone. Additionally, open hearths were used in prehistory for various other purposes such as parching seeds and grains, cooking, and to provide personal warmth. Such features may also represent sacred/ritualistic activities associated with cremating the deceased and/or animals. No burnt/calcined bone of any kind was observed within the site or feature. The conspicuous absence of any evidence of carbon residue and the paucity of artifacts would support the hypothesis that DRK-141 is a surface phenomenon that resulted from a single episode of use.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. Because this landform was formed during a period of prehistoric human presence, there is a moderate to high likelihood for subsurface deposition within the lower-lying lake basin portion. However, the episodes of filling and emptying of Lake Cahuilla that have occurred at various times in prehistory would have moved and disturbed soils at or near the surface of the lake basin landform, therefore archaeological features preserved at DRK-141 appear to be disturbed and fragmentary. In addition there is no visible charcoal or staining on the surface, therefore no carbon-14 sample can be extracted for chronometric dating and given the high deflation rate of the hearth situated within the shoreline which likely removed the potential for subsurface deposition.

As a result, DRK-141, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, DRK-141 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

DRK-146

DRK-146 is an amorphous-shaped historic refuse deposit that covers a total surface area of 9,435 square feet. The site is located within the eastern portion of the laydown area of the Proposed Solar Two Project. The site is situated atop a distal alluvial fan within the lower lake basin which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation (URS 2009). Observed profiles in this area indicate that the soils are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines flushed into the lake by streams and washes that once terminated nearby at the shoreline. Vegetation species on the site include creosote, burroweed and bunch grass.

This historic refuse deposit measures 353 feet east to west by 244 feet north to south, and contains a total of approximately 600 historic artifacts. It consists of 5 concentrations interpreted to be 5 historic refuse loci, with 385 artifacts and 215 additional artifacts observed outside the loci. The prevailing cultural constituents within this site consist of historic artifacts. Artifact density at DRK-146 is low, with a calculated distribution of 1 artifact per 4.8 square meters. The overall condition of the site is good.,

This site consists of 5 historic refuse loci and a total of approximately 600 artifacts, which includes: 254 cans (cone top, church key opened, friction, match stick, removable lid, removable lip lid, sanitary and tobacco), more than 200 glass fragments (green, colorless, cobalt, white from soda, liquor, medicine bottle), condiment and food jars, drinking glasses, laundry hangers, bailing wire, stoneware (printed) plates and bowls, yellow and red Bauer ware, crockery, a bucket, Purex bottle fragments, improved white ware, embossed white ware, crown cap neck bottles, salt glazed ceramics and glass bottles with maker's marks.

Locus 1 is located in the southern portion of the site boundary and measures 17 feet east to west by 23 feet north to south. Artifacts observed within Locus 1 include: over 60 solder dot/ crimp lid condensed milk cans, church keyed beer cans, brown and colorless bottle glass with Pierce Glass Company maker's mark.

Locus 2 is located 124 feet northeast of Locus 1 and measures 40 feet north to south by 40 feet east to west. Artifacts observed within Locus 2 include: 109 cans, including solder dot/crimp lid condensed milk cans, church keyed beer cans, baking soda, vegetable cans, Italian plant pot sherds, improved white ware fragments, embossed white ware fragments, blue Milk of Magnesia glass, crown cap neck colorless bottle, brown, and colorless bottle glass and salt glazed ceramics. The maker's marks present in this locus include Owens-Illinois Glass Company, Knox Glass Bottle Company and Glass Containers Inc.

Locus 3 is located 59 feet east of Locus 2 and measures 13 feet north to south by 30 feet east to west. Artifacts observed within Locus 3 include: 2 sanitary cans, red Bauer ware bowl sherds, screw cap colorless glass jar fragments, brown Purex bottle fragments and a bottle.

Locus 4 is located 39 feet southeast of Locus 3 and measures 58 feet north to south by 49 feet east to west. Artifacts observed within Locus 4 include: 30 cans (5 church key, 1 removable lid, 1 removable lip lid, 6 sanitary milk cans, 15 sanitary food cans and 2 Prince Albert pin hinge), 3 ceramic crockery fragments, 10 glass fragments (5 colorless soda bottle fragments, 4 brown liquor fragments and 1 colorless condiment fragment), 2 laundry hangers, 2 segments of bailing wire and 1 bucket.

Locus 5 is located 200 feet northwest of Locus 4 and measures 11 feet north to south by 12 feet east to west. Artifacts observed within Locus 5 include: a small glass scatter of 138 glass fragments (20 cobalt medicine bottle fragments, 10 green liquor bottle fragments, 82 colorless soda jar fragments, 5 milk-white cosmetic jar fragments and 21 brown liquor fragments).

Those artifacts observed within 30 meters and outside the loci consist of 2 cone top beverage cans, 2 church key opened beverage cans, 2 friction top food tins, 2 match stick milk cans, 1 removable lid can, 1 removable lip lid can, 32 sanitary cans, 5 stoneware plate sherds and 3 stoneware bowl fragments. The further character of artifacts found within DRK-146 is unreported.

The more particular physical context for DRK-146, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be within the lower lake basin which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation. The lake basin geomorphic landform consists of two distinct components: the lower lake basin and the beach zone or interface between the lake basin and the fan apron. The surface of the lower lake basin is generally very flat to very gently sloping, with a thin mantle of latest Holocene alluvium and eolian silts overlaying silts and clays. Because older surfaces have been overlain with a thin layer of more recent materials that were deposited after human occupation began in the area, there is a moderate to high likelihood for subsurface deposition within the lower-lying lake basin portion. Soils within the lower lake basin are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines flushed into the lake by streams and washes that once terminated nearby at the shoreline.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret that deposits of historic artifacts such as the ones found at DRK-146 typically represent episodes of refuse disposal after initial discard in another location (dumping) or discard and/or loss of individual articles in situ. In the case of DRK-146, the very large number of artifacts and artifact types present would more likely have resulted from dumping. Additionally, the specific artifact types present would be consistent with those expected in an assemblage of common household refuse. Though dates of manufacture can be determined for some of the artifacts present at DRK-146, the time between the initial use/consumption of the artifacts and their ultimate disposal cannot be known, so the specific date of their disposal cannot be reliably determined.

Various artifacts present at DRK-146 have diagnostic characteristics from which their dates of manufacture can be approximated. A colorless bottle base found in Locus 1 with a Pierce Glass Company maker's mark can be attributed to a time period beginning in 1905 and extending into the 1980s (Goodman 2002). Another bottle base found in Locus 2 with an Owens-Illinois maker's mark was manufactured sometime between 1929 and 1954 Goodman 2002). Also present in Locus 2 is a bottle base with a Knox Glass Company maker's mark dating to between 1935 and 1953, and another bottle base with a Glass Container Incorporated maker's mark dating from between 1945 to present (Goodman 2002). Additionally, cone top beverage cans were found at this site, which is a style of container that was first produced in 1935 and stopped being produced in the 1950s.

Based on the discrete nature of the 5 loci at DRK-146, it is likely that the at least 5 separate episodes of dumping took place there. Because of the wide range of potential manufacture dates of artifacts present at DRK-146, it can only be confidently stated that the first date of deposition could have been as early as 1945 and may have actually occurred at any time since then.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. Although, based on the landform on which DRK-146 is located, there is a greater potential of the presence of subsurface archaeological deposits, much of the geomorphic activity has occurred throughout prehistory. Therefore, there is no reason to expect that there might be buried components to relatively recent sites such as DRK-146. If shorter-term taphonomic processes have shallowly buried some of the deposits at DRK-146, the buried portions of the deposit would likely have the same basic characteristics as those visible on the surface. As a result, the data potential of DRK-146 is considered exhausted through recordation.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, DRK-146 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

JF-030

JF-030 is an oval-shaped historic/modern refuse deposit that covers a total surface of 2510 square feet. The site is located within the eastern portion of the Laydown area of the Proposed Solar Two Project area. The site is situated atop an alluvial deposit of fine grain silicate matrix within the lower lake basin which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation (URS 2009). Observed profiles in this area indicate that the soils are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines flushed into the lake by stream/wash that once terminated nearby at the shoreline. Soils are loose sands and aeolian sediments with no desert pavement. Vegetation on the site includes creosote, mesquite and ironwood trees.

This historic site measures 69 feet east to west by 50 feet north to south, and contains a total of approximately 311 historic/modern artifacts. The site also contains 1 cryptocrystalline silicate jasper secondary flake. The prevailing cultural constituents within this site consist of historic/modern refuse. Artifact density at JF-030 is low, with a calculated distribution of 1 artifact per 8 square feet. The overall condition of the site is poor due to alterations by modern trash, off-highway vehicle tracks that run along the northeast boundary and a berm associated with road grading activity, which runs east to west across the southern portion of the site.

The artifact types and materials present at JF-030 include 150 fragmented or whole glass artifacts, 103 metal artifacts, 23 cans, 12 historic ceramic fragments, and miscellaneous historic/modern refuse (oil filters, strap iron, metal sheeting, toys, butchered faunal bone, light bulb, sewage pipe, wire coils, construction materials and bricks). The site also contains 1 cryptocrystalline silicate jasper secondary flake.

A total of 150 glass fragments were observed within the site and include: 1 colorless crown cap finish bottle, 1 colorless flask fragment with a base mark of 392 and heel mark FOUR-FIFTHS, 1 colorless flask base with the base mark D1 89/I inside an O and a diamond/64-8, 1 colorless flask base with the base mark D1/I inside an O and a diamond/64-9, 1 colorless flask fragment with the base mark L/M in a circle/4, 1 colorless flask fragment with the base mark 7/560/P in a circle, 1 colorless bottle base with the base mark NOT TO BE/2 G interconnected with a C/REGISTERED/1095/ REFILLED, 1 colorless bottle base with the base mark 23 I in an O and a diamond 7, 1 colorless bottle base with the base mark TABLE PRODUCT INC./a G interconnected with a C/3833/REG. CAL/LOS ANGELES, 1 colorless bottle base with the base mark TABLE PRODUCTS/a G interconnected with a C/3542/REG. CAL/LOS ANGELES, 1 colorless tumbler/cup fragment with the base mark 3, 1 colorless flask fragment with the base mark 04.../576/I inside an O with a diamond/0954 and the heel mark HALF PINT, 1 colorless bottle base with the base mark SUN/36 with 256 embossed over the U, 1 colorless bottle base fragment with the base mark 0 9476/H over an A/4, 53 fragments are from 1 green glass bottle with a crown cap finish and texturized neck and the base mark WHITE ROCK/Duraglas in cursive/23 I in an O with a diamond 51/3C/2575-C, 45 fragments are from 1 colorless Dr. Pepper bottle with crown cap finish, a red and white applied color label 10 2/Dr. Pepper/4 and the base mark LG 70/44855, 1 colorless milk bottle with a red and white applied color label Armstrong Certified/Dairy/image of a strong arm, 1 brown bottle base with the base P C G P inside a cross, 2 are brown bottle bases with the base mark REG. US/CLOROX in a diamond/PAT. OFF., 1 milk glass toiletry jar with the base mark H over an A, 4 milk glass bottle fragments, 3 cobalt glass fragments, 4 manganese decolorized glass fragments, 1 light pink depression glass decorative bowl, 1 decorative vase finish bottle, and 20 window pane fragments.

Cans present at the site consist of 1 sanitary church key-opened can, 2 hole-in-top cans with a diameter of 2.094 inches and a height of 3.094 inches, and 10 to 20 unidentifiable cans including quart size, gallon size, pint size and smaller. This site also contains a ceramic assemblage of 5 porcelain fragments (1 jar and 4 pieces of a plate with a scalloped edge and blue rim) and 7 terra cotta fragments. Miscellaneous refuse at the site consists of 50-100 wire coil fragments, construction materials (6 bricks), toys (metal truck model and 4 wheel roller skates), 1 light bulb, 11 sewage pipe fragments, 1 strap iron-metal sheeting chicken wire window screen, 1 butchered faunal bone fragment, and 1 oil filter. The further character of artifacts associated with JF-030 is unreported.

The more particular physical context for JF-030, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be within the lower lake basin which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation. The lake basin geomorphic landform consists of two distinct components: the lower lake basin and the beach zone or interface between the lake basin and the fan apron. The surface of the lower lake basin is generally very flat to very gently sloping, with a thin mantle of latest Holocene alluvium and eolian silts overlaying silts and clays. Because older surfaces have been overlain with a thin layer of more recent materials that were deposited after human occupation began in the area, there is a moderate to high likelihood for subsurface deposition within the lower-lying lake basin portion. Because episodes of filling and emptying of Lake Cahuilla have occurred at various times in prehistory that would have ultimately moved and disturbed soils at or near the surface of the lake basin landform, archaeological features preserved there will likely be disturbed or fragmentary. Soils within the lower lake basin are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines flushed into the lake by stream/wash that once terminated nearby at the shoreline.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret that deposits of historic artifacts such as the ones found at JF-030 typically represent episodes of refuse disposal after initial discard or discard and/or loss of individual articles in situ. In the case of JF-030, the large number of artifacts and artifact types present would likely have resulted from the dumping of a wide range of artifact types that would be expected in an assemblage of common household refuse. Though dates of manufacture can be determined for some of the artifacts present at JF-030, the time between the initial use/consumption of artifacts and their ultimate disposal cannot be known so the specific date of their disposal cannot be reliably determined.

A small number of artifacts at JF-030 possess specific makers' marks, labeling styles, and evidence of manufacturing technologies from which general dates of manufacture can be determined. Two bottle bases display a maker's mark for Glass Container Corporation that was in use from 1945 until some time after 1971 (Goodman 2002).

Two bottle bases have a Hazel Atlas maker's mark that is found on bottles manufactured between 1920 and 1964 (Goodman 2002). Owens-Illinois Company included a date code on their bottle bases so more accurate dates of manufacture can sometimes be determined. One such bottle base present has a date code of "7" indicating that it was manufactured in either 1937 or 1947, another has a date code of "9" meaning that it was manufactured in either 1939 or 1949, and yet another has a date code "8" from which can be inferred that it was manufactured in either 1938 or 1948 (Owens Illinois did not switch to two-digit date codes until the 1950s - Lockhart 2004). Another bottle base is from a White Rock bottle and has the Owens Illinois Duraglas maker's mark with a date code of "51" indicating that it was manufactured in 1951 (Lockhart 2004). Additionally present but less temporally diagnostic are hole-in-top cans, which were common from the 1880's to the 1940s and where can assemblages are predominated by this type of can in the western states, typically date to the 1920s (Goodman 2002). Also present were 4 manganese decolorized glass fragments. Beginning circa 1880 manganese was added to glass to change its natural aqua color to clear. That addition had the unintended effect of turning the glass a particular amethyst color when exposed to ultraviolet light for extended periods of time. Such glass is termed "sun-colored-amethyst" (Goodman 2002:1) glass (SCA) and its manufacture predates 1920 when the practice of adding manganese ended (Goodman 2002). Based on these data it would follow that the deposition of artifacts at JF-030 could have occurred as early as 1945 or as late as sometime in the 1970s. Lastly, a single cryptocrystalline jasper secondary flake was present at the site. Archaeologists for the Applicant interpret the presence of this artifact to be anomalous and that it does not indicate the presence of a substantial prehistoric component at the site.

Although this site does possess artifacts with temporally diagnostic characteristics, those characteristics serve to date the manufacture of the objects rather than the date of deposition at the site, therefore the material remains cannot definitively be associated with a specific portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. Additionally, there is no evidence in the geomorphic study (URS 2009) or visible at the site that would indicate that there is reasonable potential for the presence of buried historic era archaeological deposits.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, JF-030 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

200 FOOT BUFFER

EBR-083

EBR-083 is a single rock cluster feature. The feature is located within the southern central extent of the 200 foot buffer project boundary of the Proposed Solar Two Project. The site is atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. Vegetation is not present on the site.

This historic/modern rock cluster site measures 3 feet north to south by 3 feet east to west. The rock cluster is constructed of 18 rocks of various source material (metavolcanic and granite); the diameter of rocks used range from 5 centimeters to 18 centimeters.

There are no artifacts present associated with the single feature that comprises this site.

The more particular physical context for EBR-083, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be a very old fan surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for Early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret that although the rock cluster present at EBR-083 has characteristics similar to survey markers in the area, it cannot be conclusively identified as such. The size of the cluster and of the stones that comprise it conforms approximately to those surrounding General Land Office (GLO) survey benchmarks found in the region, but this feature is not located on a current section or quarter section corner point.

It is, however, located on the dividing line between two sections and therefore the rock cluster could be the remains of a witness mark placed by GLO surveyors. When GLO cadastral surveys were conducted in the project area in the early 20th century, survey standards allowed for the placement of witness marks within 20 chains (1320 feet) of the actual location of a section corner if, "prevailing conditions would assure its destruction by natural causes" (White 1991:619). This rock cluster is precisely located on the dividing line between two sections and lies within 20 chains of the closest section corner. However, according to procedures, a witness marker should be inscribed with the initials, "WP" (Witness Point) and the distance and direction to the section corner. It is possible that such an inscription existed at one time but was missing or not readily visible when the site was examined during this survey effort. Additionally, expediently constructed stone clusters can also be markers of mining claims or homestead boundaries. Mining claim markers sometimes contain tobacco tins to hold copies of official records substantiating the claim. Such a tin was not evident at this stone cluster.

No temporally diagnostic historic artifacts were found and it seems unlikely that the feature contains cultural materials and does not exhibit characteristics which would indicate prehistoric age. Given the structure of the cairn, it is noteworthy that this stone cluster cannot be definitively determined to be historic in age. The site is situated within a large recreational area which is frequently used by off-highway vehicles. It is possible that the stone cluster is modern in age and perhaps was expediently placed to provide a visible landmark to facilitate navigation.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. EBR-083 is situated atop a subordinate landform characterized as a very old fan surface within the fan piedmont land form. The fan piedmont land form is an isolated exposure surrounded by the fan apron land form that has been determined to have the same geomorphological characteristics as the fan piedmont (URS 2009: CUL-6). This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits, therefore data potential is considered exhausted through recordation of EBR-083.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, EBR-083 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

EBR-218

EBR-218 is an amorphous-shaped prehistoric archaeological site that covers a total surface area of 847 square meters. The site is located within the eastern extent of the 200 foot project boundary buffer of the Proposed Solar Two Project. EBR218 appears to be within multiple landforms and subordinate landforms, with an interface between the fan apron and shoreline, and the fan apron and fan piedmont. The site is situated on a younger (Late Holocene) fan apron within the fan apron/skirt geomorphic landform, which has a Late Pleistocene/Early Holocene period of formation (URS 2009). The surface area of the site consists of an open, low-lying, aeolian/fluvial wash within a younger fan apron with intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. The southern edge of the site is bordered by a very old fan surface within the fan piedmont geomorphic landform. In addition, along the north northeastern boundary, the site is situated atop the fan apron/beach interface with deflated beach sands within the beach zone, which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating Late Pleistocene/Early Holocene period of formation (URS 2009). The soils along the northern boundary consist of beach sands that are non-cohesive and vary from coarse sub-angular to rounded sand and small gravels to medium and coarse well rounded sands overlaid by fine silts and clays. The beach zone interface is determined by the beach sand void of cobbles and desert pavement. Vegetation species on the site include creosote, ocotillo, burroweed and desert trumpet.

This archaeological deposit measures 122 meters northeast to southwest by 17 meters east to west, and contains a total of 61 prehistoric artifacts and 1 non-associated historic artifact. It consists of 2 concentrations interpreted to be multiple activity loci. Artifacts observed between loci occur at lower frequency than observed within the concentrations. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at EBR-218 is low, with a calculated distribution of 1 artifact per 13.66 square meters. The overall condition of the site is good, with the exception of several ephemeral gullies which cut through the site in north south directions.

This site contains 2 multiple activity loci and a total of 62 artifacts, which include: 25 green metavolcanic flakes (8 primary, 3 secondary, 13 tertiary and 1 piece of angular waste/shatter), 1 brown cryptocrystalline silicate chert tertiary flake, 1 black/gray cryptocrystalline silicate tertiary flake, 1 quartz tertiary flake, 1 quartzite primary flake, 2 basalt tertiary flakes, 2 granitic hammerstone, 1 green metavolcanic core tool, 1 quartzite core, 1 triangular mottled red and brown cryptocrystalline silicate jasper biface, 1 burnt sandstone metate fragment, 23 buffware body sherds, 1 brownware body sherd and 1 historic lard bucket measuring 15 inches in diameter.

Locus 1 is located in the southern portion of the site and measures 12 meters north to south by 5 meters east to west. Artifacts observed within Locus 1 include: 16 green metavolcanic flakes (7 primary, 2 secondary, 6 tertiary and 1 shatter), 1 brown cryptocrystalline silicate chert tertiary flake, 1 quartzite primary flake, 1 quartzite unifacial core, 1 granite hammerstone, 1 burnt sandstone metate fragment, 1 triangular mottled red and brown cryptocrystalline silicate jasper biface and 10 buffware ceramic sherds.

Locus 2 is located 41 meters north of Locus 1 and measures 3 meters north to south by 2 meters east to west. Artifacts observed within Locus 2 include: 3 green metavolcanic flakes, 1 brownware ceramic sherd and 5 buffware ceramic sherds.

Those artifacts observed within 30 meters and outside of the loci consist of: 6 green tertiary metavolcanic flakes (1 primary, 1 secondary and 4 tertiary), 1 granitic hammerstone, 1 green metavolcanic core tool, 1 quartz tertiary flake, 1 black/gray cryptocrystalline silicate tertiary flake, 2 basalt tertiary flakes, 8 buffware ceramic sherds and 1 non-associated historic lard bucket measuring 15 inches in diameter. The further character of artifacts found within the site is unreported.

The more particular physical context for EBR-218, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be within multiple landforms and subordinate landforms, which include fan apron within the fan apron/skirt, fan piedmont, beach zone, and interfaces between these landforms. The surface and subsurface aspects of this landform are dominated by a younger (Late Holocene) fan apron within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation. The surface consists of finer grain material eroded from the fan piedmont that has formed a number of fan “aprons” which do not individually fully cover the entire area, and which interfinger and partially bury one another and piedmont remnants. The lack of soil development within the capped alluvial unit, and the similar degree of pavement development between the 2 units, suggests that this buried portion of the lower alluvial fan deposit may not have been exposed at the surface for an appreciable amount of time; thus reducing the potential for extensive buried archaeology on that surface. Nonetheless, this area does demonstrate the potential for (shallowly) buried preserved surfaces, but there is a high likelihood these deposits will represent the same constituents recorded on the surface. As a result, there is a very low to moderate likelihood for subsurface deposition, though the particular physical context of the site's being situated on a younger fan may increase that potential. The desert pavement consists of small to large, sub-rounded to sub-angular metavolcanic, basalt, quartz, quartzite and granite gravels and cobbles overlaying coarse sands, silts, and fine gravels.

The southern boundary is situated on distal fan apron/fan piedmont interface within the fan piedmont with a very old fan surface. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007); therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Along the north northeastern boundary, the site is situated atop distal fan apron/beach interface within the beach zone which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating Late Pleistocene/Early Holocene period of formation (URS 2009). The lake basin geomorphic landform consists of two distinct components: the lower lake basin and the beach zone or interface between the lake basin and the fan apron. The land surface of the beach zone consists of beach flats and deflated beach sands that are consistent with the multiple formation and recessional events of the maximum Lake Cahuilla shoreline. Because the advance and recession of the waters of Lake Cahuilla at various times in prehistory would have moved surface soils within the beach zone, the potential for subsurface deposition is heightened. The soils within the beach zone consist of sands that are non-cohesive and vary from coarse sub-angular to rounded sand and small gravels to medium and coarse well rounded sands overlaid by fine silts and clays. The beach zone interface is evidenced in EBR-218 by beach sand void of cobbles and desert pavement located along the northern boundary of the site. Additionally, there is a wash along the southwestern margin of the site. In that area the soils are light tan sand with gravels and cobbles.

Ceramics found at this site comprise about 40% of the total artifacts observed, with the vast majority being buffware sherds and a single brownware sherd. Data gathered on ceramics in the area surrounding EBR-218 show evidence of a variety of ceramic types and techniques. Though paddle-and-anvil construction techniques were common among groups using this area, the tempers employed, vessel types manufactured, and decoration did vary between groups. The Diegueño used ground clay and did not add temper when manufacturing ceramics. They created a variety of vessels including ollas; bowls, cooking pots, and pipes. The Kamia sometimes added rose quartz as temper and produced the greatest variety of ceramics among the Yuman bands, including ollas, jars, canteens, bowls, rattles, plates, scoops, cups, and parchers. Kamia ceramics were painted after firing with red and/or black designs. The Cocopah used ground and winnowed clay tempered with ground sherds to create a variety of vessels used for storage and cooking. Quechan vessel types include bowls, parchers, cooking pots, small figurines, and large storage vessels that were used to float goods across rivers (URS 2009). Currently, the primary ethnic groups known to have occupied region surrounding EBR-218 include the Diegueño and Kamia. Other groups known to have used/traveled/inhabited the area includes the Tipai, Cocopa, Kumeyaay, Ipai, Quechan, Paipai and Cahuilla (Luomala 1978; Schaefer and Laylander 2007; URS 2009). In approximately AD 1200, the course of the Colorado River changed, refilling Lake Cahuilla and providing a stable water source and drawing people from surrounding regions to repopulate the Colorado Desert. Ceramic wares which were introduced centuries before in other areas were brought into this region at that time (URS 2009). However, it has been argued that stable populations around the lake developed their own distinctive pottery formulas that became regional expressions of their families and locales (May ND). Although these groups each had specific approaches to the creation of ceramics, ceramic vessels were also traded along with subsistence resources and other items, infusing some uncertainty into the use of data from ceramics to associate one particular area with a particular tribal group or family. Therefore, it is unlikely that surface data could directly relate EBR-218 or the area surrounding it to a particular tribe.

Of the cultural constituents found in EBR-218, 50% were primarily lithic reduction in nature with 31 of the total artifacts observed being flakes. Lithic constituents found consist primarily of tertiary flakes, a unifacial core and 2 granitic hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this multi-component site are of the same primary stone (green metavolcanic) material that is a constituent of the surrounding area, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 2 multi-activity localities or episodes; but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time. The presence of flaked stone tools, 1 triangular mottled red and brown cryptocrystalline silicate jasper biface and 1 green metavolcanic core tool, within EBR-218 also represents resource procurement and/or processing of faunal or floral resources. The creation of flaked stone tools such as the cryptocrystalline silicate jasper biface present at EBR-218 requires additional lithic technologies, possibly including bifacial thinning and pressure flaking to shape and refine cutting edges.

Ground stone present at this site includes a single potentially fire-affected metate fragment. Ground stone tools were made by grinding, abrading, pecking, pounding, and polishing rather than chipping and flaking. Ground stone tools found in the area surrounding EBR-218 include manos and metates (sometimes referred to as milling stones). Metates in this area are typically flattish slabs and manos were smaller, loaf-shaped stones that were moved in a circular motion against the metate in order to grind small seeds and other food resources. Both manos and metates were primarily constructed from coarse-grained stone such as sandstone or granite. Manos and metates are associated with subsistence procurement and/or processing (Chartkoff and Chartkoff 1984).

Evidence that the mano described above has been fire-affected may indicate that a hearth feature was once present at EBR-218. Hearth features or fire-affected rocks are evidence of resource processing and/or other activities. Hearth features found in association with lithic debitage could be evidence of more complex lithic resource processing activities. Lithic materials intended for flaked tool production were sometimes heat treated using open hearths in order to improve the flaking characteristics of the stone. Additionally, open hearths were used in prehistory for various other purposes such as parching seeds and grains, cooking, and to provide personal warmth. Such features may also represent sacred/ritualistic activities associated with cremating the deceased and/or animals.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret sites such as EBR-218, with richer assemblages containing ceramics in association with hearth features and artifacts, such as groundstone and lithic tools, as places where subsistence procurement and processing activities occurred; and it is possible that sacred or ritual activities occurred there as well.

Historic artifacts such as the one historic lard bucket found at EBR-218 typically represent a single episode of refuse disposal or discard and/or loss of individual articles in-situ. In the case of EBR-218, the most likely explanation of the presence of a single artifact lard bucket would appear to represent a single instance of in-situ disposal or the artifact may have been displaced from its original context through erosional processes. The artifact cannot be temporally associated with any other artifacts present at the site, possesses no discernable maker's mark, nor is it of any diagnostic style or construction technique; therefore, it has no potential to provide meaningful information concerning any portion of prehistory or history.

Because this site contains artifacts with unique or temporally diagnostic characteristics and the material remains may be associated with a specific portion in prehistory. This site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. Since this site contains artifacts with unique or temporally diagnostic characteristics, the material remains may provide information that can be attributed to a specific portion of prehistory. Although EBR-218 is primarily located within the fan apron/skirt geomorphic landform, which indicates a Late Pleistocene/Early Holocene period of formation and usually has a very low to moderate likelihood for subsurface deposition, its particular location is on a younger fan apron, which may have formed during the Late Holocene, which increases the possibility that subsurface deposits might be present. The southern edge of the site is situated within the transition with a subordinate landform characterized as an older fan surface with alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation, and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits. The northern edge of the site is located within the beach zone. This landform was formed by the advance and recession of the waters of Lake Cahuilla at various times in prehistory moving surface soils within the beach zone. Therefore, there is a moderate to high potential for subsurface archaeological deposits within the beach zone.

Further analysis of the geographic location of this site reveals that it is located on the high water line of the maximal potential filling of prehistoric Lake Cahuilla. Four events of maximal filling of Lake Cahuilla have occurred between AD 700 and AD 1540. An additional partial filling has been proposed to have occurred sometime between A.D. 1516 and 1659 (Cleland et al. 2000). Based on the precise alignment of the eastern edge of EBR-218 with the proposed high water mark of Lake Cahuilla, it is likely that the site existed during or before the most recent complete filling episode, which began around AD 1430 and was fully receded by AD 1540. Based on the cultural constituents and location of the site, there exists the potential for buried preserved surfaces, but there is a high likelihood these deposits will represent the same constituents recorded on the surface. As a result, it is recommended that limited subsurface testing be conducted to assess whether subsurface deposits are present at EBR-218 before a recommendation of eligibility can be made.

In addition, because of the nature of potentially informative and diagnostic characteristics of lithics, groundstone, and ceramics found at EBR-218, the recordation of all potential data that might be derived from them requires the work of a specialist. It is recommended that a sample of artifact types found at EBR-218 be studied by a specialist so it can be determined if they do provide any additional data potential; and, if so, such data can be applied in making an eligibility determination. Due to characteristics of the artifact assemblage and features present at EBR-218, and its proximity to the Lake Cahuilla shoreline, it is considered a contributor to the proposed Lake Cahuilla High Water Mark District.

JFB-004

JFB-004 is a circular-shaped historic site that covers a total surface area of 63 square meters. The site is located within the western extent of the 200 foot project boundary buffer of the Proposed Solar Two Project. The site is situated within an active wash surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Vegetation species on the site include creosote.

This historic survey benchmark site measures 10 meters east to west by 9 meters north to south, and contains a total of 18 historic artifacts and 1 historic feature. The prevailing cultural constituents within this site consist of wire fragments and wooden lathe fragments. Artifact density at JFB-004 is low, with a calculated distribution of 1 artifact per 3.5 square meters. The overall condition of the site is fair with some alterations caused by erosional processes due to active washes.

Artifacts observed at JFB-004 include 10 wire fragments and 8 weathered wooden stake fragments (5 of which are in situ). The artifacts are associated with a US General Land Office (GLO) benchmark (Feature 1).

Feature 1 is located in the center of the site and consists of a historic US GLO brass cap bench mark that reads: US GENERAL LAND OFFICE SURVEY! PENALTY $250 REMOVAL!T16S R10E (with 1!4 section info)! 191_ with associated guy wire anchor cairns that are composed of 3 to 4 stones each and 5 pieces of lathe in situ. The further character of artifacts associated with JFB-004 is unreported.

The more particular physical context for JFB-004, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be within an active wash surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting land form is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont. Areas of active erosion within the fan piedmont, such as where this site is located, do have a slightly greater potential for the presence of subsurface deposits where recent alluvium was deposited. Given the highly erosive nature of the fan piedmont it seems unlikely that such subsurface deposits would have been preserved. Furthermore, if subsurface cultural deposits were to be preserved under such isolated inset pediments, they would most likely be similar in quality and quantity of artifacts to those sites found on the surface in nearby remnant portions of the fan piedmont (URS 2009: CUL-8).

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as a General Land Office benchmark (cadastral survey corner benchmark). Benchmarks such as the one found in JFB-004 were placed by surveyors as a part of the Public Lands Survey System (PLSS). That system divided public lands into sections of 1 square mile (640 acres) and into quarter sections of 160 acres. The PLSS was created by the Land Ordinance of 1785, which declared that lands outside the then-existing states could not be sold, otherwise distributed, or opened for settlement prior to being surveyed (Stewart 1935). Along with the Homestead Act of 1862 and the Desert Land Act of 1877, the PLSS helped facilitate the U.S. expansion westward in the late 19th and early 20th centuries. For unknown reasons, the date stamp on this particular benchmark was left blank when the benchmark was placed. Based on date stamps on other similar benchmarks observed in the area that bear the date "1912," this benchmark may have been placed during the same survey effort and therefore may date to the same time. However, there are no temporally diagnostic artifacts present at JFB-004 to confirm or deny that speculation.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. JFB-004 is situated within an active wash that is contained by the larger fan piedmont. This geomorphic landform indicates a Pleistocene (or older) period of formation. Due to the stability of this land form there is very low likelihood for subsurface archaeological deposits. Areas of active erosion within the fan piedmont, such as where this site is located, do have a slightly greater potential for the presence of subsurface archaeological deposits occurring where recent alluvium was deposited. Given the highly erosive nature of active washes within the fan piedmont, it seems unlikely that such subsurface deposits would have been preserved. Furthermore, if subsurface cultural deposits were to be preserved under such isolated inset pediments, they will most likely be similar in quality and quantity of artifacts to those sites found on the surface in nearby remnant portions of the fan piedmont (URS 2009: CUL-8). Therefore, data potential is considered exhausted through recordation of JFB-004.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, JFB-004 is not considered a contributor to an existing and/or proposed archaeological district or landscape. However, destruction of US GLO survey corner benchmarks is prohibited by law and therefore it is recommended that this benchmark be left undisturbed.

RAN-024

RAN-024 is an oblong-shaped lithic scatter that covers a total surface of 334 square meters. The site is located within the south central portion of the 200 foot buffer area of the Proposed Solar Two Project. The site is situated within an active wash surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of the site consists of intact desert pavement that is moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, and granitic gravels and cobbles. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. The site is bound by ephemeral gullies and ridgelines and is altered by natural erosion and weathering. Vegetation species on site include desert trumpet.

This lithic scatter site measures 45 meters north to south by 15 meters east to west, and contains a total of 17 prehistoric artifacts. It consists of 1 concentration interpreted to be 1 single reduction locus, with 13 artifacts and 4 additional artifacts observed outside the locus. The prevailing cultural constituents within this site consist of prehistoric lithic reduction debitage. Artifact density at RAN-024 is low, with a calculated distribution of 1 artifact per 19.65 square meters. The overall condition of the site is fair due to natural erosional and deflationary processes.

The site contains 1 lithic reduction locus and a total of 17 artifacts (13 associated with the loci), which include: 12 metavolcanic flakes (7 secondary and 5 tertiary), 1 tested cryptocrystalline silicate chert cobble, 1 metavolcanic multi-directional core and 3 metavolcanic hammerstones.

Locus 1 is located 24 meters north of the site datum and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 1 include 12 metavolcanic flakes (7 secondary, 5 tertiary) and 1 metavolcanic multi-directional core.

Those artifacts observed within 30 meters and outside of the locus consist of 1 tested cryptocrystalline silicate chert cobble and 3 metavolcanic hammerstones. The further character of artifacts within RAN-024 is unreported.

The more particular physical context for RAN-024, extrapolating information from Data Response 112, Figure 4 (URS 2009) to the location of the site, appears to be within an active wash surface within the fan piedmont. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007).

Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont. Areas of active erosion within the fan piedmont such as where this site is located do have a slightly greater potential for the presence of subsurface deposits such as would occur where recent alluvium was deposited. Given the highly erosive nature of the fan piedmont it seems unlikely that such subsurface deposits would have been preserved. Furthermore, if subsurface cultural deposits were to be preserved under such isolated inset pediments, they will most likely be similar in quality and quantity of artifacts to those sites found on the surface in nearby remnant portions of the fan piedmont (URS 2009: CUL-8).

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists primarily of secondary and tertiary flakes, 1 multi-directional core, and 3 hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone (metavolcanic) material that is a constituent of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 1 single reduction locality or episode, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, RAN-024 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

TRANSMISSION LINE – 300 FOOT CORRIDOR

RAN-412C

RAN-412C is an amorphous lithic and ceramic scatter that covers a total surface of 34,991 square meters. The site is situated primarily atop lake basin sediments within the lower lake basin which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation (URS 2009). Observed profiles in this area indicate that the soils are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines flushed into the lake by streams and washes that once terminated nearby at the shoreline (URS 2009). RAN-412C shows evidence that it is being inundated from the south by recent (latest Holocene) alluvium and beach/lake basin interface soils that appear to have characteristics of the nearby beach zone. The surface area of the site consists of beach sands that are non-cohesive and vary from coarse sub-angular to rounded sand and small gravels to medium and coarse well rounded sands overlaid by fine silts and clays. Vegetation species on the site include creosote, mesquite, and saltbush.

This ceramic and lithic scatter site measures 427 meters north to south by 234 meters east to west, and contains a total of approximately 419 prehistoric artifacts. Due to the extent of the site the area of potential effect (sample area) was inventoried and individual artifacts mapped. Reconnaissance survey was conducted to identify site extant and a sample unit (SSU-1) was placed to extrapolate overall density and constituents observed with higher density. The portion of the site inventoried with mapped artifacts consists of 1 concentration interpreted to be a multiple use locus with 270 artifacts and 149 additional artifacts were observed outside the locus. Therefore the areas between loci and features are not void of artifacts, yet they occur at a much lower density than those within the locus and SSU. The prevailing cultural constituents within this site consist of prehistoric ceramic artifacts. Artifact density at RAN-412C is low, with a calculated distribution of 1 artifact per 84.5 square meters. However, the artifact density within Locus 1 (represented by SSU 1) portrays a much higher concentration of approximately 5.5 artifacts per square meter. The overall condition of the site is fair with some alterations due to off-highway vehicle (OHV) activity and many ephemeral drainages associated with the larger active wash that bound the site to the east.

Artifact types and materials occurring within the site include; 53 metavolcanic flakes (5 primary, 21 secondary, 8 tertiary, 19 shatter) and 3 metavolcanic tested cobbles; 14 black metavolcanic flakes (3 primary, 4 secondary, 2 tertiary) plus 2 multi-directional cores and 2 uni-directional cores of the same material; 18 green metavolcanic flakes (4 primary, 9 secondary, 5 tertiary), with 2 cores (1 uni-directional and 1 multi-directional), and 1 tested cobble of the same material type; 4 cryptocrystalline silicate flakes (2 secondary, 2 tertiary), 1 basalt primary flake, and 2 quartzite primary flakes; 2 quartz uni-directional cores, 1 tested cobble and 1 primary flake of quartz; 1 basalt multi-directional core, tested cobble and tertiary flake; 1 cryptocrystalline silicate multi-directional core, and 5 utilized flakes. The ceramic component of Locus 1 includes 176

Colorado buffware (17 rim and 159 body sherds) and 31 brownware sherds (1 rim and 30 body sherds). The locus also contained 1 fragment of fire affected sandstone. The ceramic constituent of those artifacts found outside the locus include 94 sherds: 83 buffware sherds (21 rim and 62 body sherds), and 11 brownware sherds (4 rim and 7 body sherds).

Locus 1 is located 177 meters southeast of the site datum and measures 22.5 meters north to south by 15.5 meters east to west. The artifacts observed within Locus 1 consist of 64 artifacts including 25 green metavolcanic flakes (1 primary, 9 secondary, 6 tertiary, 9 pieces of shatter), and 2 tested cobbles. The black metavolcanic material includes 27 flakes (4 primary, 12 secondary, 7 tertiary, 3 shatter), 1 tested cobble, and 2 cores. The cryptocrystalline flakes include 2 secondary, 1 tertiary, 1 edge-modified tertiary flake. There is only 1 primary basalt flake located within Locus 1. The main prehistoric component within Locus 1 consists of Colorado buffware ceramics (17 rim sherds and 159 body sherds). The ceramic component also includes brownware (1 rim sherd, 30 body sherds).

Due to the high density within Locus 1 a 5 by 5 meter sample unit (SSU 1) was recorded within the locus. This sample unit was centrally placed to determine a more accurate interpretation of the surface area to artifact density ratio. The artifacts observed within the sample unit include: 17 black metavolcanic flakes (1 primary, 8 secondary, 1 tertiary, and 7 shatter pieces). In addition to 14 green metavolcanic flakes (1 primary, 4 secondary, 4 tertiary, 5 shatter), and 1 tested cobble. The sample unit also contained 2 quartzite primary flakes, 1 primary basalt flake, 2 cryptocrystalline silicate secondary flakes, and 1 edge-modified tertiary flake of the same material. Just as within the rest of Locus 1, the main component of the sample unit is Colorado buffware with 94 sherds (8 rim and 86 body sherds), in addition to 7 body sherds of brownware. Therefore the density of the sample unit can be accurately interpreted as 5.5 artifacts per square meter.

Those artifacts observed within 30 meters and outside of Locus 1 consist of 14 black metavolcanic flakes (3 primary, 4 secondary, 2 tertiary, 5 utilized flakes), 2 multi-directional cores and 2 uni-directional cores of the same material. There are 18 green metavolcanic flakes (4 primary, 9 secondary, 5 tertiary), with 2 cores (1 uni-directional and 1 multi-directional), and 1 tested cobble of the same material type; there are 2 quartz uni-directional cores, 1 tested cobble and 1 primary flake of quartz; as well as 1 basalt multi-directional core, tested cobble and tertiary flake; 1 cryptocrystalline silicate multi-directional core is located outside the locus as well. The ceramic constituent of those artifacts found outside the locus include 94 sherds; 83 buffware sherds (21 rim and 62 body sherds). In addition there are 11 brownware sherds (4 rim and 7 body sherds). The further character of the artifacts associated within RAN-412C is unreported at this time.

The more particular physical context for RAN-412C, extrapolating information from Data Response 112 Figure 4 (URS 2009), to the location of the site, appears to be within both the lower lake basin and the beach zone which are both geomorphic sub-landforms to the lake basin geomorphic landform indicating a Late Pleistocene/Early Holocene period of formation. The lake basin geomorphic landform consists of two distinct components: the lower lake basin and the beach zone or interface between the lake basin and the fan apron. The surface of the lower lake basin is generally very flat to very gently sloping, with a thin mantle of latest Holocene alluvium and aeolian silts overlaying silts and clays. Because older surfaces have been overlain with a thin layer of more recent materials that were deposited after human occupation began in the area, there is a moderate to high likelihood for subsurface deposition within the lower-lying lake basin portion. The particular placement of this site is in an area of ephemeral drainages to the west and a wash to the east, with what appears to be relatively recent alluvial flow from the south, thereby increasing the chance that further archaeological deposits might be shallowly buried at the site. Because episodes of filling and emptying of Lake Cahuilla that have occurred at various times in prehistory would have moved and disturbed soils at or near the surface of the lake basin landform, archaeological features preserved there will likely be disturbed or fragmentary. Still, the presence of recent wash means that archaeological deposits could have been buried before the last maximal filling of the lake, in which case subsurface archaeological deposits could have been preserved.

Based upon the artifact assemblage visible on the surface, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as a multi-use site, where multiple resource procurement and processing activities took place.

RAN-412C has a relatively large assemblage of ceramic sherds, which place this site within Late Prehistoric era. Data from analysis of style elements and physical characteristics of ceramics can provide data pertinent to research questions regarding prehistoric ceramic production technologies and perhaps identify the ethnic origin of the pots they came from. Such data is valuable when placed in context with studies of ceramics distribution associated with prehistoric Lake Cahuilla. Currently, the primary ethnic groups known to have occupied region surrounding RAN-412C include the Diegueño and Tipai (Kamia). Other groups known to have used/traveled/inhabited the area include the Cocopa, Kumeyaay, Ipai, Quechan, Paipai and Cahuilla (Luomala 1978; Schaefer and Laylander 2007; URS 2009). In approximately AD 1200, the course of the Colorado River changed, refilling Lake Cahuilla and providing a stable water source that drew people from surrounding regions to repopulate the Colorado Desert. Ceramic wares which were introduced centuries before in other areas were brought into this region at that time (URS 2009). However, it has been argued that stable populations around the lake developed their own distinctive pottery formulas that became regional expressions of their families and locales (May ND). Although these groups each had specific approaches to the creation of ceramics, ceramic vessels were also traded along with subsistence resources and other items, infusing some uncertainty into the use of data from ceramics to associate one particular area with a particular tribal group or family (May ND). Therefore, it is unlikely that surface data could directly relate RAN-412C, or the area surrounding it to a particular tribe/group.

Data gathered on ceramics in the area surrounding RAN-412C show evidence of a variety of ceramic types and techniques. Though paddle-and-anvil construction techniques were common among groups using this area, the tempers employed, vessel types manufactured, and decoration did vary between groups. The Diegueño used ground clay and did not add temper when manufacturing ceramics. They created a variety of vessels including ollas; bowls, cooking pots, and pipes (Rogers 1973:18; URS

2009). The Kamia sometimes added rose quartz as temper and produced the greatest variety of ceramics among the Yuman bands, including ollas, jars, canteens, bowls, rattles, plates, scoops, cups, and parchers. Kamia ceramics were painted after firing with red and/or black designs (Gifford 1931; Rogers 1973; URS 2009; Van Camp 1979:57). The Cocopah used ground and winnowed clay tempered with ground sherds to create a variety of vessels used for storage and cooking (Alvarez de Williams 1983:99; URS 2009). Quechan vessel types include bowls, parchers, cooking pots, small figurines, and large storage vessels that were used to float goods across rivers (Bee 1983:10; McGuire 1982; URS 2009).

The process of deriving all possible data from ceramics requires the expertise of a specialist in the ceramics of the Lake Cahuilla region. Therefore, it is recommended that a study of the ceramic assemblage at RAN-412C be conducted by such a specialist prior to making a determination of eligibility of RAN-412C.

Archaeologists for the applicant interpret the lithic component of this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists of primary, secondary, and tertiary flakes, and cores. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone materials (black metavolcanic, green metavolcanic, and cryptocrystalline silicate) that are constituents of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes. The presence of flaked stone tools such as the edge-modified flake found within RAN-412C could represent resource procurement and/or processing of faunal or floral resources. The creation of flaked stone tools requires additional lithic technologies, possible including bifacial thinning and pressure flaking to shape and refine cutting edges. Utilized flakes found within RAN-412C show evidence of edge wear consistent with their use as an expedient cutting and/or scraping tool.

The presence of a single piece of fire-affected rock would have likely have disarticulated from a hearth and therefore would be evidence of resource processing and/or other activities. Hearth features found in association with lithic debitage could be evidence of more complex lithic resource processing activities. Lithic materials intended for flaked tool production were sometimes heat treated using open hearths in order to improve the flaking characteristics of the stone. Additionally, open hearths were used in prehistory for various other purposes such as parching seeds and grains, cooking, and to provide personal warmth. Such features may also represent sacred/ritualistic activities associated with cremating the deceased and/or animals.

Two fragments of bone were present, which are identified as coming from a large land mammal. Their relatively good state of preservation and no evidence of burning makes it likely that they are not prehistoric in age.

It also must not be disregarded that the higher concentration of artifacts were observed along the wash that bounds the site to the east. This wash runs directly through the shoreline landform to the south of the site, which would support the hypothesis that at least some of these artifacts are eroding down from the beach zone landform, where these types of artifacts are being observed more often and in higher concentrations, into the lake basin and RAN-412C. Despite this, the fairly dense concentration of artifacts at Locus 1 would seem to indicate that taphonomic processes have not disturbed the site to a degree, that would preclude the existence of intact subsurface archaeological deposits.

Based on current data, this site contains artifacts with unique or temporally diagnostic characteristics, the material remains that potentially could be associated with a specific portion of prehistory. At this time, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. RAN-412C is situated atop a very flat to very gently sloping thin mantle of latest Holocene alluvium and eolian silts overlaying silts and clays, which may be a combination of Colorado River supplied lake sediments, and fines flushed into the lake by streams/washes that once terminated near the shoreline. Because this landform was formed during a period of prehistoric human presence, there is a moderate to high likelihood for subsurface deposition within the lower-lying lake basin portion. However, the episodes of filling and emptying of Lake Cahuilla that have occurred at various times in prehistory likely moved and disturbed soils at or near the surface of the lake basin landform, therefore, archaeological features preserved in this area tend to be disturbed and/or fragmentary. Despite this, the potential for subsurface archaeological deposits at RAN-412C still remains; therefore, it is recommended that additional limited subsurface testing and artifact analysis be conducted in order to ascertain whether such deposits are present in the site before the final determination of eligibility can be made.

At this time, without additional data, it is unclear whether or not this site, as a stand-alone or individual resource, has the potential to yield important additional information about the past. More information, specifically limited subsurface testing and artifact analysis, is necessary before a final determination of eligibility can be made. In addition, RAN-412C is unknown until further data is obtained if this site should be recommended as a contributor to an existing and/or proposed archaeological district or landscape.

CA-IMP-8745 (RAN-412F)

This site was originally recorded as a "temporary camp/lithic reduction area with 2 loci of chipping circles" by K. Palmer and B. Skinner in 1981. Results of the 2007 Gallegos and Associates survey reported a small portion of this site within their study area and identified 3 lithic artifacts within the area surveyed. In 2009, URS archaeologists surveyed this site for the Solar Two Project Transmission Line corridor (300 foot). Results of the URS survey identified that this site extends beyond the Solar Two Transmission line corridor. This data is provided below in the update to CA-IMP-8745.

The following information is an update and expansion of CA-IMP-8745. Site CA-IMP-8745 is an amorphous-shaped prehistoric site that covers a total surface of 13,395 square meters. The site is situated atop an open, relatively flat plateau within the lower lake basin which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation (URS 2009). Observed profiles in this area indicate that the soils are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines, flushed into the lake by streams and washes, that once terminated nearby at the shoreline. Vegetation species on the site includes creosote, mesquite, and bunchgrass.

This lithic and ceramic scatter site measures 220 meters east to west by 140 meters north to south, and contains a total of 133 prehistoric artifacts. It consists of 1 concentration of 41 ceramic sherds interpreted to form a single vessel and an additional 92 artifacts observed outside the locus, which are interpreted to be multiple use activity. The prevailing cultural constituents within this site consist of prehistoric lithic reduction debitage and ceramic artifacts. Artifact density at CA-IMP-8745 is low, with a calculated distribution of 1 artifact per 102.25 square meters. The overall condition of the site is good.

This site contains 1 ceramic scatter locus and a total of 133 artifacts (41 associated with Locus 1), which include: 42 metavolcanic flakes (21 primary, 12 secondary and 9 tertiary), 5 quartz flakes (1 primary and 4 secondary), 1 quartzite secondary flake, 1 basalt secondary flake, 2 cryptocrystalline silicate jasper flakes (1 secondary and 1 tertiary), 5 metavolcanic tested cobbles, 1 quartz tested cobble, 1 metavolcanic edge-modified flake, 2 metavolcanic multi-directional cores, 1 basalt multi-directional core, 3 metavolcanic bifacial core tools, 1 metavolcanic unifacial and bifacial core tool, 1 sandstone metate, 1 quartzite hammerstone, 1 basalt hammerstone, 1 granitic bifacial mano, 63 ceramic sherds (51 buffware, 8 brownware, 4 Tumco buff), and 1 brownware rim sherd. The area outside of the locus contains a sparse distribution of individual artifacts.

Locus 1 is located on the southern boundary of the site and measures 5 meters east to west by 3 meters north to south. Artifacts observed within the locus include 41 buffware body sherds.

Those artifacts observed within 30 meters and outside of the locus consist of: 42 metavolcanic flakes (21 primary, 12 secondary and 9 tertiary), 5 quartz flakes (1 primary and 4 secondary), 1 quartzite secondary flake, 1 basalt secondary flake, 2 cryptocrystalline silicate jasper flakes (1 secondary and 1 tertiary), 5 metavolcanic tested cobbles, 1 quartz tested cobble, 1 metavolcanic edge-modified flake, 2 metavolcanic multi-directional cores, 1 basalt multi-directional core, 3 metavolcanic bifacial core tools, 1 metavolcanic unifacial and bifacial core tool, 1 sandstone metate, 1 quartzite hammerstone, 1 basalt hammerstone, 1 granitic bifacial mano, 22 ceramic sherds (10 buffware, 8 brownware, 4 Tumco buff), and 1 brownware rim sherd. The further character of artifacts associated within CA-IMP-8745 is unreported.

The more particular physical context for CA-IMP-8745, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be situated on an open, relatively flat lake basin plateau with distal alluvial fan/aeolian sediments of loose sands, in the form of mesquite covered hummocks and consolidated silts and clays, within the lower lake basin which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation. The lake basin geomorphic landform consists of two distinct components: the lower lake basin and the beach zone, or interface between the lake basin and the fan apron. The surface of the lower lake basin is generally very flat to very gently sloping, with a thin mantle of latest Holocene alluvium and eolian silts overlaying silts and clays.

Because older surfaces have been overlain with a thin layer of more recent materials that were deposited after human occupation began in the area, there is a moderate to high likelihood for subsurface deposition within the lower-lying lake basin portion. Because episodes of filling and emptying of Lake Cahuilla that have occurred at various times in prehistory would have moved and disturbed soils at or near the surface of the lake basin landform, archaeological features preserved there will likely be disturbed or fragmentary. Soils within the lower lake basin are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines flushed into the lake by streams and washes that once terminated nearby at the shoreline.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret sites such as CA-IMP-8745 with richer assemblages containing ceramics, in association with artifacts such as groundstone and lithic tools to represent subsistence procurement and processing activities.

Archaeologists for the applicant interpret the lithic component of this site as representing expedient tool technology (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this site are of 3 primary stone materials (metavolcanic, basalt, and quartz) that is a constituent of the surrounding area, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 3 single reduction localities or episodes. It should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Two artifacts identified at CA-IMP-8745, 1 fragmentary sandstone basin metate and 1 granite bifacial mano, are groundstone tools. Ground stone tools were made by grinding, abrading, pecking, pounding, and polishing rather than chipping and flaking. Ground stone tools found in the area surrounding CA-IMP-8745 include manos, metates (sometimes referred to as milling stones) and pestles. Metates in this area are typically flattish slabs, manos were smaller, soap and loaf-shaped stones that were moved in a circular motion against the metate, in order to grind small seeds and other food resources; pestles were elongated, club-shaped stones used for pounding and grinding in a mortar. Both manos, metates, and pestles were primarily constructed from coarse-grained stone such as sandstone or granite. Mortars in desert environments absent of large coarse bedrock outcrops were made from cottonwood. The manos and metates present at this site indicate subsistence procurement and/or processing activities (Chartkoff and Chartkoff 1984).

Also found at CA-IMP-8745 are 64 ceramic sherds (48.1% of the assemblage). Their types include 51 buffware, 9 brownware, and 4 Tumco buff. Characteristics of ceramics such as these may have the potential to provide data concerning ceramic production technologies, the ethnic origin of the vessels from which they came, and the time frame during which they were made. Currently, the primary ethnic groups known to have occupied region surrounding CA-IMP-8745 include the Diegueño and Kamia. Other groups known to have used/traveled/inhabited the area include the Tipai, Cocopa, Kumeyaay, Ipai, Quechan, Paipai and Cahuilla (Luomala 1978; Schaefer and Laylander 2007; URS 2009). In approximately AD 1200, the course of the Colorado River changed, refilling Lake Cahuilla and providing a stable water source that drew people from surrounding regions to repopulate the Colorado Desert. Ceramic wares which were introduced centuries before in other areas were brought into this region at that time (URS 2009). However, it has been argued that stable populations around the lake developed their own distinctive pottery formulas, that became regional expressions of their families and locales (May ND). Although these groups each had specific approaches to the creation of ceramics, ceramic vessels were also traded along with subsistence resources and other items, infusing some uncertainty into the use of data from ceramics to associate one particular area with a particular tribal group or family (May ND). Therefore, it is unlikely that surface data could directly relate CA-IMP-8745 or the area surrounding it, to a particular tribe.

Data gathered on ceramics in the area surrounding CA-IMP-8745 show evidence of a variety of ceramic types and techniques. Though paddle-and-anvil construction techniques were common among groups using this area, the tempers employed, vessel types manufactured, and decoration did vary between groups. The Diegueño used ground clay and did not add temper when manufacturing ceramics. They created a variety of vessels including ollas; bowls, cooking pots, and pipes (Rogers 1973:18; URS 2009). The Kamia sometimes added rose quartz as temper and produced the greatest variety of ceramics among the Yuman bands, including ollas, jars, canteens, bowls, rattles, plates, scoops, cups, and parchers. Kamia ceramics were painted after firing with red and/or black designs (Gifford 1931; Rogers 1973; URS 2009; Van Camp 1979:57). The Cocopah used ground and winnowed clay tempered with ground sherds to create a variety of vessels used for storage and cooking (Alvarez de Williams 1983:99; URS 2009). Quechan vessel types include bowls, parchers, cooking pots, small figurines, and large storage vessels that were used to float goods across rivers (Bee 1983:10; McGuire 1982; URS 2009). In order to derive all possible data from ceramic artifacts present at CA-IMP-8745, it is recommended that they be further analyzed by a ceramics specialist to provide further data such as type of vessel and ware, possible origin, and more specific temporal information before a determination of eligibility can be made.

Further analysis of the geographic location of this site reveals that it is located within close proximity to the high water line of the maximal potential filling of prehistoric Lake Cahuilla. Four events of maximal filling of Lake Cahuilla have occurred between AD 700 and AD 1540. An additional partial filling has been proposed to have occurred sometime between AD 1516 and 1659 (Cleland et al. 2000). Based on the precise alignment of the eastern edge of CA-IMP-8745 with the proposed high water mark of Lake Cahuilla, it is likely that the site existed during or before the most recent complete filling episode, which began around AD 1430 and was fully receded by AD 1540.

Based on current data, this site contains artifacts with unique or temporally diagnostic characteristics, the material remains that potentially could be associated with a specific portion of prehistory. At this time, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. CA-IMP-8745 is situated atop a very flat to very gently sloping thin mantle of latest Holocene alluvium and eolian silts overlaying silts and clays, which may be a combination of Colorado River supplied lake sediments, and fines flushed into the lake by streams/washes that once terminated near the shoreline. Because this landform was formed during a period of prehistoric human presence, there is a moderate to high likelihood for subsurface deposition within the lower-lying lake basin portion. However, the episodes of filling and emptying of Lake Cahuilla that have occurred at various times in prehistory likely moved and disturbed soils at or near the surface of the lake basin landform, therefore, archaeological features preserved in this area tend to be disturbed and/or fragmentary. Despite this, the potential for subsurface archaeological deposits at CA-IMP-8745 still remains; therefore, it is recommended that additional limited subsurface testing and artifact analysis be conducted in order to ascertain whether such deposits are present in the eastern and southern margins of the site before the final determination of eligibility can be made.

At this time, without additional data, it is unclear whether or not this site, as a stand-alone or individual resource, has the potential to yield important additional information about the past. More information, specifically limited subsurface testing and artifact analysis, is necessary before a final determination of eligibility can be made. In addition, CA-IMP-8745 is unknown until further data is obtained if this site should be recommended as a contributor to an existing and/or proposed archaeological district or landscape.

CA-IMP-4345 (RAN-419)

RAN-419 is an update to a previously recorded archaeological isolate CA-IMP-4345. CA-IMP-4345 was previously recorded by R.H. Norwood in December of 1980 and described as a single ceramic sherd. No further detail was given in Norwood's site record.

RAN-419 is an amorphous-shaped lithic scatter that covers a total surface area of 1,323 square meters. The site is situated atop surfaces ranging from consolidated silts and clays to loose sands and more recent alluvial and eolian sediments within the lower lake basin which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation (URS 2009). Observed profiles in this area indicate that the soils are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines flushed into the lake by streams and washes that once terminated nearby at the shoreline. Vegetation species on the site include creosote, burroweed and mesquite.

This lithic scatter and fire affected rock/hearth feature site measures 87 meters northeast to southwest by 42 meters northwest to southeast and contains a total of 50 prehistoric artifacts. It consists of 1 concentration with 31 artifacts interpreted to be a lithic scatter locus and 1 cluster of fire affected rocks interpreted to be a hearth feature, plus 19 additional artifacts observed outside the locus and hearth feature. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at RAN-419 is low, with a calculated distribution of 1 artifact per 26.5 square meters. The overall condition of the site is fair with minor alterations due to 3 ephemeral gullies which run through the west, south and northeast portions of the site.

The artifact types and materials represented at the site include: 27 quartz flakes (15 primary, 5 secondary, 5 tertiary and 2 shatter), 8 metavolcanic flakes (5 primary, 2 secondary, and 1 tertiary), 2 quartzite primary flakes, 2 metavolcanic tested cobbles, 1 quartzite cobble, 7 cores (6 metavolcanic, 1 quartzite), 1 metavolcanic bi-directional core tool, and 2 basalt hammerstones.

Feature 1 is located at the western edge of the site. Feature 1 measures 77 centimeters north to south by 55 centimeters east to west and consists of a cluster of 10 fire-affected sandstone and metavolcanic cobbles, all with approximately 40-50% of their surfaces covered with caliche.

Locus 1 is located at the eastern edge of the site and measures 2 meters east to west by 2 meters north to south. Artifacts observed within Locus 1 include: 27 quartz flakes (15 primary, 5 secondary, 5 tertiary, and 2 shatter), 1 metavolcanic primary flake, 1 quartz multi-directional core, 1 metavolcanic bi-directional core tool and 1 basalt hammerstone.

Those artifacts observed outside the locus consist of 7 metavolcanic flakes (4 primary, 2 secondary, 1 tertiary), 2 quartzite primary flakes, 2 metavolcanic tested cobbles, 1 quartzite cobble, 6 multi-directional cores and 1 basalt hammerstone. The further character of artifacts associated with RAN-419 is unreported.

The more particular physical context for RAN-419, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be within the lower lake basin which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation. The lake basin geomorphic landform consists of two distinct components: the lower lake basin and the beach zone or interface between the lake basin and the fan apron. The surface of the lower lake basin is generally very flat to very gently sloping, with a thin mantle of latest Holocene alluvium and eolian silts overlaying silts and clays. Because older surfaces have been overlain with a thin layer of more recent materials that were deposited after human occupation began in the area, there is a moderate to high likelihood for subsurface deposition within the lower-lying lake basin portion. Because episodes of filling and emptying of Lake Cahuilla that have occurred at various times in prehistory would have moved and disturbed soils at or near the surface of the lake basin landform, archaeological features preserved there will likely be disturbed or fragmentary. Soils within the lower lake basin are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines flushed into the lake by stream/wash that once terminated nearby at the shoreline

Based upon the cultural constituent, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, consisting mostly of primary, secondary, and tertiary flakes, angular shatter, multi-directional cores, a bi-directional core tool, tested cobbles, and hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone materials (metavolcanic and quartz) that are constituents of the surrounding area and exhibit expedient methods of percussive lithic reduction processes, the site appears to represent a single reduction locality or episode, but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

Flaked stone tools such as the single core tool present at RAN-419 represent resource procurement and/or processing of faunal or floral resources. The creation of flaked stone tools requires additional lithic technologies, possible including bifacial thinning and pressure flaking to shape and refine cutting edges. However, the particular core tool found at this site shows little evidence of additional modification to improve its efficiency therefore it is likely an expediently produced tool.

Archaeologists for the applicant interpret that the presence of a hearth feature or fire-affected rock is evidence of resource processing and/or other activities. Hearth features found in association with lithic debitage could be evidence of more complex lithic resource processing methods. Lithic materials intended for flaked tool production were sometimes heat treated using open hearths in order to improve the flaking characteristics of the stone. Additionally, open hearths were used in prehistory for various other purposes such as parching seeds and grains, cooking as well as to provide personal warmth. Such features may also represent sacred/ritualistic activities associated with cremating the deceased and/or animals. However, no calcined bone of any kind was observed associated with this feature. The conspicuous absence of any evidence of carbon residue and the paucity of artifacts would support the hypothesis that RAN-419 is a surface phenomenon that resulted from a single episode of use.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction, and analysis of artifact distribution has been accounted for during the recordation process. RAN-419 is situated atop a very flat to very gently sloping thin mantle of latest Holocene alluvium and eolian silts overlaying silts and clays, which may be a combination of Colorado River supplied lake sediments, and fines flushed into the lake by streams/washes that once terminated near the shoreline. Because this landform was formed during a period of prehistoric human presence, there is a moderate to high likelihood for subsurface deposition within the lower-lying lake basin portion. However, the episodes of filling and emptying of Lake Cahuilla that have occurred at various times in prehistory and have moved and/or disturbed soils at or near the surface of the lake basin landform, therefore archaeological features preserved here are likely to be disturbed and/or fragmentary.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, RAN-419 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

RAN-424

Site CA-IMP-4348 is an amorphous-shaped prehistoric site that covers a total surface of 153,700 square meters. The portion of the site being discussed covers approximately 44,779 square meters. The site is situated atop a very old fan surface within the fan piedmont geomorphic landform, which indicates a Pleistocene (or older) period of formation (URS 2009). The surface area of this portion of the site consists of a very old fan surface covered by intact desert pavement that is poorly to moderately developed with small to large, sub-rounded to sub-angular, metavolcanic, basalt, quartz, quartzite, sandstone and granitic gravels and cobbles. Also visible are sandstone outcrops. Soils contain alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles. The northern and southern edges of the site, outside of the Project corridor, are situated within an active wash surface within the fan piedmont geomorphic landform. In addition, along the east southeastern boundary, the site is situated atop fan piedmont/beach interface with undulating beach flats, sandstone outcrops and berms and deflated beach sands within the beach zone which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating Late Pleistocene/Early Holocene period of formation (URS 2009). The soils along the east southeastern boundary consist of beach sands that are non-cohesive and vary from coarse sub-angular to rounded sand and small gravels to medium and coarse well rounded sands overlaid by fine silts and clays. The beach zone interface is determined by the beach sand berm located along the entire east southeastern boundary of the site. In the lower areas of the site, soils are light tan sand with gravels and cobbles. Vegetation species on the site include creosote, burrow bush, bunch grass and mesquite.

This is a prehistoric lithic/ceramic scatter, fire altered rock (FAR)/hearth feature, ground-stone, and flaked stone tool site. The site measures 601 meters northeast to southwest by 538 northwest to southeast, while the sample of the site, located within the transmission corridor and a partial area south of the Project area, measures 475 meters northwest to southeast by 139 meters northeast to southwest, and contains at minimum of 2012 prehistoric artifacts. It consists of 30 concentrations of artifacts interpreted to represent multiple activity loci (such as resource procurement, temporary/semi permanent encampment and/or sacred/ritual use) that account for 1703 artifacts; 3 rock cluster features interpreted to be disarticulated hearths, and sandstone debitage reduction locus interpreted to be quarrying, reduction and manufacture of the sandstone outcrop material for groundstone milling tools (metates). Approximately 309 artifacts were observed between loci and features, displaying a lower frequency than observed within the concentrations. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at CA-IMP-4348 within the transmission corridor and a partial area south of the Project area is low, with a calculated distribution of 1 artifact per 23 square meters. The overall condition of the site is fair to good.

The site contains 30 reduction loci, 3 features and a total of approximately 2012 artifacts (1,703 associated with the loci), which include: 1,203 metavolcanic flakes (307 primary, 469 secondary, 389 tertiary and 38 shatter), 95 basalt flakes (26 primary, 44 secondary, 23 tertiary and 2 shatter), 154 quartz flakes (39 primary, 57 secondary, 49 tertiary and 9 shatter), 43 quartzite flakes (17 primary, 14 secondary, 10 tertiary and 2 shatter), 69 cryptocrystalline silicate chert flakes (22 primary, 35 secondary and 12 tertiary), 30 sandstone flakes (3 primary, 7 secondary and 20 tertiary), 1 rhyolite primary flake, 1 petrified wood primary flake, 57 cores (36 metavolcanic, 6 basalt, 6 quartzite, 4 quartz and 5 cryptocrystalline silicate chert), 22 hammerstones (9 metavolcanic, 9 quartzite, 2 quartz and 2 cryptocrystalline silicate chert), 23 core tools (13 metavolcanic, 8 basalt, 2 chalcedony and 1 quartzite), 13 edge-modified flakes (10 metavolcanic, 1 basalt, 1 quartz and 1 cryptocrystalline silicate chert), 6 groundstone (2 quartzite manos, 3 sandstone metates and 1 granitic pestle), 2 bifaces (1 metavolcanic and 1 basalt), 24 tested cobbles (17 metavolcanic, 4 quartz, 1 rhyolite and 2 quartzite), 236 ceramic body sherds (127 brownware and 109 buffware) and 33 ceramic rim fragments (25 brownware and 8 buffware).

Features 1 through 3 of site RAN-424 are situated atop moderately stabilized desert pavement and are described below.

Feature 1 is located in the northeastern center of the site within Locus 30 and measures 3 meters north to south by 2 meters east to west. The feature is composed of 13 fire altered sub-rounded to sub-angular metavolcanic, basalt, granitic and sandstone cobbles.

Feature 2 is located 76 meters southwest of Feature 1 and measures 5 meters northwest to southeast by 2 meters northeast to southwest. The feature is composed of at least 120 fire altered sub-rounded to sub-angular metavolcanic, basalt, granitic, sandstone and quartzite cobbles.

Feature 3 is located 119 meters northwest of Feature 2 within Locus 31 and measures 5 meters northwest to southeast by 2 meters northeast to southwest. The feature is composed of at least 200 fire altered sub-rounded to sub-angular metavolcanic, basalt, granitic, sandstone and quartzite cobbles. There are numerous ceramic sherds, ground-stone, flaked stone tools and debitage associated with this feature that are accounted for in locus 31 description.

Locus 1 is situated atop a transition between intact moderately developed desert pavement and beach zone beach sand berm. Loci 2 through 8, 12 through 27, 29 and 30 are situated atop intact moderately developed desert pavement. Loci 11 and 12 are situated atop poorly developed desert pavement.

Locus 1 is located at the southeastern corner of the site and measures 3 meters east to west by 8 meters north to south. Artifacts observed within Locus 1 include: 15 metavolcanic flakes (4 primary, 9 secondary and 2 tertiary), 2 cryptocrystalline silicate primary flakes, 10 brown cryptocrystalline silicate chert flakes (2 secondary and 8 tertiary), 7 ceramic body sherds (2 buffware and 5 brownware), 2 bifacial cores (1 metavolcanic and 1 cryptocrystalline silica), 1 cryptocrystalline silicate uni-directional core and 1 cryptocrystalline silicate chert edge-modified flake.

Locus 2 is located 104 meters northwest from Locus 1 and measures 2 meters east to west by 2 meters north to south. Artifacts observed within Locus 2 include: 26 metavolcanic flakes (7 primary, 7 secondary and 12 tertiary), 1 green metavolcanic uni-directional core, 1 green metavolcanic unifacial edge-modified flake and 1 quartz hammerstone.

Locus 3 is located 46 meters northwest from Locus 2 and measures 3 meters north to south by 1 meter east to west. Artifacts observed within Locus 3 include 14 metavolcanic flakes (1 primary, 6 secondary and 7 tertiary) and 1 bifacial core tool.

Locus 4 is located 21 meters north northwest from Locus 3 and measures 3 meters east to west by 1 meter north to south. Artifacts observed within Locus 4 include 34 metavolcanic flakes (5 primary, 16 secondary, 10 tertiary and 3 shatter) and 1 green metavolcanic uni-directional core.

Locus 5 is located 11 meters northeast from Locus 4 and measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 5 include 15 metavolcanic flakes (4 primary, 6 secondary, 4 tertiary and 1 shatter) and 1 green metavolcanic multi-directional core.

Locus 6 is located 29 meters west from Locus 5 and measures 2 meters north to south by 1 meter east to west. Artifacts observed within Locus 6 include: 5 cryptocrystalline silica flakes (2 primary and 3 secondary), 2 metavolcanic flakes (1 primary and 1 secondary), 2 basalt flakes (1 secondary and 1 tertiary) and 1 brown cryptocrystalline silica uni-directional core.

Locus 7 is located 77 meters northwest from Locus 6 and measures 13 meters north to south by 11 meters east to west. Artifacts observed within Locus 7 include 18 quartzite flakes (5 primary, 6 secondary and 7 tertiary), 91 metavolcanic flakes (25 primary, 24 secondary, 37 tertiary and 5 shatter), 3 metavolcanic tested cobbles and 1 quartzite unifacial core tool (scraper).

Locus 8 is located 63 meters south southwest from Locus 7 and measures 27 meters north to south by 18 meters east to west. Artifacts observed within Locus 8 include: 5 quartzite flakes (2 primary, 2 tertiary and 1 shatter), 115 metavolcanic flakes (34 primary, 38 secondary and 43 tertiary), 3 quartz flakes (1 secondary and 2 tertiary), 15 basalt flakes (3 primary, 8 secondary and 4 tertiary), 2 chalcedony secondary flakes, 5 cryptocrystalline silicate chert flakes (2 primary, 2 secondary and 1 tertiary), 2 metavolcanic unifacial core tools (chopper), 1 metavolcanic unifacial core tool (scraper), 1 metavolcanic unifacial and bifacial chopper/scraper, 1 metavolcanic multi-directional core, 1 metavolcanic uni-directional core and 1 metavolcanic unifacial tertiary edge-modified flake.

Locus 9 is located 16 meters west northwest from Locus 8 and measures 1 meter north to south by 1 meter east to west. Artifacts observed within Locus 9 include: 9 metavolcanic flakes (1 primary, 5 secondary and 3 tertiary), 1 metavolcanic uni-directional core and 1 metavolcanic bifacial edge-modified flake.

Locus 10 is located 8 meters northwest from Locus 9 and measures 2 meters east to west by 2 meters north to south. Artifacts observed within Locus 10 include: 54 metavolcanic flakes (8 primary, 12 secondary, 30 tertiary and 4 shatter), 1 quartzite primary flake, 1 green metavolcanic multi-directional core, 1 green metavolcanic uni-facial core tool and 2 hammerstones (1 quartz and 1 quartzite).

Locus 11 is located 16 meters north northwest from Locus 10 and measures 3 meters northeast to southwest by 1 meter northwest to southeast. Artifacts observed within Locus 11 include 22 metavolcanic flakes (2 primary, 5 secondary and 15 tertiary) and 1 green metavolcanic bifacial core.

Locus 12 is located 47 meters northwest from Locus 11 and measures 3 meters east to west by 2 meters north to south. Artifacts observed within Locus 12 include: 51

metavolcanic flakes (7 primary, 14 secondary, 29 tertiary and 1 shatter), 3 quartzite flakes, 2 quartzite hammerstones and 1 green metavolcanic multi-directional core.

Locus 13 is located 34 meters northwest from Locus 12 and measures 6 meters northeast to southwest by 2 meters northwest to southeast. Artifacts observed within Locus 13 include: 54 metavolcanic flakes (15 primary, 24 secondary, 13 tertiary and 2 shatter), 1 green metavolcanic uni-directional core and 1 green metavolcanic multi-directional core.

Locus 14 is located 24 meters west from Locus 13 and measures 4 meters east to west by 2 meters north to south. Artifacts observed within Locus 14 include 28 metavolcanic flakes (7 primary, 11 secondary, 8 tertiary and 2 shatter).

Locus 15 is located 26 meters north northeast from Locus 14 and measures 6 meters north to south by 3 meters east to west. Artifacts observed within Locus 15 include 17 metavolcanic flakes (2 primary, 4 secondary and 11 tertiary), 1 quartz primary flake, 3 quartzite flakes (2 primary and 1 tertiary), 2 green metavolcanic multi-directional cores and 1 green metavolcanic hammerstone.

Locus 16 is located 15 meters north northeast from Locus 15 and measures 16 meters east to west by 9 meters north to south. Artifacts observed within Locus 16 include: 81 metavolcanic flakes (15 primary, 24 secondary, 35 tertiary and 7 shatter), 51 quartz flakes (11 primary, 9 secondary, 24 tertiary and 7 shatter), 2 quartzite flakes (1 primary and 1 secondary), 1 basalt secondary flake, 2 bifacial cores (1 brown banded cryptocrystalline silicate chert and 1 white quartz), 1 green metavolcanic uni-directional core, 3 green metavolcanic bifacial core tools (choppers/hammerstones), 2 green metavolcanic unifacial core tools (choppers), 2 green metavolcanic bifacial core tools (chopper), 3 hammerstones (2 green metavolcanic and 1 quartzite), 8 ceramic body sherds (6 brownware and 2 buff ware) and 2 brownware rim sherds.

Locus 17 is located 60 meters west northwest from Locus 16 and measures 5 meters north to south by 4 meters east to west. Artifacts observed within Locus 17 include 43 quartz flakes (10 primary, 24 secondary and 9 tertiary) and 1 quartz uni-directional core.

Locus 18 is located 49 meters south southwest from Locus 17 and measures 3 meters north to south by 3 meters east to west. Artifacts observed within Locus 18 include 19 brownware body sherds and 5 decorated (incised) brownware rim sherds.

Locus 19 is located 304 meters east southeast from Locus 18 and measures 5 meters north to south by 3 meters east to west. Artifacts observed within Locus 19 include: 24 metavolcanic flakes (3 primary, 10 secondary and 11 tertiary), 4 basalt tertiary flakes, 1 cryptocrystalline silicate chert bifacial core and 1 chalcedony bifacial chopper.

Locus 20 is located 101 meters west northwest from Locus 19 and measures 7 meters north to south by 3 meters east to west. Artifacts observed within Locus 20 include: 37 metavolcanic flakes (4 primary, 19 secondary and 14 tertiary), 1 cryptocrystalline silicate chert secondary flake, 3 basalt flakes (2 primary and 1 secondary), 1 metavolcanic tested cobble, 1 green metavolcanic bifacial core and 1 gray basalt multi-directional core.

Locus 21 is located 26 meters southeast from Locus 20 and measures 1 meter north to south by 2 meters east to west. Artifacts observed within Locus 21 include: 9 quartz flakes (2 primary, 6 secondary and 1 tertiary), 1 chalcedony secondary flake and 1 quartz uni-directional core.

Locus 22 is located 80 meters west northwest from Locus 21 and measures 3 meters north to south by 2 meters east to west. Artifacts observed within Locus 22 include: 11 metavolcanic flakes (3 primary, 7 secondary and 1 shatter), 3 basalt primary flakes, 2 uni-directional cores (1 metavolcanic and 1 basalt) and 1 basalt bifacial and unifacial core tool.

Locus 23 is located 35 meters north from Locus 22 and measures 4 meters east to west by 2 meters north to south. Artifacts observed within Locus 23 include 58 metavolcanic flakes (11 primary, 11 secondary and 36 tertiary) and 1 green metavolcanic uni-directional core.

Locus 24 is located 30 meters east northeast from Locus 23 and measures 9 meters east to west by 2 meters north to south. Artifacts observed within Locus 24 include: 35 basalt flakes (8 primary, 12 secondary, 13 tertiary and 2 shatter), 2 quartz primary flakes and 2 basalt multi-directional cores.

Locus 25 is located 160 meters west northwest from Locus 24 and measures 2 meters north to south by 2 meters east to west. Artifacts observed within Locus 25 include 18 quartz flakes (6 primary, 2 secondary and 10 tertiary).

Locus 26 is located 24 meters northwest from Locus 25 and measures 4 meters east to west by 3 meters north to south. Artifacts observed within Locus 26 include: 6 cryptocrystalline silicate chert flakes (3 secondary and 3 tertiary), 4 metavolcanic flakes (3 secondary and 1 tertiary) and 1 red cryptocrystalline silicate chert multi-directional core.

Locus 27 is located 101 meters east southeast from Locus 26 and measures 5 meters north to south by 4 meters east to west. Artifacts observed within Locus 27 include: 7 basalt flakes (1 primary, 5 secondary and 1 tertiary), 22 metavolcanic flakes (1 primary, 5 secondary and 16 tertiary), 1 rhyolite tertiary flake, 2 tested cobbles (1 metavolcanic and 1 rhyolite) and 1 green metavolcanic bifacial core tool (chopper).

Locus 28 is located 60 meters west southwest from Locus 27, adjacent to a sandstone outcrop, and measures 6 meters north to south by 2 meters east to west. Artifacts observed within Locus 28 include: 30 sandstone flakes (3 primary, 7 secondary and 20 tertiary), 1 basalt unifacial core tool (chopper) and 2 green metavolcanic hammerstones.

Locus 29 is located 325 meters east southeast from Locus 28 and measures 18 meters east to west by 16 meters north to south. Artifacts observed within Locus 29 include 152 metavolcanic flakes (47 primary, 88 secondary, 10 tertiary and 7 shatter), 3 cryptocrystalline silica flakes (1 primary and 2 secondary), 1 brown cryptocrystalline silicate chert primary flake, 4 quartz flakes (1 primary and 3 secondary), 4 quartzite flakes (3 secondary and 1 shatter), 8 fire-affected rocks, 1 green metavolcanic multi-directional core, 1 granitic pestle fragment, 1 green metavolcanic bifacial edge-modified flake, 2 dark green metavolcanic uni-directional cores, 1 green metavolcanic unifacial secondary edge-modified flake, 1 gray basalt uni-facial edge-modified core tool, 1 dark green metavolcanic bifacial primary edge-modified flake, 1 quartzite uni-directional core, 135 ceramic body sherds (67 buff ware and 68 brownware), 1 buff ware rim sherd and 12 brownware rim sherds.

Locus 30 is located 168 meters west from Locus 29 and measures 42 meters north to south by 28 meters east to west. Artifacts observed within Locus 30 include: 2 green metavolcanic multi-directional cores, 2 bifacial cores (1 quartzite and 1 green metavolcanic), 1 quartzite uni-directional core, 1 quartzite multi-directional core, 6 hammerstones (4 quartzite and 2 brown cryptocrystalline silica), 2 green metavolcanic unifacial core tools (chopper), 1 basalt bifacial core tool chopper, 1 basalt biface, 2 sandstone metate fragment, 2 unifacial edge-modified flake (1 quartz and 1 gray basalt) and 6 ceramic rim sherds (3 brownware, 2 buffware and 1 buffware with drilled hole). Due to high density of this locus, two 2-meter north to south by 2 meter east to west sample units were established to determine density of the locus. Sample Unit 1 with a high artifact density of 1 artifact per 0.06 square meters is located in the central portion of the locus where observed surface density appears to be highest, and includes 42 metavolcanic flakes (12 primary, 14 secondary, 11 tertiary, 5 shatter), 7 cryptocrystalline silica flakes (1 primary and 6 secondary), 6 quartz flakes (2 secondary, 2 tertiary and 2 shatter), 1 quartzite secondary flake, 1 petrified wood primary flake, 7 ceramic body sherds (4 brownware, 3 buff ware), 2 green metavolcanic cores, 1 quartzite bifacial mano, 2 brownware rim sherds and 3 metavolcanic tested cobbles. Sample Unit 2 with a high artifact density of 1 artifact per 0.045 square meters is located 6 meters south-southwest from Sample Unit 1 and placed where artifact surface densities appeared to be highest, and includes 71 metavolcanic flakes (18 primary, 29 secondary and 24 tertiary), 4 quartz flakes (1 primary, 2 secondary and 1 tertiary), 1 metavolcanic tested cobble, 6 buffware body sherds, 6 green metavolcanic cores (2 uni-directional and 4 multi-directional), 1 green metavolcanic biface, 1 sandstone metate fragment and 3 metavolcanic cores (2 uni-directional and 1 multi-directional).

Those artifacts observed outside of the loci and features consist of 154 metavolcanic flakes (73 primary, 48 secondary and 33 tertiary), 29 cryptocrystalline silica flakes (14 primary, 9 secondary and 6 tertiary), 25 basalt flakes (9 primary, 9 secondary and 7 tertiary), 9 quartz flakes (3 primary, 4 secondary and 2 tertiary), 11 quartzite (7 primary, 3 secondary and 1 tertiary), 14 tested cobbles (12 metavolcanic, 1 quartz and 1 quartzite), 1 basalt multi-directional core, 8 uni-directional cores (4 metavolcanic, 3 quartzite and 1 basalt), 3 bifacial cores (2 metavolcanic and 1 quartzite), 2 unifacial core tool (choppers) (1 metavolcanic and 1 basalt), 1 basalt unifacial core tool, 1 basalt bifacial core tool (chopper), 3 hammerstones (2 metavolcanic and 1 quartzite), 1 granitic bifacial mano, 2 green metavolcanic unifacial edge-modified flakes, 2 green metavolcanic bifacial edge-modified flakes, 43 ceramic body sherds (31 brownware and 12 buffware) and 1 brownware recurved rim sherd. The further character of artifacts associated with this site is reported on DPR 523 series forms under a confidential filing.

The more particular physical context for CA-IMP-4348, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be within multiple landforms and subordinate landforms, which include a very old fan surface within the fan piedmont, fan apron, beach zone and interfaces between these landforms. The surface and subsurface aspects of this landform are dominated by erosional fan remnants, erosional sideslopes and gullies, and inset fans, which have been further eroded and re-deposited down slope. The resulting landform is generally made up of contiguous or partially overlapping mantles deposited during the Pleistocene (URS 2009). Despite geologically based claims for Early Pleistocene archaeological deposits within the Yuha basin, these findings remain inconclusive and lack solid chronological confirmation (Schaeffer and Laylander 2007). Therefore, there is no conclusive evidence of human presence within the fan piedmont during or before the Pleistocene. Because the formation of the land surface occurred prior to human presence in the region, there is a very low likelihood that buried archaeological deposits will be present within the fan piedmont.

Along the eastern boundary, the site is situated atop distal fan apron/beach interface within the beach zone which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating Late Pleistocene/Early Holocene period of formation (URS 2009). The lake basin geomorphic landform consists of two distinct components: the lower lake basin and the beach zone or interface between the lake basin and the fan apron. The land surface of the beach zone is undulating and consists of beach flats, sand berms and deflated beach sands that are consistent with the multiple formation and recessional events of the maximum Lake Cahuilla shoreline. Because the advance and recession of the waters of Lake Cahuilla at various times in prehistory would have moved surface soils within the beach zone, the potential for subsurface deposition is heightened. The soils within the beach zone consist of sands that are non-cohesive and vary from coarse sub-angular to rounded sand and small gravels to medium and coarse well rounded sands overlaid by fine silts and clays. The beach zone interface is evidenced in CA-IMP-4348 by a sand berm located along the entire eastern boundary of the site. Additionally, there is a wash along the southwestern margin of the site. In that area the soils are light tan sand with gravels and cobbles.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret that sites such as CA-IMP-4348 with richer assemblages containing ceramics in association with hearth features and artifacts such as groundstone and lithic tools represent subsistence procurement, processing activities, and potentially habitation and/or sacred or ritual activities.

The large numbers of ceramic sherds present at CA-IMP-4348 are of styles that date to the Late Prehistoric. Currently, the primary ethnic groups known to have occupied region surrounding CA-IMP-4348 include the Diegueño and Kamia. Other groups known to have used/traveled/inhabited the area includes the Tipai, Cocopa, Kumeyaay, Ipai, Quechan, Paipai and Cahuilla (Luomala 1978; Schaefer and Laylander 2007, URS 2009). In approximately AD 1200, the course of the Colorado River changed, refilling Lake Cahuilla and providing a stable water source and drawing people from surrounding regions to repopulate the Colorado Desert. Ceramic wares which were introduced centuries before in other areas were brought into this region at that time (URS 2009). However, it has been argued that stable populations around the lake developed their own distinctive pottery formulas that became regional expressions of their families and locales (May ND). Although these groups each had specific approaches to the creation of ceramics, ceramic vessels were also traded along with subsistence resources and other items, infusing some uncertainty into the use of data from ceramics to associate one particular area with a particular tribal group or family. Therefore, it is unlikely that surface data could directly relate CA-IMP-4348 or the area surrounding it to a particular tribe.

Included in the ceramic assemblage are various sherds that might have the potential to provide data relative to research questions regarding use, manufacturing technologies, and distribution of ceramics in the prehistoric Lake Cahuilla region. For example, present at CA-IMP-4348 are 29 ceramic rim fragments (25 brownware and 8 buff ware). Rim styles can provide evidence of the original form of vessels which may provide insight into regional and ethnic origin. The ceramic assemblage also includes 5 brownware decorated (incised) rim sherds and several ceramic sherds that showed evidence of scum coat finish, which are characteristics that may also provide stylistic evidence of origin. Two ceramic rim sherds have repair holes that may be evidence of lengthier curation of the vessels from which they once came.

The flaked stone assemblage at CA-IMP-4348 includes bifaces, edge-modified flakes and a large quantity and variety of cores, hammerstones and debitage. Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the Applicant interpret most of the loci of this site as expedient tool technology localities (Jones and Klar 2007). The cultural constituents of these loci are lithic reduction in nature. Debitage consists primarily of mostly of primary, secondary, and tertiary flakes, cores, and hammerstones. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Fifteen of the 30 loci (50%) are comprised of one stone material (metavolcanic), which are interpreted as single reduction loci, and an additional 12 loci (40%) can be described as scatters of 2 to 5 different materials. Because the majority of lithic materials reduced in this site are constituents of the surrounding area and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent at least 27 reduction localities or episodes. It should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

The presence of flaked stone tools such as bifaces and edge-modified flakes within CA-IMP-4348 represents resource procurement and/or processing of faunal or floral resources. The creation of flaked stone tools requires additional lithic technologies, possible including bifacial thinning and pressure flaking to shape and refine cutting edges.

Furthermore, archaeologists for the applicant interpret the presence of hearth features or fire-altered rock such as the 3 rock cluster features observed at CA-IMP-4348, as evidence of resource processing and/or other activities. Hearth features found in association with lithic debitage could be evidence of more complex lithic resource processing activities. Lithic materials intended for flaked tool production were sometimes heat treated using open hearths in order to improve the flaking characteristics of the stone. Additionally, open hearths were used in prehistory for various other purposes such as parching seeds and grains, cooking, and to provide personal warmth. Such features may also represent sacred/ritualistic activities associated with cremating the deceased and/or animals. Although, no burnt and/or calicined bones of any kind were observed within the areas surveyed the possibility of such being present below the surface cannot be discounted. All 3 fire features are disarticulated with their construction materials being loosely scattered. Feature 3 is located within and potentially associated with Locus 30, a high density concentration of lithic materials with some ceramic sherds. Features 1 and 2 do not show any evidence of similar associations.

Groundstone tools such as the 3 sandstone metate fragments, 2 manos and single granitic pestle fragment located at CA-IMP-4348 were made by grinding, abrading, pecking, pounding, and polishing rather than chipping and flaking. Groundstone tools found in the surrounding region include manos, metates (sometimes referred to as milling stones) and pestles. Metates in this area are typically flat slabs; manos were smaller, soap and loaf-shaped stones that were moved in a circular motion against the metate in order to grind small seeds and other food resources; pestles were elongated, club-shaped stones used for pounding and grinding in a mortar. Manos, metates and pestles were primarily constructed from coarse-grained stone such as sandstone or granite. Mortars in desert environments absent of large coarse bedrock outcrops were made from cottonwood. Manos, metates and pestles are associated with subsistence procurement and/or processing (Chartkoff and Chartkoff 1984). The particular examples of ground stone present at CA-IMP-4348 require additional analysis to determine if unique characteristics of these artifacts may provide additional data regarding prehistory and resource processing behavior for this region.

This site cannot reliably be associated with any distinctive or significant event, person, design, or construction and analysis of artifact distribution has been accounted for during the recordation process. There is a potential for subsurface deposition at this site and in conjunction with the unique and temporally diagnostic artifacts recorded, this site has the potential to provide additional data associated with a specific portion of prehistory. CA-IMP-4348 is primarily situated atop a subordinate landform characterized as an older fan surface with alluvial sands comprised of decomposed metavolcanic and granitic gravels and cobbles within the fan piedmont geomorphic landform. This geomorphic landform indicates a Pleistocene (or older) period of formation and because the formation of this landform predates human presence in the area, there is very low likelihood for subsurface archaeological deposits. The northern and southern edges of the site, located outside the Project corridor, are defined by an active wash within the fan piedmont, and have a slightly greater potential for the presence of subsurface archaeological deposits where recent alluvium has been deposited. The deposits and features found along the east southeastern edge of the site area are located within the beach zone. This landform was formed by the advance and recession of the waters of Lake Cahuilla at various times in prehistory moving surface soils within the beach zone. Therefore, there is a moderate to high potential for subsurface archaeological deposits within the beach zone. Because of that potential for subsurface archaeological deposits at CA-IMP-4348, it is recommended that additional limited subsurface testing and artifact analysis be conducted in order to ascertain whether such deposits are present in the eastern and southern margins of the site before the final determination of eligibility can be made.

Because of the nature of potentially informative and diagnostic characteristics of ceramics found at CA-IMP-4348, the recordation of all potential data that might be derived from them requires the work of a ceramics specialist. It is recommended that the ceramics at CA-IMP-4348 be studied by such a specialist so it can be determined if they do provide any additional data potential and, if so, such data can be recorded.

Further analysis of the geographic location of this site reveals that it is located on the high water line of the maximal potential filling of prehistoric Lake Cahuilla. Four events of maximal filling of Lake Cahuilla have occurred between AD 700 and AD 1540. An additional partial filling has been proposed to have occurred sometime between AD 1516 and 1659 (Cleland et al. 2000). Based on the precise alignment of the eastern edge of CA-IMP-4348 with the proposed high water mark of Lake Cahuilla, it is likely that the site existed during or before the most recent complete filling episode, which began around AD 1430 and was fully receded by AD 1540.

In addition, due to characteristics of the artifact assemblage and features present at CA-IMP-4348, and its proximity to the Lake Cahuilla shoreline, it is considered a contributor to the proposed Lake Cahuilla High Water Mark District.

RAN-426

RAN-426 is an amorphous-shaped lithic scatter that covers a total surface of 3,579 square meters. The site is situated atop an open, relatively flat plateau consisting of recent alluvium within the lower lake basin, which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation (URS 2009). Observed profiles in this area indicate that the soils are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines flushed into the lake by streams and washes that once terminated nearby at the shoreline. An active wash cuts through the site. Vegetation species on the site include creosote.

This lithic scatter site measures 159 meters north to south by 80 meters east to west, and contains a total of 33 prehistoric artifacts. It consists of 1 concentration interpreted to be 1 lithic scatter locus, with 14 artifacts and 19 additional artifacts observed outside the locus. The prevailing cultural constituents within this site consist of prehistoric artifacts. Artifact density at RAN-426 is low, with a calculated distribution of 1 artifact per 108.45 square meters. The overall condition of the site is fair with some alterations due to off-highway vehicle use.

The artifact types and materials represented at RAN-426 include: 27 metavolcanic flakes (18 primary, 7 secondary and 2 tertiary), 1 quartz primary flake, 1 uni-directional metavolcanic core, 1 bi-directional metavolcanic core, 1 metavolcanic tested cobble, 1 multi-directional cryptocrystalline silicate core and 1 quartzite edge-modified flake.

Locus 1 is located in the south central portion of the site and measures 4 meters north to south by 8 meters east to west. Artifacts observed within Locus 1 include: 7 green metavolcanic flakes (6 primary and 1 secondary), 6 black metavolcanic flakes (5 primary and 1 secondary) and 1 quartzite unifacial edge-modified flake.

Those artifacts observed within 30 meters and outside of Locus 1 consist of: 10 green metavolcanic flakes (5 primary, 3 secondary and 2 tertiary), 4 black metavolcanic flakes (2 primary and 2 secondary), 1 uni-directional metavolcanic core, 1 bi-directional metavolcanic core, 1 green tested metavolcanic cobble, 1 multi-directional green cryptocrystalline silicate core and 1 quartz primary flake. The further character of artifacts found within RAN-426 is unreported.

The more particular physical context for RAN-426, extrapolating information from Data Response 112, Figure 4 (URS 2009), to the location of the site, appears to be within the lower lake basin, which is a geomorphic sub-landform to the lake basin geomorphic landform, indicating a Late Pleistocene/Early Holocene period of formation. The lake basin geomorphic landform consists of two distinct components: the lower lake basin and the beach zone or interface between the lake basin and the fan apron. The surface of the lower lake basin is generally very flat to very gently sloping, with a thin mantle of latest Holocene alluvium and eolian silts overlaying silts and clays. Because older surfaces have been overlain with a thin layer of more recent materials that were deposited after human occupation began in the area, there is a moderate to high likelihood for subsurface deposition within the lower-lying lake basin portion. Because episodes of filling and emptying of Lake Cahuilla that have occurred at various times in prehistory would have moved and disturbed soils at or near the surface of the lake basin landform, archaeological features preserved there will likely be disturbed or fragmentary. Soils within the lower lake basin are made up of thick deposits of gray fine sand and silt that may be a combination of Colorado River supplied lake sediments and fines flushed into the lake by streams and washes that once terminated nearby at the shoreline.

Based upon the cultural constituents, the physical context, and the results of additional archival research, archaeologists for the applicant interpret this site as an expedient tool technology locality (Jones and Klar 2007). The cultural constituents of this site are lithic reduction in nature, debitage consists primarily of primary flakes and cores. Such artifacts indicate percussion (hard-hammer and/or soft-hammer) reduction (Andrefsky Jr. 2008; Odell 2004; Whittaker 1994). Because the majority of lithic materials reduced in this lithic scatter are of the same primary stone (metavolcanic) material that is a constituent of the surrounding area, and exhibit expedient lithic reduction methods of percussion reduction processes, the site appears to represent 1 single reduction locality or episode; but it should not be discounted that artifacts within this locality may have been collected and/or used at a later point in time.

The presence of flaked stone tools such as the edge-modified flake found within RAN-426, represents resource procurement and/or processing of faunal or floral resources. The creation of flaked stone tools requires additional lithic technologies, possibly including bifacial thinning and pressure flaking to shape and refine cutting edges. However, the particular edge-modified flake present at RAN-426 shows only rudimentary modification to improve its efficiency as a cutting or scraping tool.

Because this site lacks artifacts with unique or temporally diagnostic characteristics, the material remains cannot be associated with a meaningful portion of prehistory or history. Additionally, this site cannot reliably be associated with any distinctive or significant event, person, design, or construction; and analysis of artifact distribution has been accounted for during the recordation process. RAN-426 is situated atop a very flat to very gently sloping thin mantle of latest Holocene alluvium and eolian silts overlaying silts and clays, which may be a combination of Colorado River supplied lake sediments, and fines flushed into the lake by streams and washes that once terminated near the shoreline. Because this landform was formed during a period of prehistoric human presence, there is a moderate to high likelihood for subsurface deposition within the lower-lying lake basin portion. However, the episodes of filling and emptying of Lake

Cahuilla that have occurred at various times in prehistory would have moved and disturbed soils at or near the surface of the lake basin landform; therefore, archaeological features preserved appear to be disturbed and fragmentary.

As a result, this site, as a stand-alone or individual resource, is recommended not eligible for the National Register and is not a historic property pursuant to the National Register or a historical resource per the California Register under any of the criteria for eligibility. In addition, RAN-426 is not considered a contributor to an existing and/or proposed archaeological district or landscape.

C.4 - GEOLOGY AND PALEONTOLOGY

Testimony of Dal Hunter, Ph.D., C.E.G.

C.4.1 SUMMARY OF CONCLUSIONS

The proposed Stirling Energy Systems Solar Two Project site is located in an active geological area of the south-central Colorado Desert Geomorphic Province in south-central Imperial County in south-eastern California. Because of its geological setting, the site could be subject to intense levels of earthquake-related ground shaking. The effects of strong ground shaking would need to be mitigated through structural designs required by the California Building Code (CBC 2007) and the project geotechnical report. The CBC (2007) requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction potential. A geotechnical investigation has been performed and presents standard engineering design recommendations for mitigation of seismic shaking and site soil conditions.

There are no known viable geological or mineralogical resources at the proposed Solar Two site. Locally, paleontological resources have been documented within Quaternary alluvium, colluvium, lakebed sediments, and in sedimentary units of the Palm Springs Formation, all of which underlie the site in the near surface. Potential impacts to paleontological resources would be mitigated through worker training and monitoring by qualified paleontologists, as required by Conditions of Certification, **PAL-1** through **PAL-7**.

Based on its independent research and review, California Energy Commission staff concludes that the potential is low for significant adverse impacts to the proposed project from geological hazards during its design life and to potential geological, mineralogical, and paleontological resources from the construction, operation, and closure of the proposed project. It is staff's opinion that the Stirling Energy Systems Solar Two Project will be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards and in a manner that both protects environmental quality and assures public safety.

C.4.2 INTRODUCTION

In this section, California Energy Commission (Energy Commission) staff discusses the potential impacts of geological hazards on the proposed Stirling Energy Systems Solar Two (SES Solar Two) Project site as well as the project's potential impacts on geological, mineralogical, and paleontological resources. Staff's objective is to ensure that there will be no consequential adverse impacts to significant geological and paleontological resources during the project construction, operation, and closure and that operation of the plant will not expose occupants to high-probability geological hazards. A brief geological and paleontological overview is provided. The section concludes with staff monitoring and mitigation measures for geological hazards and geological, mineralogical, and paleontological resources, as proposed conditions of certification.

C.4.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Federal agencies are required to review major federal actions such as the SES Solar Two project under the National Environmental Policy Act (NEPA). This document has been prepared in consultation and coordination with the BLM to also address federal environmental issues. The BLM and CEC have conducted a joint environmental review of the project in a single NEPA/California Environmental Quality Act (CEQA) process. The Federal Land Policy and Management Act of 1976 (FLPMA) establishes the agency's multiple-use mandate to serve present and future generations.

The California Environmental Quality Act (CEQA) Guidelines, Appendix G, provide a checklist of questions that lead agencies typically address.

- Section (V) (c) includes guidelines that determine if a project will either directly or indirectly destroy a unique paleontological resource or site or a unique geological feature.
- Sections (VI) (a), (b), (c), (d), and (e) focus on whether or not the project would expose persons or structures to geological hazards.
- Sections (X) (a) and (b) concern the project's effects on mineral resources.

The California Building Standards Code (CBSC) and CBC (2007) provide geotechnical and geological investigation and design guidelines, which engineers must follow when designing a facility. As a result, the criteria used to assess the significance of a geological hazard include evaluating each hazard's potential impact on the design and construction of the proposed facility. Geological hazards include faulting and seismicity, volcanic eruptions, liquefaction, dynamic compaction, hydrocompaction, subsidence, expansive soils, landslides, tsunamis, and seiches. Of these, dynamic compaction, hydrocompaction, subsidence, and expansive soils are geotechnical engineering issues but are not normally associated with concerns for public safety.

Staff has reviewed geological and mineral resource maps for the surrounding area, as well as site-specific information provided by the applicant, to determine if any geological and mineralogical resources exist in the area and to determine if operations could adversely affect such geological and mineralogical resources.

To evaluate whether the proposed project and alternatives would generate a potentially significant impact as defined by CEQA on mineral resources, the staff evaluated them against checklist questions posed in the 2006 CEQA Guidelines, Appendix G, Environmental Checklist established for Mineral Resources. These questions are:

A. Would the project result in the loss of availability of a known mineral resource that would be of value to the region and residents of the state?

B. Would the project result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

Under NEPA, the impact of the proposed project and alternatives on mineral resources would be considered significant if they would directly or indirectly interfere with active mining claims or operations, or would result in reducing or eliminating the availability of important mineral resources. The staff's evaluation of the significance of the impact of the proposed project on mineral resources includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27.

Staff reviewed existing paleontological information and requested records searches from the San Diego Natural History Museum and the Natural History Museum of Los Angeles County for the site area. Site-specific information generated by the applicant for the SES Solar Two was also reviewed. All research was conducted in accordance with accepted assessment protocol (SVP 1995) to determine whether any known paleontological resources exist in the general area. If present or likely to be present, conditions of certification which outline required procedures to mitigate impacts to potential resources, are proposed as part of the project's approval.

The Antiquities Act of 1906 (16 United States Code [USC]) requires that objects of antiquity be taken into consideration for federal projects and the California Environmental Quality Act, Appendix G, also requires the consideration of paleontological resources. The Paleontological Resources Preservation Act of 2009 requires the Secretaries of the United States Department of the Interior and Agriculture to manage and protect paleontological resources on Federal land using scientific principles and expertise. The potential for discovery of significant paleontological resources or the impact of surface disturbing activities to such resources is assessed using the Potential Fossil Yield Classification (PYFC) system. This system includes three conditions (Condition 1 [areas known to contain vertebrate fossils]; Condition 2 [areas with exposures of geological units or settings that have high potential to contain vertebrate fossils]; and Condition 3 [areas that are very unlikely to produce vertebrate fossils]). The PYFC class ranges from Class 5 (very high) to Class 1 (very low) (USDI 2007).

The proposed conditions of certification allow BLM's Authorized Officer, the Energy Commission's compliance project manager (CPM) and the applicant to adopt a compliance monitoring scheme ensuring compliance with laws, ordinances, regulations, and standards (LORS) applicable to geological hazards and the protection of geological, mineralogical, and paleontological resources.

Based on the information below, it is staff's opinion that the potential for significant adverse impacts to the project from geological hazards, and to potential geological, mineralogical, and paleontological resources from the proposed project, is low.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Applicable laws, ordinances, regulations, and standards (LORS) are listed in the application for certification (AFC) (SES 2008a). The following briefly describes the current LORS for both geological hazards and resources and mineralogical and paleontological resources.

Geology and Paleontology Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Antiquities Act of 1906 (16 United States Code [USC], 431-433)	The proposed SES Solar Two facility site is located entirely on land currently administered by the Bureau of Land Management (BLM). Although there is no specific mention of natural or paleontological resources in the Act itself, or in the Act's uniform rules and regulations (Title 43 Part 3, Code of Federal Regulations [43 CFR Part 3], 'objects of antiquity' has been interpreted to include fossils by the Federal Highways Act of 1956, the National Park Service (NPS), the BLM, the Forest Service (USFS), and other Federal agencies.
National Environmental Policy Act (NEPA) of 1970 (42 USC 4321, et. seq.)	Established the Council on Environmental Quality (CEQ), which is charged with preserving 'important historic, cultural, and natural aspects of our national heritage'.
Federal Land Policy and Management Act (FLPMA) of 1976 (43 USC 1701-1784)	Authorizes the BLM to manage public lands to protect the quality scientific, scenic, historical, archeological, and other values, and to develop 'regulations and plans for the protection of public land areas of critical environmental concern', which include 'important historic, cultural or scenic values'. Also charged with the protection of 'life and safety from natural hazards'.
Paleontologic Resources Preservation Act (PRPA) (Public Law [PL] 111-011)	Authorizes Departments of Interior and Agriculture Secretaries to manage the protection of paleontological resources on Federal lands.
National Historic Preservation Act of 1966 (NHPA) (16 USC 470)	Establishes policies for the 'preservation of the prehistoric and historic resources of the United States', under the direction of the Secretary of the Interior and the BLM.
State	
California Building Code (CBC), 2007	The CBC (2007) includes a series of standards that are used in project investigation, design, and construction (including grading and erosion control).

Applicable Law	Description
Alquist-Priolo Earthquake Fault Zoning Act, Public Resources Code (PRC), section 2621–2630	Mitigates against surface fault rupture of known active faults beneath occupied structures. Requires disclosure to potential buyers of existing real estate and a 50-foot setback for new occupied buildings. Portions of the site and proposed ancillary facilities are located within designated Alquist-Priolo Fault Zones. The proposed site layout places occupied structures outside of the 50-foot setback zone.
The Seismic Hazards Mapping Act, PRC Section 2690–2699	Areas are identified that are subject to the effects of strong ground shaking, such as liquefaction, landslides, tsunamis, and seiches.
PRC, Chapter 1.7, sections 5097.5 and 30244	Regulates removal of paleontological resources from state lands, defines unauthorized removal of fossil resources as a misdemeanor, and requires mitigation of disturbed sites.
Warren-Alquist Act, PRC, sections 25527 and 25550.5(i)	The Warren-Alquist Act requires the Energy Commission to “give the greatest consideration to the need for protecting areas of critical environmental concern, including, but not limited to, unique and irreplaceable scientific, scenic, and educational wildlife habitats; unique historical, archaeological, and cultural sites.” With respect to paleontological resources, the Energy Commission relies on guidelines from the Society for Vertebrate Paleontology, indicated below.
California Environmental Quality Act (CEQA), PRC sections 15000 et seq., Appendix G	Mandates that public and private entities identify the potential impacts on the environment during proposed activities. Appendix G outlines the requirements for compliance with CEQA and provides a definition of significant impacts on a fossil site.
Society for Vertebrate Paleontology (SVP), 1995	The “Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontologic Resources: Standard Procedures” is a set of procedures and standards for assessing and mitigating impacts to vertebrate paleontological resources. The measures were adopted in October 1995 by the SVP, a national organization of professional scientists.
Local	
Imperial County General Plan	Section 5.3.5.3 Seismic and Public Safety Element requires utilities that cross active faults to prepare an operations plan.

C.4.4 PROPOSED PROJECT

C.4.4.1 SETTING AND EXISTING CONDITIONS

The proposed Solar Two project would be constructed on approximately 6,500 acres south of Evan Hewes Highway and north of Interstate 8 in Imperial County, California. The property includes about 6,140 acres of federal land managed by the Bureau of Land Management (BLM) and approximately 360 acres of privately owned land. The site is about 100 miles east of San Diego, 14 miles west of El Centro, and approximately 4 miles east of Ocotillo Wells.

The proposed Solar Two project would be a primary power generating facility constructed in two phases. Phase one would involve construction of a 300-megawatt facility and phase two would generate an additional 450 megawatts. Power would be generated by up to 30,000 SunCatcher solar dish collectors which would be supported on individual metal pipe or drilled pier foundations. Each SunCatcher consists of a solar receiver heat exchanger and a closed-cycle, high-efficiency Solar Stirling Engine specifically designed to convert solar power to rotary power and then drive an electrical generator to produce electricity. Supporting facilities would include an operations and administration building, a maintenance building, three assembly buildings, a substation, metal canopy cover for a water treatment plant, and storage tanks for fuel and water. Ancillary facilities associated with the solar array would include two utility lines, a 7.18-mile long water supply pipeline, and a 10.35-mile long electrical transmission line supported on 85 to 100 double-circuit towers. Other improvements would include an onsite septic system, and paved and unpaved roads for site access.

REGIONAL SETTING

The proposed site is located in the south-central portion of the Imperial Valley region of the Salton Trough, a topographic and structural depression within the Colorado Desert physiographic province in Southern California. Tectonically, the Salton Trough appears to lie on the boundary between the western edge of the North American Plate and the eastern edge of the Pacific Plate, with relative plate motion being transferred to the regional San Andreas Fault system via at least three more localized fault zones (Elders, 1979). This province is characterized by broad alluvium-filled valleys and plains and is bounded to the west by the northwest trending granitic mountains of the Peninsular Ranges physiographic province and on the east by the southern portion of the Mojave Desert physiographic province (Norris and Webb, 1990).

PROJECT SITE DESCRIPTION

The proposed Solar Two project would be constructed on 6,500 acres south of Evan Hewes Highway and north of Interstate 8 in Imperial County, California. The potential site is located within the Yuha Desert geomorphic subprovince of the Colorado Desert geomorphic province. The property lies near the eastern shoreline of ancient Lake Cahuilla and includes approximately 6,140 acres of federal land managed by the Bureau of Land Management (BLM) and approximately 360 acres of privately owned land. The eastern portion of the site is primarily composed of gently sloping undisturbed desert. The western portion of the site is better characterized by more rolling terrain or badlands with intermittent incised drainages. Overall the site slopes northeast toward the regional topographic low point at the Salton Sea.

Subsurface stratigraphy within the project area is generally characterized by Holocene alluvium and colluvium deposits which overlie Holocene lakebed deposits. These in turn overlie Late Pleistocene to Holocene older alluvium deposits which are underlain by Pleistocene to Pliocene Palm Springs Formation.

The surficial alluvium and colluvium deposits are composed of primarily locally derived silty and clayey sands or poorly graded sand with silt or clay and are commonly 2 to 7 feet thick. These overlie sediments of ancient Lake Cahuilla which are similar in composition. Lacustrine sediments of Lake Cahuilla vary between approximately 100 to 300 feet thick where the ancient lake was deepest and are probably much thinner in the project area (Kovach et. al., 1962). Lake Cahuilla sediments are generally underlain by Late Miocene to Latest Pleistocene marine and non-marine sandstones and mudstones of the Palm Springs Formation which can be more than 15,000 feet thick. Alluvium, colluvium, and lacustrine deposits are thicker in the eastern, gently sloping portion of the project area and thinner in the western portion where tectonic forces have uplifted Palm Springs Formation deposits to the surface where they form incised badland topography.

C.4.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section considers two types of impacts. The first is geological hazards, which could impact the proper functioning of the proposed facility and create life/safety concerns. The second is the potential impacts the proposed facility could have on existing geological, mineralogical, and paleontological resources in the area.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Ground shaking (earthquakes) represents the main geological hazard at this site. This potential for ground shaking to damage structures catastrophically can be effectively mitigated through facility design by incorporating recommendations contained in the project geotechnical report. Proposed Conditions of Certification **GEN-1, GEN-5,** and **CIVIL-1** in the **Facility Design** section should also mitigate these impacts to a less than significant level.

The proposed Solar Two project site is not located within an established Mineral Resource Zone (MRZ) and no economically viable mineral deposits are known to be present within the site boundaries. A major sand and gravel quarry is located approximately 4 miles north of the town of Ocotillo, California and 10 miles northwest of the western boundary of the proposed SES Solar Two site. These aggregate deposits occur in young alluvial fans and active washes along the southern flank of the Coyote Mountains. There is no similar geological environment within or along the proposed SES Solar Two boundary where similar sand and gravel deposits might reasonably be expected.

Five stratigraphic units have been identified within the project area. These are Holocene alluvium , Holocene colluvium, Holocene older alluvium, Holocene lakebeds (Lake Cahuilla), and Plio-Pleistocene age Palm Springs Formation (Morton, 1977). Staff reviewed correspondence from the San Diego Natural History Museum (Randall 2008) and the project confidential paleontological resources technical report (PRC 2008) for information regarding known fossil localities and stratigraphic unit sensitivity within the project area. The San Diego Natural History Museum has recorded 17 fossil localities within 2 miles of the project area and ancillary facilities. Of these, 6 are terrestrial invertebrates collected from Lake Cahuilla sediments and 11 are marine invertebrates collected from the Imperial formation which is not known or expected to be present near the surface within the project boundaries. The Anza-Borrego Desert State Park Stout Research Center has located terrestrial vertebrate fossils including turtles, tortoises, and some mammals within the Palm Springs Formation within 4 miles of the project site. Just south of Anza Borrego, and approximately 3 miles west of the proposed SES Solar Two site, vertebrate fossils have been found in the Coyote Mountains Wilderness (Fossil Canyon). The Coyote Mountains Wilderness has been designated as a BLM Area of Environmental Concern.

Based on the recorded fossil finds, staff concludes the Holocene alluvium and colluvium have moderate paleontological resource sensitivity and the Late Cahuilla sediments and the Palm Springs Formation have high paleontological resource sensitivity. The Cahuilla lakebed deposits will likely be encountered by excavations, in particular, on the eastern area of the site. The Palm Springs Formation underlies the lakebed deposits so that its exposures are more sporadic.

Overall, staff considers the probability for significant paleontological resources to be encountered during site construction activities to be moderate. However, if construction includes significant amounts of grading or deep foundation excavation and utility trenching the potential for exposure of paleontological resources will increase with depth of the excavations. This assessment is based on SVP criteria and the paleontological report appended to the AFC (SES 2008a). Proposed Conditions of Certification **PAL-1** to **PAL-7** are designed to mitigate paleontological resource impacts, as discussed above, to less than significant levels. These conditions essentially require a worker education program in conjunction with the monitoring of earthwork activities by a qualified professional paleontologist (a paleontological resource specialist, or PRS).

The proposed conditions of certification allow the BLM Authorized Office and the Energy Commission's compliance project manager (CPM) and the applicant to adopt a compliance monitoring scheme ensuring compliance with LORS applicable to geological hazards and the protection of geological, mineralogical, and paleontological resources.

Based on the information below and proposed conditions of certification, it is staff's opinion that the potential for significant adverse, direct or indirect impacts to the project, from geological hazards, and to potential geological, mineralogical, and paleontological resources, from the proposed project, is low.

GEOLOGICAL HAZARDS

The AFC provides documentation of potential geological hazards at the proposed Solar Two plant site, including limited site-specific subsurface information (SES 2008a). Review of the AFC, coupled with staff's independent research, indicates that the potential for geological hazards to impact the proposed plant site during its practical design life is low if recommendations for mitigation of seismic shaking are followed. Geological hazards related to seismic shaking are addressed in the project geotechnical report per CBC (2007) requirements (SES 2008a).

Staff's independent research included the review of available geological maps, reports, and related data of the Solar Two plant site. Geological information was available from the California Geological Survey (CGS), California Division of Mines and Geology (CDMG, now know as CGS), the U.S. Geological Survey (USGS), the American Geophysical Union, the Geological Society of America, and other organizations.

Faulting and Seismicity

Energy Commission staff reviewed numerous CDMG and USGS publications as well as informational websites in order to gather data on the location, age, and type of faulting in the project area (Blake 2006a; CDMG 1981; CDMG 1988; CDMG 2003; CGS 2002a and b; CGS 2007; SCEC 2006; USGS 2006). Type A and B faults within 80 miles of the Solar Two site are listed in Table 2. Type A faults have slip-rates of $\geq$5 mm per year and are capable of producing an earthquake of magnitude 7.0 or greater. Type B faults have slip-rates of 2 to 5 mm per year and are capable of producing an earthquake of magnitude 6.5 to 7.0. The fault type, potential magnitude, and distance from the site are summarized in **Geology and Paleontology Table 2**.

Geology and Paleontology Table 2
Active Faults Relative to the Proposed SES Solar Two Site

Fault Name	Distance From Site (miles)	Maximum Earthquake Magnitude (Mw)	Estimated Peak Site Acceleration (g)	Movement and Strike	Slip Rate mm/yr	Fault Type
Laguna Salada	4.1	7.0	.334	Right-Lateral Strike Slip (Northwest)	3.5	A
Elsinore (Coyote Mountain)	9.3	6.8	.187	Right-Lateral Strike Slip (Northwest)	4.0	A
Superstition Mtn. (San Jacinto)	10.8	6.6	.151	Right-Lateral Strike Slip (Northwest)	5.0	A
Superstition Hills (San Jacinto)	13.4	6.6	.129	Right-Lateral Strike Slip (Northwest)	4.0	A
Elmore Ranch	17.5	6.6	.106	Left-Lateral Strike Slip (Northwest)	1.0	B
San Jacinto – Borrego	17.8	6.6	.105	Right-Lateral Strike Slip (Northwest)	4.0	A
Imperial	18.8	7.0	.124	Right-Lateral Strike Slip (Northwest)	20.0	A
Brawley Seismic Zone	23.4	6.4	.077	Right-Lateral Strike Slip (Northwest)	25.0	B
Elsinore (Julian)	32.6	7.1	.086	Right-Lateral Strike Slip (Northwest)	5.0	A
San Jacinto – Coyote Creek	35.5	6.6	.062	Right-Lateral Strike Slip (Northwest)	4.0	A
San Jacinto – Anza	37.2	7.2	.082	Right-Lateral Strike Slip (Northwest)	12.0	A
Earthquake Valley	38.7	6.5	.055	Right-Lateral Strike Slip (Northwest)	2.0	B
San Andreas – SB - Coachella	40.4	7.7	.100	Right-Lateral Strike Slip (Northwest)	24.0	A
San Andreas - Coachella	40.4	7.7	.100	Right-Lateral Strike Slip (Northwest)	25.0	A
San Andreas – Whole	40.4	8.0	.117	Right-Lateral Strike Slip (Northwest)	34.0	A
Rose Canyon	76.6	7.2	.047	Right-Lateral Strike Slip (Northwest)	1.5	B
Elsinore (Temecula)	79.4	6.8	.037	Right-Lateral Strike Slip (Northwest)	5.0	A

Type C and otherwise undifferentiated faults which are more than 20 miles from the site are not discussed here because they are unlikely to undergo movement or generate seismicity which could affect the project.

Seventeen Type A and B faults and fault segments were identified within 80 miles of the potential site (**Geology and Paleontology Table 2).** In addition the Yuha Wells and Dixieland faults are within close proximity to the site. The Yuha Wells fault is a zone of reticulated strands between the Laguna Salada fault southeast of the site and the Elsinore fault northwest of the site. The fault passes through the western portions of the site. Age, magnitude, and recurrence intervals of movement along the Yuha Wells fault are not well constrained but there is evidence of Quaternary movement and possible left-lateral offset of Holocene stream channels within the fault zone.

The Dixieland fault trends southeast to northwest and crosses the Evan Hewes Highway east of the proposed SSTP site. The eastern end of the proposed project water line crosses the Dixieland fault. Surface deformation in the form of ground cracking and subsidence was first noted in 1969 and approximately 200 feet wide by 700 feet long zone of eroded fissures and sinkholes was noted in 1973 (Smith 1979). Deformation associated with the Dixieland fault may have resulted from a seismic response to the magnitude 6.4 Borrego Mountain earthquake on the Coyote Creek segment of the San Jacinto fault on April 9, 1968 (Sharp and Clark 1972).

Based on previous drilling and on the soil profile generated for this site by the geotechnical investigation, the site soil class is assumed to be seismic Class D. The estimated peak horizontal ground acceleration for the power plant is 0.74 times the acceleration of gravity (0.74g) for bedrock acceleration based on 2 percent probability of exceedence in 50 years under 2007 CBC criteria. For a Class D site, the soils profile amplifies the acceleration of the ground surface to 1.94g (USGS 2008).

All of the faults listed in Geology and Paleontology Table 2 could generate some level of ground shaking at this site. Since there are no known faults of any age through the site, the potential for actual seismic ground surface rupture is negligible.

<u>Liquefaction</u>

Liquefaction is a condition in which a saturated cohesionless soil may lose shear strength because of sudden increase in pore water pressure caused by an earthquake. However, the potential for liquefaction of strata deeper than approximately 40 feet below surface is considered negligible due to the increased confining pressure and because geological strata at this depth are generally too compact to liquefy. The reported deep ground water table (greater than 50 feet) would indicate no potential for liquefaction. Standard penetration testing (blowcounts) reported in the project-specific geotechnical report (SES 2008a) indicate strata beneath the site are also generally too dense to liquefy. Liquefaction potential on the Solar Two site was addressed in the project geotechnical report per CBC (2007) and proposed Condition of Certification **GEN-1** requirements.

<u>Lateral Spreading</u>

Lateral spreading of the ground surface can occur within liquefiable beds during seismic events. Lateral spreading generally requires an abrupt change in slope—that is, a nearby steep hillside or deeply eroded stream bank, etc.—but can also occur on gentle slopes such as are present at the project site. Other factors such as distance from the epicenter, magnitude of the seismic event, and thickness and depth of liquefiable layers also affect the amount of lateral spreading. Because the Solar Two site is not subject to liquefaction, there is no potential for lateral spreading at the site surface during seismic events.

Dynamic Compaction

Dynamic compaction of soils results when relatively unconsolidated granular materials experience vibration associated with seismic events. The vibration causes a decrease in soil volume, as the soil grains tend to rearrange into a more dense state (an increase is soil density). The decrease in volume can result in settlement of overlying structural improvements. Site specific geotechnical investigation indicates the alluvial deposits in the site subsurface are generally too dense to allow significant dynamic compaction (SES 2008a).

Hydrocompaction

Hydrocompaction (also known as hydro-collapse) is generally limited to young soils that were deposited rapidly in a saturated state, most commonly by a flash flood. The soils dry quickly, leaving an unconsolidated, low density deposit with a high percentage of voids. Foundations built on these types of compressible materials can settle excessively, particularly when landscaping irrigation dissolves the weak cementation that is preventing the immediate collapse of the soil structure. Site specific geotechnical investigation indicates the subsurface alluvial deposits which underlie the site are generally too dense to experience significant hydrocompaction (SES 2008a).

Subsidence

Local subsidence or settlement may occur when areas containing compressible soils are subjected to foundation or fill loads. Site-specific geotechnical investigation indicates the alluvial deposits which underlie the site are generally at a medium-dense to very dense consistency and therefore are considered unlikely to support site-wide subsidence due to foundation loading. Due to relatively recent fissuring and subsidence along the trace of the Dixieland fault a geologist or engineer experienced in recognition and examination of faults and fissures should be available during trenching performed during construction of the ancillary facilities, particularly the water supply pipeline, to document any potential near-surface soil anomalies and facilitate any necessary changes in design. With proper geotechnical engineering design, in accordance with proposed Condition of Certification **GEN-1** and **CIVIL-1** (**Facility Design** section), the potential for localized foundation subsidence should be minimal.

Regional ground subsidence is typically caused by petroleum or ground water withdrawal that increases the effective unit weight of the soil profile, which in turn increases the effective stress on the deeper soils. This results in consolidation or settlement of the underlying soils. No petroleum or natural gas withdrawals are taking place in the site vicinity and no ground water would be pumped at the site. Significant ground water pumping for geothermal power production is taking place in the vicinity of Brawley, approximately 15 miles northeast of the project site. However, ground water extraction at this distance is unlikely to affect ground water conditions beneath the site. Regional subsidence of the Salton Trough is occurring due to ongoing tectonism and possibly basin loading. However, minor settling, spread over the entirety of the Salton Trough, is unlikely to result in significant localized subsidence within the project area. Therefore, negative impacts to the project due to subsidence from tectonism or from petroleum, natural gas, or future ground water production is considered very unlikely.

Expansive Soils

Soil expansion occurs when clay-rich soils with an affinity for water exist in place at a moisture content below their plastic limit. The addition of moisture from irrigation, precipitation, capillary tension, water line breaks, etc. allows the clay minerals to absorb water molecules into their structure, which results in an increase in the overall volume of the soil. This increase in volume can cause excessive movement (heave) of overlying structural improvements. The alluvium, colluvium, and lakebed deposits which form most of the site subsurface are not considered to be expansive. However, claystone members within the Palm Springs Formation may be expansive if exposed to moisture. An inspector experienced in recognition of clay rich soils should be onsite during excavation of building foundations to implement mitigation measures in areas of clay rich soils, if they are encountered. Proper routine, geotechnical mitigation of any expansive clay soils would provide adequate project performance and a minimal project impact.

Landslides

The SSTP site slopes gently to the east-northeast at a gradient of less than 1 percent. Due to the low site gradient and the absence of topographically high ground in the site vicinity the potential for landslide impacts to the site is considered to be negligible. The Imperial County General Plan Landslide Activity map indicates moderate potential for landslide activity in the hills west of the site but no potential for landslide activity within the site boundaries is indicated (Imperial County 1993).

Flooding

The Federal Emergency Management Agency (FEMA) has identified the majority of the Solar Two site and ancillary facilities areas as lying in Unshaded Zone X, or “Areas determined to be outside the 0.2 percent annual chance floodplain”. However, the channels and surrounding banks of ephemeral drainages which cross the site are designated special flood hazard areas subject to inundation by the 1 percent annual chance flood (FEMA 2008). Civil engineering design can minimize the potential for flash floods damage to this project to a (CEQA) less than significant level. Additional discussion of flash flooding is presented under the **Soil and Water** section of this document.

Tsunamis and Seiches

The proposed Solar Two project and associated linear facilities are not located near any significant surface water bodies and therefore there are no potential impacts due to tsunamis and seiches.

Volcanic Hazards

The proposed Solar Two project site is located approximately 30 miles southwest of the Salton Buttes volcanic vent area. The Salton Buttes are an area of explosive and extrusive rhyolitic eruptions which occurred approximately 16,000 years ago. Although no recurrence interval has been determined, the Salton Buttes is an area of active crustal spreading which makes it conducive to further eruptive activity in the future (Miller, 1989). Due to its distance from the project site the impact of eruptive activity at the Salton Buttes would likely be limited to ashfall which would have a short-lived affect on the project. This would involve having to shut down and probably cover the generators to prevent damage from the abrasive ash and having to clean the mirrors once the eruption was over. Mirrors will need to be cleaned periodically as part of normal plant operation and maintenance.

The Cerro Prieto volcano is located approximately 40 miles southeast of the project site in northern Sonora, Mexico. Cerro Prieto consists of a 733-feet tall dacitic dome with a 660-feet wide caldera which formed during a series of eruptions beginning approximately 100,000 years ago and continuing to about the earliest Holocene (10,000 years). The actual occurrence of Holocene eruptions and potential recurrence intervals has not been established. Like the Salton Buttes volcanic vent, the Cerro Prieto volcano is located in an area of active crustal spreading which makes it conducive to further eruptive activity in the future. Due to its distance from the project site the impact of eruptive activity at Cerro Prieto would likely be limited to ashfall. The generators would need to be protected from the ash and the mirrors would need to be cleaned.

Due to the distance of the site from known Holocene volcanic areas and the likely long recurrence intervals between eruptions the potential for volcanic eruptions to cause long term or catastrophic damage to the SES Solar Two project is considered to be very low.

GEOLOGICAL, MINERALOGICAL, AND PALEONTOLOGICAL RESOURCES

Energy Commission staff has reviewed applicable geological maps, reports, and on-line resources for this area (Blake 2006a; CDMG 1977; CDMG 1981; CDMG 1984; CDMG 1988; CDMG 1990; CDMG 1994; CDMG 1998; CDMG 1999; CDMG 2003; CGS 2002a and b; CGS 2007; Jennings and Saucedo 2002; SCEC 2006; and USGS 2006). Staff did not identify any geological or mineralogical resources at the energy facility location.

Energy Commission staff reviewed the paleontological resources assessment in Section 5.8 and Appendix H of the AFC (SES 2008a) and the confidential paleontological resources report (PRC 2008). Staff has also reviewed paleontological literature and records searches conducted by the San Diego Natural History Museum (Randall 2008) and the Natural History Museum of Los Angeles County (McLeod 2009). These studies indicate the Holocene alluvium and colluvium within and near the proposed project site contain abundant fossils including wood and invertebrates, most of which are probably reworked by erosion of older formations. However, the depositional environment of these sediments is considered to be conducive to preservation of vertebrate and plant remains. Therefore the paleontological sensitivity of the Holocene alluvium and colluvium within the project boundaries is considered to be moderate.

Holocene lakebed deposits of ancient Lake Cahuilla have yielded fossil remains from numerous localities in Imperial Valley. These include extensive fresh water shell beds, fish, seeds, pollen, diatoms, foraminifera, sponges, and wood. Lake Cahuilla deposits have also yielded vertebrate fossils including teeth and bones of birds, horses, bighorn sheep, and reptiles. Therefore the paleontological sensitivity of these lakebed deposits within the potential project boundaries is considered to be high.

The Pliocene-Pleistocene Palm Springs Formation has yielded thousands of fossils from more than 2,000 collection sites in Imperial Valley. These include a large range of fossil plants, invertebrate, and vertebrate species. Therefore the paleontological sensitivity of the Palm Springs Formation, within the proposed project boundaries, is considered to be high.

This assessment is based on SVP criteria, the paleontological report appended to the AFC (PRC 2008), and the independent paleontological assessment of McLeod (2009) and Randall (2008). The Coyote Mountains Wilderness and Area of Environmental Concern (ACECS) northwest of the proposed project, were set aside primarily because of fossil discoveries. Although these mountains represent a different geological environmental than the project site, there are a number of geological units with moderate to high paleontological sensitivity, within or near the boundaries of the proposed project. Moderate and high sensitivity roughly correspond to PYFC Condition 2 Class 3a to 4a and 4b, respectively (USDI 2007). If unauthorized, unmonitored excavations were to be made in these materials, there would be some potential to damage valuable paleontological resources. This damage could include illegal collection of fossil materials, dislodging of fossils from their preserved environment (fossils out of context), and/or physical damage to fossil specimens. Proposed Conditions of Certification **PAL-1** to **PAL-7** are designed to mitigate paleontological resource impacts, as discussed above, to less than significant levels. These conditions essentially require a worker education program in conjunction with the monitoring of earthwork activities by a qualified professional paleontologist (a paleontological resource specialist, or PRS).

The proposed conditions of certification allow the Energy Commission's compliance project manager (CPM), the BLM Authorized Office, and the applicant to adopt a compliance monitoring scheme ensuring compliance with LORS applicable to geological hazards and the protection of geological, mineralogical, and paleontological resources.

CONSTRUCTION IMPACTS AND MITIGATION

The design-level geotechnical investigation, required for the project by the CBC (2007) and proposed Condition of Certification **GEN-1** should provide standard engineering design recommendations for mitigation of earthquake ground shaking and excessive settlement (see **Proposed Conditions of Certification, Facility Design**).

As noted above, no viable geological or mineralogical resources are known to exist in the vicinity of the Solar Two construction site. However the alluvium, colluvium, lakebeds, and Palm Springs Formation which underlie the project site are considered to have moderate to high paleontological sensitivity due to the abundance and diversity of fossils found within these strata in other areas of the Imperial Valley. Construction of the proposed project will include grading, foundation excavation, and utility trenching. Based on the soils profile, SVP assessment criteria, and the shallow depth of the potentially fossiliferous geological units, staff considers the probability of encountering paleontological resources to be high.

Proposed Conditions of Certification **PAL-1** to **PAL-7** are designed to mitigate any paleontological resource impacts, as discussed above, to a less than significant level. Essentially, Conditions of Certification **PAL-1** to **PAL-7** require a worker education program in conjunction with monitoring of earthwork activities by qualified professional paleontologists (paleontological resource specialist, or PRS). Earthwork is halted any time potential fossils are recognized by either the paleontologist or the worker. For finds deemed significant by the PRS, earthwork cannot restart until all fossils in that strata, including those below the design depth of the excavation, are collected. When properly implemented, the conditions of certification should yield a net gain to the science of paleontology since fossils that would not otherwise have been discovered can be collected, identified, studied, and properly curated. A paleontological resource specialist is retained, for the project by the applicant, to produce a monitoring and mitigation plan, conduct the worker training, and oversee the monitoring. During the monitoring, the PRS can and often does petition the Energy Commission for a change in the monitoring protocol. Most commonly, this is a request for lesser monitoring after sufficient monitoring has been performed to ascertain that there is little chance of finding significant fossils. In other cases, the PRS can propose increased monitoring due to unexpected fossil discoveries or in response to repeated out-of-compliance incidents by the earthwork contractor.

Based upon the literature and archives search, field surveys, and compliance documentation for the Solar Two project, the applicant has proposed monitoring and mitigation measures to be followed during the construction of the project. Energy Commission staff believes that the facility can be designed and constructed to minimize the effect of geological hazards and impacts to potential paleontological resources at the site during project design life.

OPERATION IMPACTS AND MITIGATION

Operation of the proposed new solar energy generating facility should not have any adverse impact on geological, mineralogical, or paleontological resources.

FACILITY CLOSURE

The future decommissioning and closure of the project should not negatively affect geological, mineralogical, or paleontological resources since the ground disturbed during plant decommissioning and closure would have been already disturbed, and mitigated as required, during construction and operation of the project.

C.4.4.3 CEQA LEVEL OF SIGNIFICANCE

CEQA guidelines state that the environmental analysis "…shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy" (Title 14 CCR §15126.4[a][1]). Appendix F of the guidelines further suggests consideration of such factors as the project's energy requirements and energy use efficiency; its effects on local and regional energy supplies and energy resources; its requirements for additional energy supply capacity; its compliance with existing energy standards; and any alternatives that could reduce the wasteful, inefficient, and unnecessary consumption of energy (Title 14, CCR §15000 et seq., Appendix F).

Energy use, production, and efficiency are addressed in other sections of this document. Energy/efficiency factors affect geological hazards and geological, mineralogical, and/or paleontological resources only when energy/efficiency concerns require changes to the size or location of the construction zone, as addressed below. Potential impacts to paleontological resources within the proposed project can be mitigated to a (CEQA) less than significant level by adopting and enforcing the proposed Conditions of Certification **PAL-1** through **PAL-7**.

C.4.5 300 MW ALTERNATIVE

The 300 MW alternative proposes construction and operation of a 300 MW facility using the Stirling SunCatcher technology. The 300 MW facility under this Alternative would provide the same number of SunCatchers and other on and off-site facilities as the 300 MW phase of the proposed 750 MW project.

C.4.5.1 SETTING AND EXISTING CONDITIONS

The 300 MW alternative would consist of approximately 40 percent as many SunCatchers (12,000 machines) producing 40 percent as much power (300 MW) and occupying 40 percent as much land as the proposed project. The environmental setting described in **Section C.4.4.1** applies to this alternative.

C.4.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The discussion of impacts to the proposed project, discussed in Section C.4.4.2, applies also to the 300 MW alternative. As for the proposed project, two types of impacts are considered. The first is geological hazards, which could impact the proper functioning of the proposed facility and create life/safety concerns. The second is the potential impacts the proposed facility could have on existing geological, mineralogical, and paleontological resources in the area.

Because the geological setting is the same as that of the proposed project, and the same types of facilities would be constructed in this alternative, the impacts would be the same as for the proposed project. The active geological setting means that the site could be subject to intense levels of earthquake-related ground shaking. The effects of strong ground shaking would need to be mitigated through structural designs required by the California Building Code (CBC 2007) and the project geotechnical report. The CBC (2007) requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction potential. A geotechnical investigation has been performed and presents standard engineering design recommendations for mitigation of seismic shaking and site soil conditions.

There are no known viable geological or mineralogical resources at the proposed Solar Two site, so none exist on the 300 MW alternative. Because the 300 MW alternative is also located in geological formations with moderate to high paleontological sensitivity (PYFC Condition 2, Class 3a, 4a, 4b), there is the potential for impacts to paleontological resources to occur; these would be mitigated through worker training and monitoring by qualified paleontologists, as required by Conditions of Certification, **PAL-1** through **PAL-7**.

Since the 300MW alternative plant would occupy only about 40 percent of the total 6500 acres, its potential to encounter and positively or negatively impact significant fossils would, roughly, be reduced to about 40 percent of that of the proposed project. Because the eastern half of the 6500-acre site may have a slightly higher potential to encounter fossils than the western half, this 40 percent value could vary, depending on the location and orientation of a smaller development within the overall project boundary.

C.4.5.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, the potential is low for significant adverse impacts to the 300 MW alternative from geological hazards during its design life and moderate to high paleontological resources from the construction, operation, and closure of the proposed project. It is staff's conclusion that the alternative will be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards and in a manner that both protects environmental quality and assures public safety. The CEQA level of significance would remain unchanged from the proposed project.

C.4.6 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives developed to reduce impacts to the waters of the U.S. would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative is illustrated in **Alternatives Figure 1B**. This alternative would have the same outer project boundaries as the proposed project, but it would include prohibition of installing permanent structures within drainages, thereby reducing the available acreage for development to 4,690 acres, and reducing the number of SunCatchers from 30,000 under the proposed project to 25,290.

C.4.6.1 SETTING AND EXISTING CONDITIONS

The Drainage Avoidance #1 alternative would be constructed within the boundaries of the proposed project. The environmental setting described in Section C.4.4.1 applies to this alternative.

C.4.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The discussion of impacts to the proposed project, discussed in Section C.4.4.2, applies also to the Drainage Avoidance #1 alternative. As for the proposed project, two types of impacts are considered. The first is geological hazards, which could impact the proper functioning of the proposed facility and create life/safety concerns. The second is the potential impacts the proposed facility could have on existing geological, mineralogical, and paleontological resources in the area.

Because the overall geological setting is the same as that of the proposed project, and the same types of facilities would be constructed in this alternative, the impacts would be the same as for the proposed project. The active geological setting means that the site could be subject to intense levels of earthquake-related ground shaking. The effects of strong ground shaking would need to be mitigated through structural designs required by the California Building Code (CBC 2007) and the project geotechnical report. The CBC (2007) requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction potential. A geotechnical investigation has been performed and presents standard engineering design recommendations for mitigation of seismic shaking and site soil conditions.

There are no known viable geological or mineralogical resources at the proposed Solar Two site, so none exist on the Drainage Avoidance #1 alternative. Because the alternative is also located in geological formations with moderate to high paleontological sensitivity (PYFC Condition 2, Class 3a, 4a, 4b), there is the potential for impacts to paleontological resources to occur, but these would be mitigated through worker training and monitoring by qualified paleontologists, as required by Conditions of Certification, **PAL-1** through **PAL-7**. The smaller area of disturbance inherent in the Drainage Avoidance #1 alternative would reduce the potential to encounter fossils during construction.

Overall, this alternative could be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards and in a manner that both protects environmental quality and assures public safety.

C.4.6.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, the potential is low for significant adverse impacts to the Drainage Avoidance #1 alternative from geological hazards during its design life and to potential geological, mineralogical, and paleontological resources from the construction, operation, and closure of the proposed project. It is staff's conclusion that the alternative will be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards and in a manner that both protects environmental quality and assures public safety. The CEQA level of significance would remain unchanged from the proposed project.

C.4.7 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative would eliminate both the eastern and western-most portions of the proposed project, where the largest drainage complexes are located. This alternative is shown in **Alternatives Figure 1C**. It would reduce the overall size of the project site by 3,347 acres (from 6,500 acres to 3,153 acres) It would also reduce the number of SunCatchers from 30,000 under the proposed project to 16,915. In this alternative, permanent structures would be allowed within all drainages inside the revised project boundaries.

C.4.7.1 SETTING AND EXISTING CONDITIONS

The Drainage Avoidance #2 alternative would be constructed within the boundaries of the proposed project. The environmental setting described in Section C.4.4.1 applies to this alternative.

C.4.7.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The discussion of impacts to the proposed project, discussed in Section C.4.4.2, applies also to the Drainage Avoidance #2 alternative. As for the proposed project, which extends further east and west than this alternative, two types of impacts are considered. The first is geological hazards, which could impact the proper functioning of the proposed facility and create life/safety concerns. The second is the potential impacts the proposed facility could have on existing geological, mineralogical, and paleontological resources in the area.

Because the overall geological setting is the same as that of the proposed project, and the same types of facilities would be constructed in this alternative, the impacts would be the same as for the proposed project. The active geological setting means that the site could be subject to intense levels of earthquake-related ground shaking. The effects of strong ground shaking would need to be mitigated through structural design required by the California Building Code (CBC 2007) and the project geotechnical report. The CBC (2007) requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction potential. A geotechnical investigation has been performed and presents standard engineering design recommendations for mitigation of seismic shaking and site soil conditions.

There are no known viable geological or mineralogical resources at the proposed Solar Two site, so none exist on the Drainage Avoidance #2 alternative. Because the alternative is also located in geological formations with moderate to high paleontological sensitivity (PYFC Condition 2, Class 3a, 4a, 4b), there is the potential for impacts to paleontological resources to occur, but these would be mitigated through worker training and monitoring by qualified paleontologists, as required by Conditions of Certification, **PAL-1** through **PAL-7**. The smaller area of disturbance inherent in the Drainage Avoidance #1 alternative would reduce the potential to encounter fossils during construction.

Overall, this alternative could be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards and in a manner that both protects environmental quality and assures public safety.

C.4.7.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, the potential is low for significant adverse impacts to the Drainage Avoidance #2 alternative from geological hazards during its design life and to potential geological, mineralogical, and paleontological resources from the construction, operation, and closure of the proposed project. It is staff’s conclusion that the alternative can be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards and in a manner that both protects environmental quality and assures public safety. The CEQA level of significance would remain unchanged from the proposed project.

C.4.8 NO PROJECT / NO ACTION ALTERNATIVE

NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on SES Solar Two project application and on CDCA land use plan amendment

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

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no ground disturbance. As a result, impacts caused by the effects of earthquake related ground shaking would not occur. Because no ground disturbance would occur, impacts to potential geologic, mineralogic, and paleontologic resources from the construction, operation, and closure of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on SES Solar Two project and amend the CDCA land use plan to make the area available for future solar development

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

Because the CDCA Plan would be amended, it is possible that the site will be developed with another solar technology. Construction and operation requirements for solar technologies vary; however, it is expected that all solar technologies require some grading and some infrastructure. The effects of strong ground shaking on the project structures would need to be mitigated through structural designs required by the CBC as with the proposed project. Because it is expected that all solar technologies would require ground disturbance, the impacts to potential geologic, mineralogic, and paleontologic resources from the construction, operation, and closure of the alternative would likely be similar to under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on SES Solar Two project application and amend the CDCA land use plan to make the area unavailable for future solar development

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

Because the CDCA Plan would be amended so no solar projects can be approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no construction of a solar facility. Therefore, this No Project/No Action Alternative would not impact potential geologic, mineralogic, and paleontologic resources from the construction, operation, and closure of 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.4.9 CUMULATIVE IMPACT ANALYSIS

Section B.3, Cumulative Scenario, provides detailed information on the potential cumulative solar and other development projects in the project area. Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis for the proposed project. In summary, these projects are:

- Renewable energy projects on BLM, State, and private lands, as shown on **Cumulative Figures 1 and 2** and in **Cumulative Tables 1A and 1B.** Although not all of those projects are expected to complete the environmental review processes, or be funded and constructed, the list is indicative of the large number of renewable projects currently proposed in California.
- Foreseeable future projects in the immediate Plaster City area, as shown on **Cumulative Impacts Figure 3, Plaster City Existing and Future/Foreseeable Projects, and Cumulative Tables 2 and 3**. Table 2 presents existing projects in this area and Table 3 presents future foreseeable projects in the Plaster City Area. Both tables indicate project name and project type, its location and its status.

These projects are defined within a geographic area that has been identified by the CEC and BLM as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all resource elements or environmental parameters. Most of these projects have, are, or will be required to undergo their own independent environmental review under CEQA and/or NEPA. Even if the cumulative projects described in Section B.3 have not yet completed the required environmental processes, they were considered in the cumulative impacts analyses in this SA/Draft EIS.

GEOGRAPHIC SCOPE OF ANALYSIS

The geographic area considered for cumulative impacts on geology and paleontology is, essentially, the western half of the Colorado Desert geomorphic province of extreme south-central California, bordering Mexico (Norris and Webb 1990). More specifically, the area includes all of Imperial County west of Range 17 and a small portion of the extreme east end of San Diego County. It is these areas that roughly define the limits of the Lake Cahuilla formation and the older, underlying Palm Springs formation. The potential impacts are limited to those involving paleontological resources since no geological or mineralogical resources have been identified within the boundaries of the proposed project. There are no geological hazards with potential cumulative effects, other than regional subsidence from ground water withdrawal. Significant ground water withdrawal is not part of the proposed project.

EFFECTS OF PAST AND PRESENT PROJECTS

Any previously completed project involving subsurface excavation with paleontological monitoring could already have had a detrimental effect on paleontological resources in the area defined above under **Geographic Scope of Analysis**. Given the general scarcity of fossils, even within known fossil bearing strata, the likelihood of prior damage is modest but unavoidable, after the fact.

The existing projects most likely to have damaged paleontological resources in geological formation similar to those of the proposed SES Solar Two site include, by virtue of size and location:

- U.S. Gypsum Plant in Plaster City
- California State Prison, Centinela

EFFECTS OF REASONABLY FORESEEABLE FUTURE PROJECTS

As shown in **Section B.3, Cumulative Scenario Table 1A**, the El Centro office of the BLM is aware of 9 solar energy and 8 wind energy potential projects totaling 112,495 acres of land under their jurisdiction. All energy projects on BLM land would be subject to paleontological monitoring and mitigation during construction. When properly implemented and enforced, these safeguards would provide adequate protection of paleontological resources, reducing potential impacts to a (CEQA) less than significant level.

In addition to potential renewable energy projects on BLM land, a large number of renewable energy, residential, and public works projects are proposed for the Mojave and Colorado Desert regions of Southern California on State and private lands. These projects are summarized in **Table 1B** of **Section B.3, Cumulative Scenario**. Of these, the following projects have the greatest potential to affect paleontological resources within the geographic scope of this analysis:

- Bethel Solar Hybrid Power Plant (estimated 200 to 400 acres)
- LADWP and OptiSolar Power Plant (estimated 400 acres)
- TelStar Energy (wind – estimated 10,000 acres)
- Wind Zero Training Facility (400 to 1,000 acres)
- Mount Signal Solar Power Station (estimated 350 to 400 acres)
- Ocotillo Express Wind Facility (15,000 acres)

These projects would be subject to CEC and/or CEQA environmental review which would include requirements for construction monitoring and mitigation of potential paleontological resources. When properly implemented and enforced, these safeguards should provide adequate protection of paleontological resources, reducing potential impacts to a (CEQA) less than significant level.

Contribution of the SES Solar Two Project to Cumulative Impacts

Construction of the proposed SES Solar Two project would require localized excavation over a very large area. Because the project area lies within geologic units with moderate to high paleontological sensitivity, the required excavation could, potentially, damage paleontological resources. Any damage could be cumulative to damage from other projects within the same geological formations. Implementation and enforcement of a properly designed Paleontological Resource Monitoring and Mitigation Plan (PRMMP) at this SES Solar Two site should result in a net gain to the science of paleontology by allowing fossils that would not otherwise have been found to be recovered, identified, studied, and preserved. Cumulative impacts from SES Solar Two, in consideration with other nearby similar projects, should therefore be either neutral (no fossils encountered) or positive (fossils encountered, preserved, and identified).

Operation. The operation of the SES Solar Two Project would not present additional risk to geological resources (none identified) or paleontological resources. Once ground disturbing activity is complete plant operation has no real potential to further affect paleontological resources. Therefore, routine plant operation would not increase potential cumulative affects on paleontological resources. The longer the plant operates, however, the more likely it is to be damaged by hazards, primarily earthquake-related ground shaking. Construction and operation of the plant does not increase the potential of geological hazards at the site, just their potential to damage civil improvements.

Decommissioning. The decommissioning of the SES Solar Two Project is expected to result in no adverse impacts related to geology or paleontology. Any potential impact to geological resources (none identified) or paleontological resources would have occurred and been completed during the ground disturbing phase of project construction.

C.4.10 COMPLIANCE WITH LORS

Federal, state, or local/county laws, ordinances, regulations, and standards (LORS) applicable to this project or alternatives other than the No Project / No Action alternative, were detailed in **Geology and Paleontology Table 1**. Staff anticipates that the project will be able to comply with applicable LORS.

C.4.11 NOTEWORTHY PUBLIC BENEFITS

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

C.4.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

PAL-1 The project owner shall provide BLM's Authorized Officer and the Compliance Project Manager (CPM) with the resume and qualifications of its PRS for review and approval. If the approved PRS is replaced prior to completion of project mitigation and submittal of the Paleontological Resources Report, the project owner shall obtain BLM's Authorized Officer and CPM approval of the replacement PRS. The project owner shall keep resumes on file for qualified Paleontological Resource Monitors (PRMs). If a PRM is replaced, the resume of the replacement PRM shall also be provided to BLM's Authorized Officer and the CPM.

The PRS resume shall include the names and phone numbers of references. The resume shall also demonstrate to the satisfaction of BLM's Authorized Officer and the CPM the appropriate education and experience to accomplish the required paleontological resource tasks.

As determined by BLM's Authorized Officer and the CPM, the PRS shall meet the minimum qualifications for a vertebrate paleontologist as described in the Society of Vertebrate Paleontology (SVP) guidelines of 1995. The experience of the PRS shall include the following:

1. Institutional affiliations, appropriate credentials, and college degree;
2. Ability to recognize and collect fossils in the field;
3. Local geological and biostratigraphic expertise;
4. Proficiency in identifying vertebrate and invertebrate fossils; and
5. At least three years of paleontological resource mitigation and field experience in California and at least one year of experience leading paleontological resource mitigation and field activities.

The project owner shall ensure that the PRS obtains qualified paleontological resource monitors to monitor as he or she deems necessary on the project. Paleontological Resource Monitors (PRMs) shall have the equivalent of the following qualifications:

- BS or BA degree in geology or paleontology and one year of experience monitoring in California; or
- AS or AA in geology, paleontology, or biology and four years' experience monitoring in California; or
- Enrollment in upper division classes pursuing a degree in the fields of geology or paleontology and two years of monitoring experience in California.

Verification: (1) At least 60 days prior to the start of ground disturbance, the project owner shall submit a resume and statement of availability of its designated PRS for on-site work.

(2) At least 20 days prior to ground disturbance, the PRS or project owner shall provide a letter with resumes naming anticipated monitors for the project, stating that the identified monitors meet the minimum qualifications for paleontological resource monitoring required by the condition. If additional monitors are obtained during the project, the PRS shall provide additional letters and resumes to BLM's Authorized Officer and the CPM. The letter shall be provided to BLM's Authorized Officer and the CPM no later than one week prior to the monitor's beginning on-site duties.

(3) Prior to the termination or release of a PRS, the project owner shall submit the resume of the proposed new PRS to BLM's Authorized Officer and the CPM for review and approval.

PAL-2 The project owner shall provide to the PRS, BLM's Authorized Officer and the CPM, for approval, maps and drawings showing the footprint of the power plants, construction lay down areas, and all related facilities. Maps shall identify all areas of the project where ground disturbance is anticipated. If the PRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the PRS, BLM's Authorized Officer and CPM. The site grading plan and plan and profile drawings for the utility lines would be acceptable for this purpose. The plan drawings should show the location, depth, and extent of all ground disturbances and be at a scale of 1 inch = 40 feet to 1 inch = 100 feet range. If the footprint of the project or its linear facilities change, the project owner shall provide maps and drawings reflecting those changes to the PRS, BLM's Authorized Officer and CPM.

If construction of the ISEGS project proceeds in phases, maps and drawings may be submitted prior to the start of each power plant. A letter identifying the proposed schedule of each project power plant shall be provided to the PRS, BLM's Authorized Officer and CPM. Before work commences on affected power plants, the project owner shall notify the PRS, BLM's Authorized Officer and CPM of any construction phase scheduling changes.

At a minimum, the project owner shall ensure that the PRS or PRM consults weekly with the project superintendent or construction field manager to confirm area(s) to be worked the following week, and until ground disturbance is completed.

<u>Verification:</u> (1) At least 30 days prior to the start of ground disturbance, the project owner shall provide the maps and drawings to the PRS, BLM's Authorized Officer and CPM.

(2) If there are changes to the footprint of the project, revised maps and drawings shall be provided to the PRS, BLM's Authorized Officer and CPM at least 15 days prior to the start of ground disturbance.

(3) If there are changes to the scheduling of the construction phases of each power plant, the project owner shall submit a letter to BLM's Authorized Officer and the CPM within 5 days of identifying the changes.

PAL-3 If after review of the plans provided pursuant to **PAL-2**, the PRS determines that materials with moderate, high, or unknown paleontological sensitivity could be impacted, the project owner shall ensure that the PRS prepares, and the project owner submits to BLM’s Authorized Officer and the CPM for review and approval, a paleontological resources monitoring and mitigation plan (PRMMP) to identify general and specific measures to minimize potential impacts to significant paleontological resources. Approval of the PRMMP by BLM’s Authorized Officer and the CPM shall occur prior to any ground disturbance. The PRMMP shall function as the formal guide for monitoring, collecting, and sampling activities, and may be modified with BLM’s Authorized Officer and CPM approval. This document shall be used as the basis of discussion when on-site decisions or changes are proposed. Copies of the PRMMP shall reside with the PRS, each monitor, the project owner’s on-site manager, BLM’s Authorized Officer and the CPM.

The PRMMP shall be developed in accordance with the guidelines of the Society of Vertebrate Paleontology (SVP 1995) and shall include, but not be limited, to the following:

1. Assurance that the performance and sequence of project-related tasks, such as any literature searches, pre-construction surveys, worker environmental training, fieldwork, flagging or staking, construction monitoring, mapping and data recovery, fossil preparation and collection, identification and inventory, preparation of final reports, and transmittal of materials for curation will be performed according to PRMMP procedures;
2. Identification of the person(s) expected to assist with each of the tasks identified within the PRMMP and the conditions of certification;
3. A thorough discussion of the anticipated geologic units expected to be encountered, the location and depth of the units relative to the project when known, and the known sensitivity of those units based on the occurrence of fossils either in that unit or in correlative units;
4. An explanation of why, how, and how much sampling is expected to take place and in what units. Include descriptions of different sampling procedures that shall be used for fine-grained and coarse-grained units;
5. A discussion of the locations of where the monitoring of project construction activities is deemed necessary, and a proposed plan for monitoring and sampling;
6. A discussion of procedures to be followed in the event of a significant fossil discovery, halting construction, resuming construction, and how notifications will be performed;
7. A discussion of equipment and supplies necessary for collection of fossil materials and any specialized equipment needed to prepare, remove, load, transport, and analyze large-sized fossils or extensive fossil deposits;
8. Procedures for inventory, preparation, and delivery for curation into a retrievable storage collection in a public repository or museum, which meet the Society of Vertebrate Paleontology’s standards and requirements for the curation of paleontological resources;

9. Identification of the institution that has agreed to receive data and fossil materials collected, requirements or specifications for materials delivered for curation, and how they will be met, and the name and phone number of the contact person at the institution; and

10. A copy of the paleontological conditions of certification.

Verification: At least 30 days prior to ground disturbance, the project owner shall provide a copy of the PRMMP to BLM's Authorized Officer and the CPM. The PRMMP shall include an affidavit of authorship by the PRS, and acceptance of the PRMMP by the project owner evidenced by a signature.

PAL-4 If after review of the plans provided pursuant to **PAL-2**, the PRS determines that materials with moderate, high, or unknown paleontological sensitivity could be impacted then, prior to ground disturbance and for the duration of construction activities involving ground disturbance, the project owner and the PRS shall prepare and conduct weekly BLM Authorized Officer- and CPM-approved training for the following workers: project managers, construction supervisors, foremen and general workers involved with or who operate ground-disturbing equipment or tools. Workers shall not excavate in sensitive units prior to receiving BLM Authorized Officer- and CPM-approved worker training. Worker training shall consist of an initial in-person PRS training during the project kick-off, for those mentioned above. Following initial training, a CPM-approved video or in-person training may be used for new employees. The training program may be combined with other training programs prepared for cultural and biological resources, hazardous materials, or other areas of interest or concern. No ground disturbance shall occur prior to BLM's Authorized Officer and CPM approval of the Worker Environmental Awareness Program (WEAP), unless specifically approved by the CPM.

The WEAP shall address the possibility of encountering paleontological resources in the field, the sensitivity and importance of these resources, and legal obligations to preserve and protect those resources.

The training shall include:

1. A discussion of applicable laws and penalties under the law;
2. Good quality photographs or physical examples of vertebrate fossils for project sites containing units of high paleontological sensitivity;
3. Information that the PRS or PRM has the authority to halt or redirect construction in the event of a discovery or unanticipated impact to a paleontological resource;
4. Instruction that employees are to halt or redirect work in the vicinity of a find and to contact their supervisor and the PRS or PRM;
5. An informational brochure that identifies reporting procedures in the event of a discovery;
6. A WEAP certification of completion form signed by each worker indicating that he/she has received the training; and

7. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

(1) At least 30 days prior to ground disturbance, the project owner shall submit the proposed WEAP, including the brochure, with the set of reporting procedures for workers to follow.

(2) At least 30 days prior to ground disturbance, the project owner shall submit the script and final video to BLM's Authorized Officer and the CPM for approval if the project owner is planning to use a video for interim training.

(3) If the owner requests an alternate paleontological trainer, the resume and qualifications of the trainer shall be submitted to BLM's Authorized Officer and the CPM for review and approval prior to installation of an alternate trainer. Alternate trainers shall not conduct training prior to BLM's Authorized Officer and CPM authorization.

(4) In the monthly compliance report (MCR, the project owner shall provide copies of the WEAP certification of completion forms with the names of those trained and the trainer or type of training (in-person or video) offered that month. The MCR shall also include a running total of all persons who have completed the training to date.

PAL-5 The project owner shall ensure that the PRS and PRM(s) monitor consistent with the PRMMP all construction-related grading, excavation, trenching, and augering in areas where potential fossil-bearing materials have been identified, both at the site and along any constructed linear facilities associated with the project. In the event that the PRS determines full-time monitoring is not necessary in locations that were identified as potentially fossil-bearing in the PRMMP, the project owner shall notify and seek the concurrence of BLM's Authorized Officer and the CPM.

The project owner shall ensure that the PRS and PRM(s) have the authority to halt or redirect construction if paleontological resources are encountered. The project owner shall ensure that there is no interference with monitoring activities unless directed by the PRS. Monitoring activities shall be conducted as follows:

1. Any change of monitoring from the accepted schedule in the PRMMP shall be proposed in a letter or email from the PRS and the project owner to BLM's Authorized Officer and the CPM prior to the change in monitoring and will be included in the monthly compliance report. The letter or email shall include the justification for the change in monitoring and be submitted to BLM's Authorized Officer and the CPM for review and approval.
2. The project owner shall ensure that the PRM(s) keep a daily monitoring log of paleontological resource activities. The PRS may informally discuss paleontological resource monitoring and mitigation activities with BLM's Authorized Officer and the CPM at any time.
3. The project owner shall ensure that the PRS notifies BLM's Authorized Officer and the CPM within 24 hours of the occurrence of any incidents of non-compliance with any paleontological resources conditions of certification.

The PRS shall recommend corrective action to resolve the issues or achieve compliance with the conditions of certification.

4. For any significant paleontological resources encountered, either the project owner or the PRS shall notify BLM's Authorized Officer and the CPM within 24 hours, or Monday morning in the case of a weekend event where construction has been halted because of a paleontological find.

The project owner shall ensure that the PRS prepares a summary of monitoring and other paleontological activities placed in the monthly compliance reports. The summary will include the name(s) of PRS or PRM(s) active during the month, general descriptions of training and monitored construction activities, and general locations of excavations, grading, and other activities. A section of the report shall include the geologic units or subunits encountered, descriptions of samplings within each unit, and a list of identified fossils. A final section of the report will address any issues or concerns about the project relating to paleontological resource monitoring, including any incidents of non-compliance or any changes to the monitoring plan that have been approved by BLM's Authorized Officer and the CPM. If no monitoring took place during the month, the report shall include an explanation in the summary as to why monitoring was not conducted.

Verification: The project owner shall ensure that the PRS submits the summary of monitoring and paleontological activities in the MCR. When feasible, BLM's Authorized Officer and the CPM shall be notified 10 days in advance of any proposed changes in monitoring different from the plan identified in the PRMMP. If there is any unforeseen change in monitoring, the notice shall be given as soon as possible prior to implementation of the change.

PAL-6 The project owner, through the designated PRS, shall ensure that all components of the PRMMP are adequately performed including collection of fossil materials, preparation of fossil materials for analysis, analysis of fossils, identification and inventory of fossils, the preparation of fossils for curation, and the delivery for curation of all significant paleontological resource materials encountered and collected during project construction.

Verification: The project owner shall maintain in his/her compliance file copies of signed contracts or agreements with the designated PRS and other qualified research specialists. The project owner shall maintain these files for a period of three years after project completion and approval of BLM Authorized Officer- and CPM-approved paleontological resource report (see **PAL-7**). The project owner shall be responsible for paying any curation fees charged by the museum for fossils collected and curated as a result of paleontological mitigation. A copy of the letter of transmittal submitting the fossils to the curating institution shall be provided to BLM's Authorized Officer and the CPM.

PAL-7 The project owner shall ensure preparation of a Paleontological Resources Report (PRR) by the designated PRS. The PRR shall be prepared following completion of the ground-disturbing activities. The PRR shall include an analysis of the collected fossil materials and related information, and submit it to the CPM for review and approval.

The report shall include, but is not limited to, a description and inventory of recovered fossil materials; a map showing the location of paleontological resources encountered; determinations of sensitivity and significance; and a statement by the PRS that project impacts to paleontological resources have been mitigated below the level of significance.

Verification: Within 90 days after completion of ground-disturbing activities, including landscaping, the project owner shall submit the PRR under confidential cover to BLM's Authorized Officer and the CPM.

C.4.13 CONCLUSIONS

The applicant should easily be able to comply with applicable LORS, provided that the proposed conditions of certification are implemented and followed. The design and construction of the project should have no adverse impact with respect to geological, mineralogical, and paleontological resources. Staff proposes to ensure compliance with applicable LORS through the adoption of the proposed conditions of certification listed above.

Certification of Completion
Worker Environmental Awareness Program
Stirling Energy Systems Solar Two Project (08-AFC-5)

This is to certify these individuals have completed a mandatory California Energy Commission-approved Worker Environmental Awareness Program (WEAP). The WEAP includes pertinent information on cultural, paleontological, and biological resources for all personnel (that is, construction supervisors, crews, and plant operators) working on site or at related facilities. By signing below, the participant indicates that he/she understands and shall abide by the guidelines set forth in the program materials. Include this completed form in the Monthly Compliance Report.

No.	Employee Name	Title/Company	Signature
1.			
2.			
3.			
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Cultural Trainer: ____________ Signature:__________________ Date: ___/___/___

PaleoTrainer: ______________ Signature:__________________ Date: ___/___/___

Biological Trainer: ___________ Signature:__________________ Date:___/___/___

C.4.14 REFERENCES

Blake, T.F. 2006a – EQFAULT™ Version 3.00, *A Computer Program for the Deterministic Estimation of Peak Acceleration Using Three-Dimensional California Faults as Earthquake Sources*, http://thomasfblake.con/eqfault.htm.

CBC – California Building Code, 2007.

CDMG (California Division of Mines and Geology) 1977 – *Geology and Mineral Resources of Imperial County, California,* DMG County Report 7.

CDMG 1981 – *Preliminary Map of October 1979 Fault Ruptures, Imperial County, California.* DMG Open File Report 81-5.

CDMG 1984 – *Preliminary Geological Map of the California-Baja California Border Region,* DMG Open File Report 84-59.

CDMG 1988 – *Preliminary Map of the Quaternary Faults in Southeastern San Diego County and in Southwestern Imperial County California,* DMG Open File Report 88-6.

CDMG 1990 – *Industrial Minerals in California: Economic Importance, Present Availability, and Future Development*. Special Publication 105, reprinted from U.S. Geological Survey Bulletin 1958.

CDMG 1994 – *Fault Activity Map of California and Adjacent Areas with Locations and Ages of Recent Volcanic Eruptions, Scale: 1:750,000.*

CDMG 1998 – *Gold Districts of California*, Sesquicentennial Edition, California Gold Discovery to Statehood. Bulletin 193.

CDMG 1999 – *Mines and Mineral Producers Active in California (1997–19980,.* Special Publication 103.

CDMG 2003 – *Fault Investigation Reports for Development Sites Within Alquist-Priolo Earthquake Fault Zones in Southern California, 1974–2000.*

CGS (California Geological Survey) 2002a – *Fault Evaluation Reports Prepared Under the Alquist-Priolo Earthquake Fault Zoning Ac*t*, Region 2 – Southern California,* CD 2002-02.

CGS 2002b – Probablistic Seismic Hazard Assessment Online Database, http://www.conservation.ca.gov/cgs/rghm/psha/

CGS 2007 – *California Historical Earthquake Online Database,* http://www.consrv.ca.gov/cgs/rghm/quakes/historical/.

Elders, W.A. 1979 – *The Geological Background of the Geothermal Fields of the Salton Trough*, In Geology and Geothermics of the Salton Trough, Geological Society of Americas 92nd Annual Meeting, San Diego, P. 1-19.

FEMA (Federal Emergency Management Agency) 2008 – *Flood Insurance Rate Map 06025C, Panels 1650C, 1675C, 2000C, and 2025C, Imperial County and Unincorporated Areas, California*, September 26, 2008.

Imperial County 1993 – *Seismic and Public Safety Element*, Imperial County General Plan, Planning/Building Department.

Jennings, Charles W. and George J. Saucedo 2002 – *Simplified Fault Activity Map of California*. CGS Map Sheet 54.

Kovach, R.L., C.R. Allen, and F. Press 1962 – Geophysical Investigations in the Colorado Delta Region, *Journal of Geophysical Research*, Vol. 67, No. 7, pp. 2845+2871.

McLeod, Samuel A. 2009 – *Paleontological Resources for the Proposed SES Solar 2 Power Plant,* Natural History Museum of Los Angeles County private correspondence.

Miller, Dan C. 1989 – *Potential Hazards from Future Volcanic Eruptions in California*. USGS Bulletin 1847.

Morton, P.K. 1977 – *Geology and Mineral Resources of Imperial County, California*: California Division of Miens and Geology County Report 7, 104 p., scale 1:125,000.

Norris, R. M. and R. W. Webb 1990 – *Geology of California*. Second Edition. John Wiley and Sons. New York.

PRC (PaleoResource Consultants) 2008 – *Paleontological Resources Technical Report for the Solar Two Project.*

Randall, Kesler A. 2008 – *Paleontological Record Search – SES Solar Two Power Project*, San Diego Natural History Museum Private Correspondence, November 24, 2008.

Sharp, Robert V. and Clark, Malcolm M. 1972 – *Geological Evidence of Previous Faulting Near the 1968 Rupture on the Coyote Creek Fault,* In USGS Professional Paper 787, *The Borrego Mountain Earthquake of April 9, 1968*.

Smith, Drew P. 1979 – *Fault Evaluation Report FER-90 Dixieland Fault,* CDMG.

SCEC (Southern California Earthquake Center) 2006 – Data Center website: http://www.data.scec.org/

SES (Stirling Energy Systems Solar Two, LLC) 2008a – Application for Certification for the Stirling Energy Systems (SES) Solar Two Project, Volumes 1 and 2, Submitted to the California energy Commission, June 30, 2008.

SVP (Society for Vertebrate Paleontology) 1995 – *Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontological Resources: Standard Procedures.*

USDI (United States Department of the Interior) 2007 – Bureau of Land Management, Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Land, Instruction Memorandum No. 2008-009, dated October 15, 2007.

USGS (United States Geological Survey) 2006 – Earthquake Hazards Program Search Results for Class A and B Faults. USGS website http://gldims.cr.usgs.gov/webapps/cfusion/Sites/qfault/index.cfm

USGS 2008 – Earthquake Hazards Program, Seismic Design for Buildings. USGS website http://earthquake.usgs.gov/research/hazmap/design/.

C.5 - HAZARDOUS MATERIALS MANAGEMENT

Testimony of Rick Tyler

C.5.1 SUMMARY OF CONCLUSIONS

The Bureau of Land Management and California Energy Commission staff's (referred to as staff hereafter) evaluation of the proposed project, along with staff's proposed mitigation measures, indicate that hazardous materials use at the proposed Stirling Energy Systems Solar Two Project would not present a significant impact (pursuant to the California Environmental Quality Act) on the public or environment. With adoption of the proposed conditions of certification, the proposed project would comply with all applicable laws, ordinances, regulations, and standards.

C.5.2 INTRODUCTION

The purpose of this **HAZARDOUS MATERIALS MANAGEMENT** section of this Staff Assessment/Draft Environmental Impact Statement (SA/DEIS) is to determine if the proposed Stirling Energy Systems Solar Two (SES Solar Two) Project could potentially cause significant impacts [pursuant to the California Environmental Quality Act (CEQA)] on the public from the use, handling, storage, or transportation of hazardous materials at the proposed project site. If significant adverse impacts on the public are identified, Energy Commission staff must evaluate facility design alternatives and additional mitigation measures to reduce those impacts to the extent feasible.

This analysis does not address the potential exposure of workers to hazardous materials used at the proposed project site. Employers must inform employees of hazards associated with their work and provide those employees with special protective equipment and training to reduce the potential for health impacts from the handling of hazardous materials. The **WORKER SAFETY AND FIRE PROTECTION** section of this document describes the protection of workers from those risks.

For this analysis, staff examines plausible potential loss of containment incidents (spills) for the hazardous materials to be used at the proposed facility. The worst case plausible event, regardless of cause, is considered, and analyzed to see whether the potential impacts and risk to local populations are significant (pursuant to CEQA). Hazardous material handling and usage procedures are designed to reduce the likelihood of a spill, to reduce its potential size, and to prevent or reduce the potential migration of a spill off site to the extent that there won't be significant off-site impacts. These measures look at potential direct contact from runoff of spills, air-borne plume concentrations, and the potential for spills to mix with runoff water and be carried offsite. Generally, staff seeks to confirm that the applicant has proposed secondary containment basins for containing liquids, and that volatile chemicals would have a restricted exposure to the atmosphere after capture. Containment basins are designed to be able to hold the contents of a full tank plus the potential rainfall from a 25-year storm without any loss of containment. The spilled material, along with any mixed-in water and any contaminated soils, would then be placed into containers and processed and disposed of as required by regulations.

Hazardous materials such as mineral and lubricating oils, corrosion inhibitors, herbicides, and acids and bases to control pH would be present at the proposed project site. Hazardous materials used during the construction phase include gasoline, diesel fuel, motor oil, lubricants, and small amounts of solvents and paint. No acutely toxic hazardous materials would be used on-site during construction. None of these materials pose a significant potential for off-site impacts as a result of the quantities on-site, their relative toxicity, their physical states, and/or their environmental mobility.

The SES Solar Two Project would also require the transportation of certain liquid and solid hazardous materials to the facility. This document addresses all potential impacts associated with the use, storage, and transport of hazardous materials.

C.5.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Laws, Ordinances, Regulation, and Standards

The following federal, state, and local laws and policies apply to the protection of public health and hazardous materials management. Staff's analysis examines the project's compliance with these requirements.

Hazardous Materials Management Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
The Superfund Amendments and Reauthorization Act of 1986 (42 USC §9601 et seq.)	Contains the Emergency Planning and Community Right To Know Act (also known as SARA Title III).
The Clean Air Act (CAA) of 1990 (42 USC 7401 et seq. as amended)	Establishes a nationwide emergency planning and response program, and imposes reporting requirements for businesses that store, handle, or produce significant quantities of extremely hazardous materials.
The CAA Section on Risk Management Plans (42 USC §112(r)	Requires states to implement a comprehensive system to inform local agencies and the public when a significant quantity of such materials is stored or handled at a facility. The requirements of both SARA Title III and the CAA are reflected in the California Health and Safety Code, section 25531, et seq.
49 CFR 172.800	Requires that the suppliers of hazardous materials prepare and implement security plans in accordance with U.S. Department of Transportation (DOT) regulations.
49 CFR Part 1572, Subparts A and B	Requires that suppliers of hazardous materials ensure that their hazardous material drivers comply with personnel background security checks.

Applicable Law	Description
The Clean Water Act (CWA) (40 CFR 112)	Aims to prevent the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Requires a written spill prevention, control, and countermeasures (SPCC) plan to be prepared for facilities that store oil that could leak into navigable waters.
Title 49, Code of Federal Regulations, Part 190	Outlines gas pipeline safety program procedures.
Title 49, Code of Federal Regulations, Part 191	Addresses the transportation of natural and other gases by pipeline. Requires preparation of annual reports, incident reports, and safety-related condition reports. Also requires operators of pipeline systems to notify the U.S. Department of Transportation DOT) of any reportable incident by telephone and submit a follow-up written report within 30 days.
Title 49, Code of Federal Regulations, Part 192	Addresses transportation of natural and other gases by pipeline: Requires minimum federal safety standards, specifies minimum safety requirements for pipelines, and includes material selection, design requirements, and corrosion protection. The safety requirements for pipeline construction vary according to the population density and land use that characterize the surrounding land. This part also contains regulations governing pipeline construction, which must be followed for Class 2 and Class 3 pipelines, and requirements for preparing a pipeline integrity management program.
6 CFR Part 27	The CFATS (Chemical Facility Anti-Terrorism Standard) regulation of the U.S. Department of Homeland Security (DHS) that requires facilities that use or store certain hazardous materials to submit information to the DHS so that a vulnerability assessment can be conducted to determine what certain specified security measures shall be implemented.
State	
California Health and Safety Code, section 25531 to 25543.4	The California Accidental Release Program (Cal-ARP) requires the preparation of a Risk Management Plan (RMP) and Off-site Consequence Analysis (OCA) and submittal to the local Certified Unified Program Authority (CUPA) for approval.
Title 8, California Code of Regulations, Section 5189	Requires facility owners to develop and implement effective safety management plans to ensure that large quantities of hazardous materials are handled safely. While these requirements primarily provide for the protection of workers, they also indirectly improve public safety and are coordinated with the RMP process.

Applicable Law	Description
Title 8, California Code of Regulations, Section 5189	Sets forth requirements for design, construction, and operation of the vessels and equipment used to store and transfer ammonia. These sections generally codify the requirements of several industry codes including the American Society for Material Engineering (ASME) Pressure Vessel Code, the American National Standards Institute (ANSI) K61.1, and the National Boiler and Pressure Vessel Inspection Code. These codes apply to anhydrous ammonia but are also used to design storage facilities for aqueous ammonia.
California Health and Safety Code, Section 41700	Requires that "No person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property."
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)	Prevents certain chemicals that cause cancer and reproductive toxicity from being discharged into sources of drinking water.
Local	
	Imperial County Department of Toxic Substances Control does not have additional LORS that apply to Hazardous Materials Handling, but administers the State of California programs as the CUPA.

The Imperial County Department of Toxic Substances Control (ICDTSC) acts as the Certified Unified Program Authority (CUPA), and is responsible for reviewing Hazardous Materials Business Plans. With regard to seismic safety issues, the proposed SES Solar Two Project site is located in Seismic Risk Zone 4. The construction and design of buildings and vessels storing hazardous materials would meet the seismic requirements of the Uniform Building Code (SES2008a).

C.5.4 PROPOSED PROJECT

C.5.4.1 SETTING

Several characteristics of an area in which a project is located affect its potential for an accidental release of a hazardous material. These include:

- local meteorology;
- terrain characteristics; and
- location of population centers and sensitive receptors relative to the project.

Meteorological Conditions

Meteorological conditions, including wind speed, wind direction, and air temperature, affect both the extent to which accidentally released hazardous materials would be dispersed into the air and the direction in which they would be transported. This affects the potential magnitude and extent of public exposure to such materials, as well as their health risks. When wind speeds are low and the atmosphere is stable, dispersion is severely reduced and can lead to increased localized public exposure.

Recorded wind speeds, ambient air temperatures, and terrain characteristics are described in the Air Quality section (5.2) and Appendix V of the Application for Certification (AFC) (SES2008a).

Terrain Characteristics

The location of elevated terrain is often an important factor in assessing potential exposure. An emission plume from an accidental release may impact high elevations before it impacts lower elevations. The topography of the SES Solar Two Project site (like it’s immediately surrounding areas) is essentially flat.

Location of Exposed Populations and Sensitive Receptors

The general population includes many sensitive subgroups that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. In addition, the location of the population in the area surrounding a project site may have a large bearing on health risk. There are no sensitive receptors within the project vicinity. The nearest residence to the SES Solar Two Project is more than a mile from the project (SES2008a, Section 5.16).

C.5.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Method and Threshold for Determining CEQA Significance

Staff reviewed and assessed the potential for the transportation, handling, and use of hazardous materials to impact the surrounding community. All chemicals and natural gas were evaluated. Staff’s analysis examines the potential impacts on all members of the population including the young, the elderly, and people with existing medical conditions that may make them more sensitive to the adverse effects of hazardous materials. In order to accomplish this goal, staff utilizes the most current acceptable public health exposure levels (both acute and chronic) to protect the public from the effects of an accidental chemical release.

In order to assess the potential of released hazardous materials traveling off-site and affecting the public, staff analyzed several aspects of the proposed use of materials at the facility. Staff recognizes that some hazardous materials must be used at power plants. Therefore, staff conducted its analysis by focusing on the choice and amount of chemicals to be used, the manner in which the applicant would use the chemicals, the manner by which it would be transported to the facility and transferred to facility storage tanks, and the way in which the applicant plans to store those materials on-site.

Staff reviewed the applicant's proposed engineering and administrative controls for hazardous material use. Engineering controls are physical or mechanical systems such as storage tanks or automatic shut-off valves that can prevent a spill of hazardous material from occurring, or that can limit the spill to a small amount or confine it to a small area. Administrative controls are rules and procedures that workers must follow to help either prevent accidents or keep them small if they do occur. Both engineering and administrative controls can act as either methods of prevention or methods of response and minimization. In both cases, the goal is to prevent a spill from moving off-site and harming the public.

Staff reviewed and evaluated the proposed use of hazardous materials, as described by the applicant (SES2008a, section 5.15). Staff's assessment followed the five steps listed below:

- Step 1: Staff reviewed the chemicals and amounts proposed for on-site use, as listed in Table 5.5-3 of the AFC and determined the need and appropriateness of their use. Only those that are needed and appropriate are allowed to be used. If staff feels that a safer alternative chemical can be used, staff would recommend or require its use, depending upon the impacts posed.
- Step 2: Those chemicals, proposed for use in small amounts or whose physical state is such that there is virtually no chance that a spill would migrate off the site and impact the public, were removed from further assessment.
- Step 3: Measures proposed by the applicant to prevent spills were reviewed and evaluated. These included engineering controls such as automatic shut-off valves and different size transfer-hose couplings and administrative controls such as worker training and safety management programs.
- Step 4: Measures proposed by the applicant to respond to accidents were reviewed and evaluated. These measures also included engineering controls such as catchment basins and methods to keep vapors from spreading, and administrative controls such as training emergency response crews.
- Step 5: Staff analyzed the theoretical impacts on the public of a worst-case spill of hazardous materials even with the mitigation measures proposed by the applicant. When mitigation methods proposed by the applicant are sufficient, no further mitigation is recommended. If the proposed mitigation is not sufficient to reduce the potential for adverse impacts to an insignificant level, staff would propose additional prevention and response controls until the potential for causing harm to the public is reduced to an insignificant level. It is only at this point that staff can recommend that the project be allowed to use hazardous materials.

Direct/Indirect Impacts and Mitigation

Small Quantity Hazardous Materials

In conducting this analysis, staff determined in Steps 1 and 2 that most of the proposed materials, although present at the proposed facility, pose a minimal potential for off-site impacts since they would be stored in either solid form or in small quantities, have low mobility, low vapor pressure, or low levels of toxicity. These hazardous materials, which were eliminated from further consideration, are discussed briefly below.

During the construction phase of the project, the only hazardous materials proposed for use include paint, cleaners, solvents, gasoline, diesel fuel, motor oil, welding gases, and lubricants. Any impact of spills or other releases of these materials would be limited to the site because of the small quantities involved, the infrequent use and hence reduced chances of release, and/or the temporary containment berms used by contractors. Petroleum hydrocarbon-based motor fuels, mineral oil, lube oil, and diesel fuel all have very low volatility and would represent limited off-site hazards, even in larger quantities.

During operations, hazardous chemicals such as cleaning agents, lube oil, sulfuric acid, sodium hydroxide, ammonium hydroxide, diesel fuel and other various chemicals (see **Hazardous Materials Appendix A** for a list of all chemicals proposed to be used and stored at the SES Solar Two site) would be used and stored on-site and represent limited off-site hazard due to their small quantities, low volatility, and/or low toxicity.

After removing from consideration those chemicals that pose no potential for risk of off-site impact in Steps 1 and 2, staff continued with Steps 3, 4, and 5 to review the remaining hazardous material: Hydrogen.

Large Quantity Hazardous Materials

Hydrogen

Hydrogen is used as the working fluid in the Stirling cycle engines utilized by the project. The proposed project involves roughly 30,000 individual engines and solar collectors. Originally SES proposed use of hydrogen storage at each collector engine assembly. The proposal was later modified to utilize onsite hydrogen generation. This eliminated the use of 30,000 individual small hydrogen storage bottles at each assembly. It also eliminated the constant transportation of hydrogen bottles to and from the site. Staff views this change in the project as risk reduction particularly to road users. The project now involves the use of a distributed hydrogen system described in (SES2009b).

SES conducted analysis assuming a worst case release of all the hydrogen on site. It was assumed that a hydrogen release would form a vapor cloud and detonate causing an unconfined vapor cloud explosion. The distance to an over pressure of 1.0 psi was then determined. This is an overpressure that could cause some damage to structures and injury to exposed members of the general population. The maximum distance to this level of impact was estimated to be 0.13 miles. There are no public receptors at this distance and in general such overpressures would be confined to the project site depending on the location of the cloud at detonation. It should be noted that it is nearly impossible to detonate hydrogen in an unconfined cloud and that it disperses very rapidly due to its low density relative to air. It should also be noted that the release scenarios are very conservative in that a release would almost certainly occur over a period of time resulting in significant dispersion of the hydrogen while the cloud was forming. Actual experience with hydrogen releases have not resulted in unconfined cloud explosions. It is wildly believed that unconfined hydrogen will not detonate without a high explosive initiating event (Lees F.P. 1998).

Staff concurs with the analysis and a conclusion provided by SES and independently concludes that it is very conservative and grossly overestimates both the magnitude the potential risk of any actual explosion that could occur at the facility. It is staff's conclusion that that an unconfined hydrogen explosion is not plausible and will not occur at the proposed facility. Thus, use of hydrogen at the proposed facility poses a risk of an on-site fire, but no plausible potential for significant impact on surrounding populations or the environment.

Mitigation

Staff believes that this project's use of hazardous materials poses no significant risk (pursuant to CEQA) but only if mitigation measures are used. These mitigation measures are discussed in this section. The potential for accidents resulting in the release of hazardous materials is greatly reduced by the implementation of a Safety Management Program, which includes both engineering and administrative controls. Elements of facility controls and the safety management plan are summarized below.

Engineering Controls

Engineering controls help prevent accidents and releases (spills) from moving off-site and impacting the community by incorporating engineering safety design criteria into the project's design. Engineering safety features proposed by the applicant include:

- Usage of secondary containment areas surrounding each of the hazardous materials storage areas, designed to contain accidental releases during storage;
- Physical separation of stored chemicals in isolated containment areas, separated by a noncombustible partition in order to prevent the accidental mixing of incompatible materials, which may in turn cause the formation and release of toxic gases or fumes.

Administrative Controls

Administrative controls help prevent accidents and releases (spills) from moving off-site and impacting the community by establishing worker training programs and process safety management programs.

A Worker Health and Safety Program would be prepared by the applicant and include (but not be limited to) the following elements (see the **WORKER SAFETY/FIRE PROTECTION** section in this analysis for specific regulatory requirements):

- Worker training on chemical hazards, health and safety issues, and hazard communication;
- Procedures to ensure the proper use of personal protective equipment;
- Safety operating procedures for the operation and maintenance of systems that use hazardous materials;
- Fire safety and prevention; and
- Emergency response actions including facility evacuation, hazardous material spill cleanup, and fire prevention.

At the SES Solar Two Project, the project owner would be required to designate an individual who would have the responsibility and authority to ensure a safe and healthful workplace. This project health and safety official would oversee the health and safety program and would have the authority to halt any action or modify any work practice in order to protect the workers, facility, and the surrounding community in the event that the health and safety program is violated.

Staff proposes Condition of Certification **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in the AFC and reviewed for appropriateness, unless there is prior approval by the Energy Commission Compliance Project Manager (CPM) and the BLM Approved Safety Officer. Staff reviewed the chemicals and amounts proposed for on-site use, as listed in Table 5.15-2 of the AFC and determined the need and appropriateness of their use. **HAZ-1** also requires changes to the allowed list of hazardous materials and their maximum amounts to be approved by the CPM. Only those that are needed and appropriate would be allowed to be used. If staff feels that a safer alternative chemical can be used, staff would recommend or require its use, depending upon the impacts posed (see Appendix A for the list of proposed hazardous materials to be used).

A Hazardous Materials Business Plan (HMBP) would also be prepared by the applicant that would incorporate state requirements for the handling of hazardous materials (SES2008a, section 5.15). Staff proposes Condition of Certification **HAZ-2** which ensures that the HMBP, which includes the Inventory and Site Map, Emergency Response Plan and Owner/Operator Identification, and Employee Training would be provided to the ICDTSC so that ICDTSC can better prepare emergency response personnel for handling emergencies which could occur at the facility.

On-site Spill Response

In order to address spill response, the facility would prepare and implement an emergency response plan which includes information on hazardous materials contingency and emergency response procedures, spill containment and prevention systems, personnel training, spill notification, on-site spill containment, prevention equipment and capabilities, etc. Emergency procedures would be established which include evacuation, spill cleanup, hazard prevention, and emergency response.

A Spill Prevention Control and Countermeasure Plan (SPCC) is required by Federal Regulations (see LORS above) and would be prepared for the petroleum-containing hazardous materials.

The El Centro Fire Department located at 900 South Dogwood, El Centro would provide response to emergencies at the proposed facility. The response time to an emergency call from Solar 2 is approximately 30 minutes (SES2000a, Section 5.17).

Staff concludes that, given the remote location, the hazardous material response time is acceptable, and that the El Centro Fire Department is adequately trained and equipped to respond to an emergency at Solar 2 in a timely manner.

Transportation of Hazardous Materials

Containerized hazardous materials including sulfuric acid, and cleaning chemicals, would be transported to the facility via truck. While many types of hazardous materials would be transported to the site, previous modeling of spills involving much larger quantities of more toxic materials, (aqueous ammonia and 93% sulfuric acid)—two hazardous materials that would be used, stored, and transported at the proposed power plant—has demonstrated that minimal airborne concentrations would occur at short distances from the spill.

During construction and operation of the SES Solar Two Project, staff believes that minimal amounts and types of hazardous materials (paint, cleaners, solvents, gasoline, diesel fuel, motor oil, lubricants, sodium hypochlorite, and welding gases in standard-sized cylinders) do not pose a significant risk (pursuant to CEQA) of either spills or public impacts along any transportation route. Staff therefore does not recommend a specific route.

Liquid hazardous materials can be released during a transportation accident, and the extent of their impact in the event of a release would depend on the location of the accident and the rate of vapor dispersion from the surface of the spilled pool. The likelihood of an accidental release during transport is dependent upon three factors:

- The skill of the tanker truck driver;
- The type of vehicle used for transport; and
- Accident rates.

To address this concern, staff evaluated the risk of an accidental transportation release in the project area. Staff's analysis focused on the project area after the delivery vehicle leaves the main Interstate highway (I-8) and State route 98. Staff believes it is appropriate to rely upon the extensive regulatory program that applies to shipment of hazardous materials on California Highways to ensure safe handling in general transportation (see the Federal Hazardous Materials Transportation Law 49 USC §5101 et seq, the U.S. Department of Transportation Regulations 49 CFR Subpart H, §172-700, and the California DMV Regulations on Hazardous Cargo). These regulations also address issues of driver competence. See AFC section 5.11 for additional information on regulations governing the transportation of hazardous materials.

Seismic Issues

The possibility exists that an earthquake could cause the failure of a hazardous materials storage tank. A quake could also cause the failure of the secondary containment system (berms and dikes), as well as electrically controlled valves and pumps. The failure of all these preventive control measures might then result in the release of hazardous. The effects of the Loma Prieta earthquake of 1989, the Northridge earthquake of 1994, and the earthquake in Kobe, Japan, in January 1995, heighten concerns about earthquake safety.

Information obtained after the January 1994 Northridge earthquake showed that some damage was caused to several large and small storage tanks at the water treatment system of a cogeneration facility. The tanks with the greatest damage, including seam leakage, were older tanks, while newer tanks sustained lesser damage with displacements and attached line failures. Therefore, staff conducted an analysis of the codes and standards, which should be followed to adequately design and build storage tanks and containment areas that could withstand a large earthquake. Staff also reviewed the impacts of the February 2001 Nisqually earthquake near Olympia, Washington, a state with similar seismic design codes as California. No hazardous materials storage tanks were impacted by this quake. Referring to the sections on **GEOLOGIC RESOURCES AND HAZARDS** and **FACILITY DESIGN** in the AFC, staff notes that the proposed facility would be designed and constructed to the applicable standards of the 2007 California Building Code for Seismic Zone 4 (SES2008a,). Therefore, on the basis of damage experienced from the Northridge quake to older tanks and the lack of failures during the Nisqually earthquake with newer tanks, staff determined that tank failures during seismic events are not likely and do not represent a significant risk (pursuant to CEQA) to the public.

Site Security

The SES Solar Two Project proposes to use hazardous materials which necessitates that special site security measures should be developed and implemented to prevent unauthorized access. To address site security, US EPA published a *Chemical Accident Prevention Alert* regarding site security (EPA 2000a), the U.S. Department of Justice (US DOJ) published a special report on Chemical Facility Vulnerability Assessment Methodology (US DOJ 2002), the North American Electric Reliability Corporation (NERC) published *Security Guidelines for the Electricity Sector* in 2002 (NERC 2002), and the U.S. Department of Energy published a draft *Vulnerability Assessment Methodology for Electric Power Infrastructure* in 2002 (DOE 2002). The energy generation sector is one of 14 areas of critical Infrastructure listed by the U.S. Department of Homeland Security. On April 9, 2007, the U.S Department of Homeland Security published, in the Federal Register (6 CFR Part 27), an Interim Final Rule requiring facilities that use or store certain hazardous materials to conduct vulnerability assessments and implement certain specified security measures. This rule was implemented with the publication of Appendix A, the list of chemicals, on November 2, 2007. Staff believes that all power plants under the jurisdiction of the Energy Commission should implement a minimum level of security consistent with the guidelines listed here.

In order to ensure that this facility (or a shipment of hazardous material) is not the target of unauthorized access, staff's proposed conditions of certification **HAZ-4** and **HAZ-5** address both construction security and operations security plans. These plans would require the implementation of site security measures that are consistent with both the above-referenced documents and Energy Commission guidelines.

The goal of these conditions of certification is to provide the minimum level of security for power plants needed to protect California's electrical infrastructure from malicious mischief, vandalism, or domestic/foreign terrorist attacks. The level of security needed for this power plant is dependent upon the threat imposed, the likelihood of an adversarial attack, the likelihood of success in causing a catastrophic event, and the severity of consequences of that event.

In order to determine the level of security, the Energy Commission staff used an internal vulnerability assessment decision matrix modeled after the U.S. Department of Justice Chemical Vulnerability Assessment Methodology (July 2002), the NERC 2002 guidelines, the U.S. Department of Energy VAM-CF model, and U.S. Department of

Homeland Security regulations published in the Federal Register (Interim Final Rule 6 CFR Part 27). Staff determined that the SES Solar Two Project would fall into the “low vulnerability” category, so staff proposes that certain security measures be implemented but does not propose that the project owner conduct its own vulnerability assessment.

These security measures include perimeter fencing and breach detectors, guards (if appropriate), alarms, site access procedures for employees and vendors, site personnel background checks, and law enforcement contact in the event of a security breach. Site access for vendors would be strictly controlled. Consistent with current state and federal regulations governing the transport of hazardous materials, hazardous materials vendors would have to maintain their transport vehicle fleets and employ only drivers who are properly licensed and trained. The project owner would be required, through its contractual language with vendors, to ensure that vendors supplying hazardous materials strictly adhere to the U.S. DOT requirements that hazardous materials vendors prepare and implement security plans per 49 CFR 172.800 and ensure that all hazardous materials drivers are in compliance with personnel background security checks per 49 CFR Part 1572, Subparts A and B. The CPM or the BLM Authorized Safety Officer may authorize modifications to these measures, or may require additional measures in response to additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or NERC, after consultation with appropriate law enforcement agencies and the applicant.

Facility Closure and Decommissioning

The requirements for handling of hazardous materials remain in effect until such materials are removed from the site, regardless of facility closure. Therefore, the facility owners are responsible for continuing to handle such materials in a safe manner, as required by applicable laws. In the event that the facility owner abandons the facility in a manner that poses a risk to surrounding populations, staff would coordinate with the California Office of Emergency Services, El Centro Fire Department, and the California Department of Toxic Substances Control (DTSC) as BLM would be the landowner of the abandoned facility. To ensure that any unacceptable risk to the public is eliminated, Funding for such emergency action as well as site removal, rehabilitation and revegetation activities would be available from a performance bond required of the applicant by BLM.

C.5.4.3 CEQA LEVEL OF SIGNIFICANCE

Cumulative Impacts and Mitigation

Staff considered the potential for impacts due to a simultaneous release of any of the hazardous chemicals from the proposed SES Solar Two Project with any other existing or foreseeable nearby facilities. Because of the small amounts of the hazardous chemicals to be stored at the facility, Staff determined that there was no possibility of producing an offsite impact. Because of this determination, and the additional fact that there are no nearby facilities using large amounts of hazardous chemicals, there is no possibility that vapor plumes would mingle (combine) to produce an airborne concentration that would present a significant risk (pursuant to CEQA).

Compliance With LORS

Staff concludes that construction and operation of SES Solar Two would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of hazardous materials management.

Noteworthy Public Benefits

Staff has not identified any noteworthy public benefits associated with the use of hazardous materials at the proposed project.

C.5.5 300 MW ALTERNATIVE

The 300 MW alternative would essentially be Phase 1 of the proposed 750 MW project. This alternative is illustrated in Alternatives Figure 1.

C.5.5.1 SETTING AND EXISTING CONDITIONS

The setting for this alternative would be the same as for the Phase 1 of the proposed project. The local meteorology, terrain characteristics, and location of population centers and sensitive receptors relative to the project would remain the same. Please see the discussion of existing conditions within affected BLM lands under Section C.5.4.1

C.5.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The types of construction and operational impacts of the 300 MW alternative would be the same as those of the proposed project, as described in Section C.5.4.2. For the analysis, staff examines plausible potential loss of containment incidents (spills) for the hazardous materials to be used at the proposed facility. The proposed project analysis considers the worst case, plausible event, and the impacts are found to be less than significant (pursuant to CEQA) with the incorporation of conditions of certification. The impacts of this alternative would be even smaller due to the reduce use, handling, storage, or transport of hazardous materials and the smaller number of SunCatchers of the alternative. Construction and operation risk to workers due to the use of hydrogen will be reduced because of the reduced number of SunCatchers.

C.5.5.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, the construction and operation of the 300 MW alternative would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of hazardous materials management with the adoption of the proposed conditions of certification. The mitigation that would be proposed for the 300 MW alternative would be the same as that proposed for the proposed project (staff recommended conditions **HAZ-1** to **HAZ-6**).

C.5.6 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives developed to reduce impacts to the waters of the U.S. would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative is illustrated in **Alternatives Figure 1B**. This alternative would have the same outer project boundaries as the proposed project, but it would include prohibition of installing permanent structures within drainages, thereby reducing the available acreage for development from 6,500 to 4,690, and reducing the generation capacity from 750 MW under the proposed project to 632 MW (84% of the proposed generation capacity). Rather than the 30,000 SunCatchers included in the proposed project, there would be approximately 25,000 of them installed.

C.5.6.1 SETTING AND EXISTING CONDITIONS

The setting for this alternative would be the same as for the proposed project, including all the area within the proposed project boundaries. While the alternative boundaries would be the same as for the proposed project, development within the boundaries would be less dense due to avoidance of primary drainages. The local meteorology, terrain characteristics, and location of population centers and sensitive receptors relative to the project would remain the same. Please see the discussion of existing conditions within affected BLM lands under Section C.5.4.1

C.5.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The types of construction and operational impacts of the Drainage Avoidance #1 alternative would be the same as those of the proposed project, as described in Section C.5.4.2. For the analysis, staff examines plausible potential loss of containment incidents (spills) for the hazardous materials to be used at the proposed facility. The proposed project analysis considers the worst case, plausible event, and the impacts are found to be less than significant (pursuant to CEQA) with the incorporation of conditions of certification. The impacts of this alternative would be even smaller due to the reduce use, handling, storage, or transport of hazardous materials and the smaller number of SunCatchers of the alternative. Construction and operation risk to workers due to the use of hydrogen will be reduced because of the reduced number of SunCatchers.

C.5.6.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, the construction and operation of the Drainage Avoidance #1 alternative would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of hazardous materials management with the adoption of the proposed conditions of certification. The mitigation that would be proposed for the Drainage Avoidance #1 Alternative would be the same as that proposed for the proposed project (staff recommended conditions **HAZ-1** to **HAZ-6**).

C.5.7 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative would eliminate both the eastern and westernmost portions of the proposed project, where the largest drainage complexes are located. This alternative is shown in **Alternatives Figure 1C**. It would reduce the overall size of the project area by over 50% (from 6,500 acres to 3,153 acres). It would also reduce the generation capacity from 750 MW to 423 MW (retaining only about 32% of the proposed number of SunCatchers). In this alternative, permanent structures would be allowed within all drainages inside the revised, smaller project boundaries.

C.5.7.1 SETTING AND EXISTING CONDITIONS

The setting for this alternative would be the same as for the proposed project, including all the area within the proposed project boundaries. While the alternative boundaries would be the same as for the proposed project, development within the boundaries would be less dense due to avoidance of primary drainages. The local meteorology, terrain characteristics, and location of population centers and sensitive receptors relative to the project would remain the same. Please see the discussion of existing conditions within affected BLM lands under Section C.5.4.1

C.5.7.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The types of construction and operational impacts of the Drainage Avoidance #2 alternative would be the same as those of the proposed project, as described in Section C.5.4.2. For the analysis, staff examines plausible potential loss of containment incidents (spills) for the hazardous materials to be used at the proposed facility. The proposed project analysis considers the worst case, plausible event, and the impacts are found to be less than significant (pursuant to CEQA) with the incorporation of conditions of certification. The impacts of this alternative would be even smaller due to the reduce use, handling, storage, or transport of hazardous materials and the smaller number of SunCatchers of the alternative. Construction and operation risk to workers due to the use of hydrogen will be reduced because of the reduced number of SunCatchers.

C.5.7.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, the construction and operation of the Drainage Avoidance #2 alternative would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of hazardous materials management with the adoption of the proposed conditions of certification. The mitigation that would be proposed for the Drainage Avoidance #1 Alternative would be the same as that proposed for the proposed project (staff recommended conditions **HAZ-1** to **HAZ-6**).

C.5.8 NO PROJECT/NO ACTION ALTERNATIVE

There are three No Project/No Action Alternatives evaluated in this section, as follows:

NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on SES Solar Two project application and on CDCA land use plan amendment

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

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

NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on SES Solar Two project and amend the CDCA land use plan to make the area available for future solar development

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

Because the CDCA Plan would be amended, it is possible that the site would be developed with a different solar technology. As a result, construction and operation of the solar technology would likely result in use of hazardous materials. Different solar technologies require the use of different hazardous materials; however, it is expected that all solar technologies would require the use of hazardous materials. As such, this No Project/No Action Alternative could result impacts to hazardous material handling similar to under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on SES Solar Two project application and amend the CDCA land use plan to make the area unavailable for future solar development

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

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

C.5.9 CUMULATIVE IMPACT ANALYSIS

A project may result in significant adverse cumulative impacts (pursuant to CEQA) when its effects are “cumulatively considerable.” Cumulatively considerable means that the incremental effects of an individual project are significant (pursuant to CEQA) when viewed in connection with the effects of past projects, the effects of other current projects, or the effects of probable future projects. (Title 14, California Code of Regulations, section 15130). NEPA states that cumulative effects can result from individually minor but significant actions taking place over a period of time (40 CFR § 1508.7).

As discussed in section C.5.4.3 above, staff considered the potential for impacts due to a simultaneous release of any of the hazardous chemicals from the proposed SES Solar Two Project with any other existing or foreseeable nearby facilities. Because of the small amounts of the hazardous chemicals to be stored at the facility, Staff determined that there was no possibility of producing an offsite impact. Because of this determination, and the additional fact that there are no nearby facilities using large amounts of hazardous chemicals, there is no possibility that vapor plumes would mingle (combine) to produce an airborne concentration that would present a significant risk (pursuant to CEQA).

Section B.3, Cumulative Scenario, provides detailed information on the potential cumulative solar and other development projects in the project area. Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis for the proposed project. In summary, these projects are:

- Renewable energy projects on BLM, State, and private lands, as shown on **Cumulative Figures 1 and 2** and in **Cumulative Tables 1A and 1B.** Although not all of those projects are expected to complete the environmental review processes, or be funded and constructed, the list is indicative of the large number of renewable projects currently proposed in California.
- Foreseeable future projects in the immediate Plaster City area, as shown on **Cumulative Impacts Figure 3, Plaster City Existing and Future/Foreseeable Projects, and Cumulative Tables 2 and 3**. Table 2 presents existing projects in this area and Table 3 presents future foreseeable projects in the Plaster City Area. Both tables indicate project name and project type, its location and its status.

These projects are defined within a geographic area that has been identified by the CEC and BLM as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all resource elements or environmental parameters. Most of these projects have, are, or will be required to undergo their own independent environmental review under CEQA and/or NEPA. Even if the cumulative projects described in Section B.3 have not yet completed the required environmental processes, they were considered in the cumulative impacts analyses in this SA/Draft EIS.

Geographic Scope of Analysis

The geographic area considered for cumulative impacts from the use of Hazardous Materials is the area within one mile of the project boundary. Staff concludes that there is no potential to cause impacts beyond the facility boundary.

For this analysis, no other projects are located close enough to the proposed SES Solar Two Project to cause cumulative impacts on any surrounding population.

Effects of Past and Present Projects

There are no past or currently operating projects in the geographic area that would affect the same area that would be affected by the proposed facility.

Effects of Reasonably Foreseeable Future Projects

There are no reasonably foreseeable future projects in the geographic area that would affect the same area that would be affected by accidental releases at the proposed facility.

Contribution of the SES Solar Two Project to Cumulative Impacts

Construction. The SES Solar Two Project would not be expected to contribute to the possible short term cumulative impacts related to Hazardous Materials because it is not in close proximity to any other facility that might impact the same surrounding population in the event of an accidental release of hazardous materials.

Operation. The SES Solar Two Project would not be expected to the possible long term operational cumulative impacts related to because it is not in close proximity to any other facility that might impact the same surrounding population in the event of an accidental release of hazardous materials.

Decommissioning. The decommissioning of the SES Solar Two Project would not be expected to contribute to the possible short term cumulative impacts related to Hazardous Materials, similar to during construction, because it is not in close proximity to any other facility that might impact the same surrounding population in the event of an accidental release of hazardous materials. similar to construction impacts. It is unlikely that the construction or decommissioning of any of the cumulative projects would occur concurrently with the decommissioning of this project, because the decommissioning is not expected to occur for approximately 40 years. As a result, there may not be impacts related to during decommissioning of the SES Solar Two Project generated by the cumulative projects. As a result, the impacts of the decommissioning of the SES Solar Two Project would not be expected to contribute to cumulative impacts related to Hazardous Materials because all hazardous materials would either continue to be managed effectively or removed from the facility.

C.5.10 COMPLIANCE WITH LORS

A discussion of the proposed project's compliance with LORS applicable to hazardous materials is provided above in subsection C.5.4.3, and **Hazardous Materials Table 1**.

C.5.11 NOTEWORTHY PUBLIC BENEFITS

The SES Solar Two Project would employ an advanced solar thermal technology. The project would not use the hazardous materials associated with the operation of a non-renewable energy project. Consequently, the project would help in reducing the use of riskier hazardous materials for power production at other facilities.

C.5.12 CONCLUSIONS

Staff’s evaluation of the proposed project (with proposed mitigation measures) indicates that hazardous material use, storage, and transportation would not pose a significant (pursuant to CEQA) impact on the public. Staff’s analysis also shows that there would be no significant (pursuant to CEQA) cumulative impact. With adoption of the proposed conditions of certification, the proposed project would comply with all applicable LORS. Other proposed conditions of certification address the issues of site security matters.

Staff recommends that the Energy Commission impose the proposed conditions of certification, presented below, to ensure that the project is designed, constructed, and operated in compliance with applicable LORS, and would protect the public from significant risk (pursuant to CEQA) of exposure to an accidental release of hazardous materials. If all mitigation proposed by the applicant and by staff are implemented, the use, storage, and transportation of hazardous materials would not present a significant risk (pursuant to CEQA) to the public.

Staff concludes that there is insignificant potential for hazardous materials release to have significant impact beyond the facility boundary, and therefore concludes there is also insignificant potential for significant (pursuant to CEQA) impact to the environment. For any other potential impacts upon the environment, including vegetation, wildlife, air, soils, and water resulting from hazardous materials usage and disposal at the proposed facility, the reader is referred to the **Biology**, the **Air Quality**, the **Soil and Water**, and the **Waste Management** sections of this SA/DEIS.

Staff also concludes that none of the alternatives to the proposed project would materially or significantly change the impacts associated with hazardous materials handling. None of the alternatives would be preferred to the proposed project or reduce any otherwise significant (pursuant to CEQA) impacts caused by hazardous materials handling.

Staff proposes six conditions of certification, some of which are mentioned in the text (above), and listed below. **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in the AFC, unless there is prior approval by the Energy Commission Compliance Project Manager (CPM) and the BLM Authorized Safety Officer. **HAZ-2** ensures that local emergency response services are notified of the amounts and locations of hazardous materials at the facility, **HAZ-3** requires the development of a Safety Management Plan that addresses the delivery of all liquid hazardous materials during the construction, commissioning, and operation of the project would further reduce the risk of any accidental release not specifically addressed by the proposed spill prevention mitigation measures, and further prevent the mixing of incompatible materials that could result in the generation of toxic vapors. Site security during both the construction and operation phases is addressed in **HAZ-4** and **HAZ-5.** **HAZ-6** ensures that the applicant complies with all Federal LORS regarding use, management, spills, and reporting of hazardous materials on Federal lands.

C.5.13 PROPOSED CONDITIONS OF CERTIFICATION

HAZ-1 The project owner shall not use any hazardous materials not listed in **Appendix A**, below, or in greater quantities than those identified by chemical name in **Appendix A,** unless approved in advance by the BLM's authorized officer and Compliance Project Manager (CPM).

Verification: The project owner shall provide to BLM's authorized officer and the CPM in the Annual Compliance Report, a list of hazardous materials contained at the facility.

HAZ-2 The project owner shall concurrently provide a Hazardous Materials Business Plan to the Imperial County Department of Toxic Substances Control, BLM's authorized officer and the CPM for review. After receiving comments from the Imperial County, BLM's authorized officer and the CPM, the project owner shall reflect all received recommendations in the final documents. If no comments are received from the county within 30 days of submittal, the project owner may proceed with preparation of final documents upon receiving comments from BLM's authorized officer and the CPM. . Copies of the final Hazardous Materials Business Plan shall then be provided to the Imperial County Department of Toxic Substances Control for information and to the BLM's authorized officer and CPM for approval.

Verification: At least 60 days prior to receiving any hazardous material on the site for commissioning or operations, the project owner shall provide a copy of a final Hazardous Materials Business Plan to BLM's authorized officer and the CPM for approval.

HAZ-3 The project owner shall develop and implement a Safety Management Plan for delivery of liquid hazardous materials. The plan shall include procedures, protective equipment requirements, training and a checklist. It shall also include a section describing all measures to be implemented to prevent mixing of incompatible hazardous materials. This plan shall be applicable during construction, commissioning, and operation of the power plant.

Verification: At least sixty (60) days prior to the delivery of any liquid hazardous material to the facility, the project owner shall provide a Safety Management Plan as described above to BLM's authorized officer and the CPM for review and approval.

HAZ-4 At least thirty (30) days prior to commencing construction, a site-specific Construction Site Security Plan for the construction phase shall be prepared and made available to BLM's authorized officer and the CPM for review and approval. The Construction Security Plan shall include the following:

1. Perimeter security consisting of fencing enclosing the construction area;
2. Security guards;
3. Site access control consisting of a check-in procedure or tag system for construction personnel and visitors;

4. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;

5. Protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency; and

6. Evacuation procedures.

<u>Verification:</u> At least thirty (30) days prior to commencing construction, the project owner shall notify BLM's authorized officer and the CPM that a site-specific Construction Security Plan is available for review and approval.

HAZ-5 The project owner shall prepare a site-specific Security Plan for the operational phase and shall be made available to BLM's authorized officer and the CPM for review and approval. The project owner shall implement site security measures addressing physical site security and hazardous materials storage. The level of security to be implemented shall not be less than that described below (as per NERC 2002).

The Operation Security Plan shall include the following:

1. Permanent full perimeter fence, at least eight feet high around the Solar Field;

2. Main entrance security gate, either hand operable or motorized;

3. Evacuation procedures;

4. Protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency;

5. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;

6. a. A statement (refer to sample, attachment "A") signed by the project owner certifying that background investigations have been conducted on all project personnel. Background investigations shall be restricted to ascertain the accuracy of employee identity and employment history, and shall be conducted in accordance with state and federal law regarding security and privacy;

   b. A statement(s) (refer to sample, attachment "B") signed by the contractor or authorized representative(s) for any permanent contractors or other technical contractors (as determined by the CPM after consultation with the project owner) that are present at any time on the site to repair, maintain, investigate, or conduct any other technical duties involving critical components (as determined by the CPM after consultation with the project owner) certifying that background investigations have been conducted on contractor personnel that visit the project site.

7. Site access controls for employees, contractors, vendors, and visitors;

8. Closed Circuit TV (CCTV) monitoring system, recordable, and viewable in the power plant control room and security station (if separate from the control room) capable of viewing, at a minimum, the main entrance gate; and

9. Additional measures to ensure adequate perimeter security consisting of either:

   a. Security guard present 24 hours per day, seven days per week, **OR**

   b. Power plant personnel on-site 24 hours per day, seven days per week and **all** of the following:

      1) The CCTV monitoring system required in number 8 above shall include cameras that are able to pan, tilt, and zoom (PTZ), have low-light capability, are recordable, and are able to view 100% of the perimeter fence, the outside entrance to the control room, and the front gate from a monitor in the power plant control room; **AND**

      2) Perimeter breach detectors **<u>or</u>** on-site motion detectors.

The project owner shall fully implement the security plans and obtain BLM's authorized officer and CPM approval of any substantive modifications to the security plans. BLM's authorized officer and the CPM may authorize modifications to these measures, or may require additional measures, such as protective barriers for critical power plant components (e.g., transformers, gas lines, compressors, etc.) depending on circumstances unique to the facility or in response to industry-related standards, security concerns, or additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or the North American Electrical Reliability Council, after consultation with appropriate law enforcement agencies and the applicant.

<u>Verification:</u> At least 30 days prior to the initial receipt of hazardous materials on-site, the project owner shall notify BLM's authorized officer and the CPM that a site-specific Operations Site Security Plan is available for review and approval. In the Annual Compliance Report, the project owner shall include a statement that all current project employee and appropriate contractor background investigations have been performed, and updated certification statements are appended to the Operations Security Plan. In the Annual Compliance Report, the project owner shall include a statement that the Operations Security Plan includes all current hazardous materials transport vendor certifications for security plans and employee background investigations.

HAZ-6 The holder (project owner) shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder(s) shall comply with the Toxic Substances Control Act of 1976, as amended (15 U.S.C. 2601, et seq.) with regard to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR, Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, Section 102b

Verification: A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to BLM's authorized officer and the CPM concurrent with the filing of the reports to the involved Federal agency or State government.

SAMPLE CERTIFICATION (Attachment "A")

Affidavit of Compliance for Project Owners

I, ____

(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

____

(Company Name)

for employment at

____

(Project name and location)

have been conducted as required by the U.S. Bureau of Land Management Right-of-Way and California Energy Commission Decision for the above- named project.

____

(Signature of Officer or Agent)

Dated this ____________________ day of ____________________, 20 _______.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY BLM's AUTHORIZED OFFICER AND THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

SAMPLE CERTIFICATION (Attachment “B”)

Affidavit of Compliance for Contractors

I, ____

(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

____

(Company Name)

for contract work at

____

(Project name and location)

have been conducted as required by the U.S. Bureau of Land Management Right-of-Way and California Energy Commission Decision for the above- named project.

____

(Signature of Officer or Agent)

Dated this ____________________ day of ____________________, 20 _______.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY BLM’s AUTHORIZED OFFICER AND THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

C.5.14 REFERENCES

AIChE (American Institute of Chemical Engineers) 1989 – *Guidelines for Technical Management of* Chemical *Process Safety*, AIChE, New York, NY 10017.

AIChE (American Institute of Chemical Engineers) 1994 – *Guidelines for Implementing Process Safety* Management *Systems*, AIChE, New York, NY 10017.

API (American Petroleum Institute) 1990 – *Management of Process Hazards, API Recommended* Practice *750*; American Petroleum Institute, First Edition, Washington, DC, 1990.

Davies, P.A. and Lees, F.P. 1992 – *The Assessment of Major Hazards: The Road Transport* Environment *for Conveyance of Hazardous Materials in Great Britain*. Journal of Hazardous Materials, 32: 41-79.

Environmental Protection Agency (US EPA) 2000a – *Chemical Accident Prevention: Site Security* Environmental Protection Agency, Office of Solid Waste and Emergency Response. February 2000.

Harwood, D.W., Viner, J.G., and E.R. Russell 1990 – *Truck Accident Rate Model for Hazardous Materials Routing*. Transportation Research Record. 1264: 12-23.

Harwood, D.W., Viner, J.G., and E.R. Russell 1993 – *Procedure for Developing Truck Accident and Release Rates for Hazmat Routing*. Journal of Transportation Engineering. 119(2): 189-199.

Lees, F.P. 1998 – *Loss* Prevention *in the Process Industries*, Vols. I, II and III. Second Edition, Butterworths.

National Response Center Database. U.S. Coast Guard. 2002

National Transportation Safety Board Database. U.S. Department of Transportation. 2001

North American Electric Reliability Corporation (NERC) 2002 – *Security Guidelines for the Electricity* Sector*,* version 1.0, June 14, 2002.

NRC (National Research Council) 1979 – *Ammonia. Subcommittee on Ammonia. Committee on* Medical *and Biologic Effects of Environmental Pollutants*. Division of Medical Sciences, Assembly of Life Sciences, National Research Council (NRC), Baltimore, Maryland, University Park Press (NTIS No. PB 278-027).

Pet-Armacost, J.J., Sepulveda, J. and M. Sakude 1999 – *Monte Carlo Sensitivity Analysis of Unknown Parameters in Hazardous Materials Transportation Risk Assessment.* Risk Analysis. 19(6): 1173-1184.

Rhyne, W.R. 1994 – Hazardous Materials Transportation Risk Analysis. Quantitative Approaches for Truck and Train. Chapter 2: Transportation Quantitative Risk Analysis; and Chapter 3: Databases

SES 2008a – Solar Energy Solutions. Application For Certification, Volumes I and II, For the SES Solar Two, (tn: 46819), Submitted to CEC Docket 6/30/08.

SES 2008b – Solar Energy Solutions. Application to Application for Certification, For SES Solar Two, (tn: 51973), Submitted to CEC Docket 6/12/09.

U.S. Department of Energy (US DOE) 2002 – Draft Vulnerability Ass, assessment Methodology, Electric Power Infrastructure. Office of Energy Assurance, September 30, 2002.

U.S. Department of Justice (US DOJ) 2002 – *Special Report: Chemical Facility Vulnerability* Assessment *Methodology*. Office of Justice Programs, Washington, D.C. July 2002.

OSHA (United States Occupational Safety and Health Administration) 1993 – *Process Safety* Management */ Process Safety Management Guidelines for Compliance*. U.S. Department of Labor, Washington, DC.

Vilchez, J.A., Sevilla, S., Montiel, H. and J. Casal 1995 – *Historical Analysis of Accidents in Chemical Plants and in the Transportation of Hazardous Materials*. J. Loss Prev. Process Ind. 8(2): 87-96.

Hazardous Materials Appendix A
Hazardous Materials Proposed for Use at SES Solar Two

Hazardous Materials Usage and Storage During Operations				
Chemical	**Use**	**Storage Location/Type**	**State**	**Storage Quantity**
Insulating oil	Electrical equipment	Electrical equipment (contained in transformers and electrical switches)	Liquid	60,000 gallons initial fill
Lubricating oil	Stirling Engine/ dish drives PCU	Equipment 150-gallon recycle tank located in Maintenance Building	Liquid	40,000 gallons initial fill with usage of 21 gallons per month
Hydrogen	PCU working fluid	Generated on-site and stored in pressure vessel	Gas	33,000 scf
Acetylene	Welding	Cylinders stored in maintenance buildings	Gas	1,000 cubic feet
Oxygen	Welding	Cylinders stored in maintenance buildings	Gas	1,000 cubic feet
Ethylene glycol	PCU Radiator Coolant, antifreeze	PCU radiator Maintenance Buildings	Liquid	40,000 gal initial fill with usage of 21 gallons per month
Various solvents, detergents, paints, and other cleaners	Building maintenance and equipment cleaning	Three (3) 55-gallon drums and 1-gallon containers will be stored Maintenance Buildings	Liquid	Ten (10) 55-gallon drums Commercial 1-gallon containers
Gasoline	Maintenance vehicles	5,000 gallon AST at refueling station with containment	Liquid	5,000 gallons
Diesel fuel	Firewater pump Maintenance Vehicles	Firewater skid 5,000-gallon AST refueling station with containment	Liquid	100 gallons initial fill 5,000 gallons
Sodium hypochlorite 12.5 percent solution (bleach)	Disinfectant for potable water	Water treatment structure	Liquid	4 gallons

Source: SES2008a.
Notes:
AST = aboveground storage tank
PCU = power conversion unit

C.6 - PUBLIC HEALTH AND SAFETY

Testimony of Alvin J. Greenberg, Ph.D.

C.6.1 SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management and Energy Commission staff (hereafter jointly referred to as staff) have analyzed potential public health and safety risks associated with construction, operation, and decommissioning of the Stirling Energy Systems Solar Two Project (SES Solar Two) and does not expect any significant adverse cancer or short- or long-term noncancer health effects from project toxic emissions. Staff's analysis of potential health impacts from the proposed SES Solar Two Project uses a conservative health-protective methodology that accounts for impacts to the most sensitive individuals in a given population, including newborns and infants. According to the results of staff's health risk assessment, emissions from the SES Solar Two Project would not contribute significantly to morbidity or mortality in any age or ethnic group residing in the project area.

C.6.2 INTRODUCTION

The purpose of this Staff Assessment/Draft Environmental Impact Statement (SA/DEIS) is to determine if emissions of toxic air contaminants (TACs) from the proposed SES Solar Two Project would have the potential to cause significant (under the California Environmental Quality Act) adverse public health and safety impacts or to violate standards for public health protection. If potentially significant health and safety impacts are identified, staff will evaluate mitigation measures to reduce such impacts to insignificant levels.

In addition to the analysis contained in this Public Health and Safety Section that focuses on potential effects to the public from emissions of toxic air contaminants, other related aspects to the assessment of potential public health and safety impacts from SES Solar Two are considered elsewhere in this document as listed and briefly described below:

- Air Quality - evaluates the expected air quality impacts from the emissions of criteria air pollutants from construction, operation, and decommissioning of the SES Solar Two Project; Criteria air pollutants are defined as air contaminants for which the state and/or federal governments have established an ambient air quality standard to protect public health;
- Hazardous Materials Management - evaluates the potential impacts on public and worker health from accidental releases of hazardous materials;
- Socioeconomics and Environmental Justice - evaluates project-induced changes on community services including law enforcement and hospitals;
- Soil and Water Resources – evaluates the potential for SES Solar Two to cause contamination of soil and water resources, to exacerbate flooding, and to cause adverse effects to water supply in consideration of other existing users and projected needs;

- Transmission Line Safety and Nuisance – evaluates potential effects associated with proposed transmission lines accounting for both the physical presence of the lines and the physical interactions of their electric and magnetic fields; The potential effects include aviation safety, interference with radio-frequency communication, audible noise, fire hazards, hazardous shocks, nuisance shocks, and electric and magnetic field (EMF) exposure.
- Worker Safety and Fire Protection - assess the worker safety and fire protection measures proposed by the applicant including determining whether the project would have any adverse impacts on fire protection and emergency medical services that are also relied upon by the public;
- Waste Management - evaluates issues associated with wastes generated from the proposed project construction, operation, and decommissioning including ensuring that wastes would be managed in an environmentally safe manner.

C.6.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The analysis of proposed project effects must comply with both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) requirements given the respective power plant licensing and land jurisdictions of the California Energy Commission and U.S. Bureau of Land Management (BLM). CEQA requires that the significance of individual effects be determined by the Lead Agency; however, the use of specific significance criteria is not required by NEPA.

Because this document is intended to meet the requirements of both NEPA and CEQA, the methodology used for determining environmental impacts of the proposed project includes a consideration of guidance provided by both laws.

CEQA requires a list of criteria that are used to determine the significance of identified impacts. A significant impact is defined by CEQA as “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project” (State CEQA Guidelines Section 15382).

In comparison, NEPA states that “‘Significantly’ as used in NEPA requires considerations of both context and intensity…” (40 CFR 1508.27). Therefore, thresholds serve as a benchmark for determining if a project action will result in a significant adverse environmental impact when evaluated against the baseline. NEPA requires that an Environmental Impact Statement (EIS) is prepared when the proposed federal action (project) as a whole has the potential to “significantly affect the quality of the human environment.”

Thresholds for determining significance in this section are based on Appendix G of the CEQA Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission staff. In addition, staff’s evaluation of the environmental effects of the proposed project on land uses (i.e., those listed below) includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27.

Effects of the proposed project on the land use environment (and in compliance with both CEQA and NEPA) have been determined using the thresholds listed below.

The **PUBLIC HEALTH** section of this staff assessment discusses toxic emissions into the air to which the public could be exposed during project construction, operation, and decommissioning. Following the release of toxic contaminants into the air, people may come into contact with them through inhalation, dermal contact, or ingestion via contaminated food or water.

Air pollutants for which no ambient air quality standards have been established are called noncriteria pollutants. Unlike criteria pollutants such as ozone, carbon monoxide, sulfur dioxide, or nitrogen dioxide, noncriteria pollutants have no ambient (outdoor) air quality standards that specify levels considered safe for everyone.

Since noncriteria pollutants do not have such standards, a health risk assessment is used to determine if people might be exposed to those types of pollutants at unhealthy levels. The risk assessment consists of the following steps:

- identify the types and amounts of hazardous substances that SES Solar Two could emit to the environment;
- estimate worst-case concentrations of project emissions in the environment using dispersion modeling;
- estimate amounts of pollutants that people could be exposed to through inhalation, ingestion, and dermal contact; and
- characterize potential health risks by comparing worst-case exposure to safe standards based on known health effects.

Staff relies upon the expertise of the California Environmental Protection Agency (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA) to identify contaminants that are known to the state to cause cancer or other noncancer toxicological endpoints and to calculate the toxicity and cancer potency factors of these contaminants. Staff also relies upon the expertise of the California Air Resources Board and the local air districts to conduct ambient air monitoring of toxic air contaminants and the state Department of Public Health to conduct epidemiological investigations into the impacts of pollutants on communities. It is not within the purview or the expertise of the Energy Commission staff to duplicate the expertise and statutory responsibility of these agencies.

Initially, a screening level risk assessment is performed using simplified assumptions that are intentionally biased toward protection of public health. That is, an analysis is designed that overestimates public health impacts from exposure to project emissions. In reality, it is likely that the actual risks from the power plant will be much lower than the risks as estimated by the screening level assessment. The risks for screening purposes are based on examining conditions that would lead to the highest, or worst-case, risks and then using those conditions in the study. Such conditions include:

- using the highest levels of pollutants that could be emitted from the plant;

- assuming weather conditions that would lead to the maximum ambient concentration of pollutants;
- using the type of air quality computer model which predicts the greatest plausible impacts;
- calculating health risks at the location where the pollutant concentrations are estimated to be the highest;
- assuming that an individual's exposure to cancer-causing agents occurs continuously for 70 years; and
- using health-based standards designed to protect the most sensitive members of the population (i.e., the young, elderly, and those with respiratory illnesses).

A screening level risk assessment will, at a minimum, include the potential health effects from inhaling hazardous substances. Some facilities may also emit certain substances that could present a health hazard from noninhalation pathways of exposure (OEHHA 2003, Tables 5.1, 6.3, 7.1). When these substances are present in facility emissions, the screening level analysis includes the following additional exposure pathways: soil ingestion, dermal exposure, and mother's milk (OEHHA 2003, p. 5-3).

The risk assessment process for this project addresses two categories of health impacts: chronic (long-term) noncancer effects, and cancer risk (also long-term). Since the only TAC emitted from this project would be diesel particulate from emergency diesel-fueled engines, and since only long-term health effects have been established for diesel particulate, no acute (short-term) health effects are calculated for this project.

Chronic health effects are those that arise as a result of long-term exposure to airborne concentrations of pollutants. The exposure period is considered to be approximately from 12% to 100% of a lifetime, or from 8 to 70 years (OEHHA 2003, p. 6-5). Chronic health effects include diseases such as reduced lung function and heart disease.

The analysis for noncancer health effects compares the maximum project contaminant levels to safe levels called *Reference Exposure Levels*, or RELs. These are amounts of toxic substances to which even sensitive people can be exposed and suffer no adverse health effects (OEHHA 2003, p. 6-2). These exposure levels are designed to protect the most sensitive individuals in the population, such as infants, the aged, and people suffering from illness or disease which makes them more sensitive to the effects of toxic substance exposure. The Reference Exposure Levels are based on the most sensitive adverse health effect reported in the medical and toxicological literature and include margins of safety. The margin of safety addresses uncertainties associated with inconclusive scientific and technical information available at the time of standard setting and is meant to provide a reasonable degree of protection against hazards that research has not yet identified. The margin of safety is designed to prevent pollution levels that have been demonstrated to be harmful, as well as to prevent lower pollutant levels that may pose an unacceptable risk of harm, even if the risk is not precisely identified as to nature or degree. Health protection is achieved if the estimated worst-case exposure is below the relevant reference exposure level. In such a case, an adequate margin of safety exists between the predicted exposure and the estimated threshold dose for toxicity.

Exposure to multiple toxic substances may result in health effects that are equal to, less than, or greater than effects resulting from exposure to the individual chemicals. Only a small fraction of the thousands of potential combinations of chemicals have been tested for the health effects of combined exposures. In conformity with the California Air Pollution Control Officers Association (CAPCOA) guidelines, the health risk assessment assumes that the effects of each substance are additive for a given organ system (OEHHA 2003, pp. 1-5, 8-12). Other possible mechanisms due to multiple exposures include those cases where the actions may be synergistic or antagonistic (where the effects are greater or less than the sum, respectively). For these types of substances, the health risk assessment could underestimate or overestimate the risks.

For carcinogenic substances, the health assessment considers the risk of developing cancer and assumes that continuous exposure to the cancer-causing substance occurs over a 70-year lifetime. The risk that is calculated is not meant to project the actual expected incidence of cancer, but rather a theoretical upper-bound number based on worst-case assumptions.

Cancer risk is expressed in chances per million and is a function of the maximum expected pollutant concentration, the probability that a particular pollutant will cause cancer (called *potency factors* and established by OEHHA), and the length of the exposure period. Cancer risks for each carcinogen are added to yield total cancer risk. The conservative nature of the screening assumptions used means that actual cancer risks due to project emissions are likely to be considerably lower than those estimated.

The screening analysis is performed to assess worst-case risks to public health associated with the proposed project. If the screening analysis predicts no significant risks, then no further analysis is required. However, if risks are above the significance level, then further analysis, using more realistic site-specific assumptions, would be performed to obtain a more accurate assessment of potential public health risks. This methodology is also consistent with U.S. EPA risk assessment guidelines for public health assessments prepared pursuant to NEPA.

Significance Criteria

Energy Commission staff determines the health effects of exposure to toxic emissions based on impacts to the maximum exposed individual. This is a person hypothetically exposed to project emissions at a location where the highest ambient impacts were calculated using worst-case assumptions, as described above.

As described earlier, noncriteria pollutants for this project are evaluated for long-term (chronic) noncancer health effects as well as cancer (long-term) health effects. The significance of project health impacts is determined separately for each of these categories.

Chronic Noncancer Health Effects

Staff assesses the significance of noncancer health effects by calculating a *hazard index*. A hazard index is a ratio comparing exposure from facility emissions to the reference (safe) exposure level. A ratio of less than 1.0 signifies that the worst-case exposure is below the safe level. The hazard index for every toxic substance that has the same type of health effect is added to yield a Total Hazard Index. A Total Hazard Index of less than 1.0 indicates that cumulative worst-case exposures are less than the reference exposure levels. Under these conditions, health protection from the project is likely to be achieved, even for sensitive members of the population. In such a case, staff presumes that there would be no significant noncancer project-related public health impacts.

Cancer Risk

Staff relied upon regulations implementing the provisions of Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986, (Health & Safety Code, §§25249.5 et seq.) for guidance to determine a cancer risk significance level. Title 22, California Code of Regulations section 12703(b) states that “the risk level which represents no significant risk shall be one which is calculated to result in one excess case of cancer in an exposed population of 100,000, assuming lifetime exposure.” This level of risk is equivalent to a cancer risk of 10 in 1 million, which is also written as 10×10^{-6}. An important distinction is that the Proposition 65 significance level applies separately to each cancer-causing substance, whereas staff determines significance based on the total risk from all cancer-causing chemicals. Thus, the manner in which the significance level is applied by staff is more conservative (health-protective) than that applied by Proposition 65. The significant risk level of 10 in 1 million is consistent with the level of significance adopted by many air districts. In general, these air districts would not approve a project with a cancer risk exceeding 10 in 1 million.

As noted earlier, the initial risk analysis for a project is typically performed at a screening level, which is designed to overstate actual risks, so that health protection can be ensured. Staff’s analysis also addresses potential impacts on all members of the population including the young, the elderly, people with existing medical conditions that may make them more sensitive to the adverse effects of toxic air contaminants and any minority or low-income populations that are likely to be disproportionately affected by impacts. To accomplish this goal, staff uses the most current acceptable public health exposure levels set to protect the public from the effects of airborne toxics. When a screening analysis shows cancer risks to be above the significance level, refined assumptions would likely result in a lower, more realistic risk estimate. Based on refined assumptions, if risk posed by the facility exceeds the significance level of 10 in 1 million, staff would require appropriate measures to reduce the risk to less than significant. If, after all risk reduction measures had been considered, a refined analysis identifies a cancer risk greater than 10 in 1 million, staff would deem such risk to be significant and would not recommend project approval. This assumption is also consistent with U.S. EPA risk management guidelines.

Laws, Ordinances, Regulations, and Standards

PUBLIC HEALTH AND SAFETY Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Clean Air Act section 112 (Title 42, U.S. Code section 7412)	This act requires new sources that emit more than 10 tons per year of any specified Hazardous Air Pollutant (HAP) or more than 25 tons per year of any combination of HAPs to apply Maximum Achievable Control Technology.
State	
California Health and Safety Code section 25249.5 et seq. (Proposition 65)	These sections establish thresholds of exposure to carcinogenic substances above which Prop 65 exposure warnings are required.
California Health and Safety Code section 41700	This section states that “no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property.”
California Public Resource Code section 25523(a); Title 20 California Code of Regulations (CCR) section 1752.5, 2300–2309 and Division 2 Chapter 5, Article 1, Appendix B, Part (1); California Clean Air Act, Health and Safety Code section 39650, et seq.	These regulations require a quantitative health risk assessment for new or modified sources, including power plants that emit one or more toxic air contaminants (TACs).
Local	
Imperial County Air Pollution Control District (ICAPCD) Rule 216	Requires use of T-BACT for major sources.
ICAPCD Rule 309	Requires annual fees for the Air Toxic Hot Spots (AB2588).
ICAPCD Rule 407	States that no source shall cause injury, detriment, nuisance or annoyance to the public, which could endanger their comfort, repose, health and safety, or property.
ICAPCD Rule 1002	California Airborne Toxic Control Measures.

C.6.4 PROPOSED PROJECT

C.6.4.1 SETTING AND EXISTING CONDITIONS

This section describes the environment in the vicinity of the proposed project site from the public health perspective. Characteristics of the natural environment, such as meteorology and terrain, affect the project's potential for causing impacts on public health. An emissions plume from a facility may affect elevated areas before lower terrain areas due to a reduced opportunity for atmospheric mixing. Consequently, areas of elevated terrain can often be subjected to increased pollutant impacts. Also, the types of land use near a site influence the surrounding population distribution and density, which, in turn, affect public exposure to project emissions. Additional factors affecting potential public health impacts include existing air quality, existing health concerns, and environmental site contamination.

Site and Vicinity Description

The project would be located in Imperial County between Plaster City and Interstate 8, on lands that are managed by the Bureau of Land Management (BLM) or by Imperial County. Land uses in the vicinity of the proposed project include industrial, recreational, residential, and agricultural (SES 2008a, Section 5.9.1). The nearest residence is located approximately 2,500 feet northwest of the property boundary, and the nearest sensitive receptor is the Westside Elementary School, located about 4 miles east of the project site (SES 2008a, Section 5.16.1).

The site elevation is below sea level, and the topography in the vicinity of the project is generally flat or slightly sloping. Elevated terrain exists to the north, east, and west of the project site where several mountain ranges rise to elevations ranging from 600 to 4,800 feet above mean sea level. However, the nearest elevated terrain is about 7 miles west of the project site (SES 2008a, Section 5.2.2.3).

Meteorology

Meteorological conditions, including wind speed, wind direction, and atmospheric stability, affect the extent to which pollutants are dispersed into ambient air as well as the direction of pollutant transport. This, in turn, affects the level of public exposure to emitted pollutants and associated health risks. When wind speeds are low and the atmosphere is stable, for example, dispersion is reduced, and localized exposure may be increased.

Imperial County is characterized by a desert climate; summers are hot and dry, winters are moderate with low precipitation, and temperature inversions are strong. Winds generally flow from the west and southwest across the region (SES 2008a, Section 5.2.1.1 and Figure 5.2-2).

Atmospheric stability is a measure related to turbulence, or the ability of the atmosphere to disperse pollutants due to convective air movement. Mixing heights (the height above ground level through which the air is well mixed and in which pollutants can be dispersed) are lower during mornings due to temperature inversions and increase during the warmer afternoons. Staff's **Air Quality** section presents more detailed meteorological data.

Existing Air Quality

The proposed site is within the jurisdiction of the Imperial County Air Pollution Control District (ICAPCD). By examining average toxic air contaminants' concentration levels from representative air monitoring sites with cancer risk factors specific to each contaminant, lifetime cancer risk can be calculated to provide a background risk level for inhalation of ambient air. For comparison purposes, it should be noted that the overall lifetime cancer risk for the average individual in the United States is about 1 in 3, or 333,000 in 1 million.

There are several air quality monitoring stations operated by the ICAPCD, the closest of which is the El Centro 9th Street Station, located about 14 miles east of the proposed site. Data from this monitoring stations shows that the annual arithmetic mean for PM10 ranged between 34 and 44 $\mu g/m^3$ during 2005 and 2006, and that the annual arithmetic mean for PM2.5 ranged between 8.5 and 9.7 $\mu g/m^3$ during 2004 to 2007 (SES 2008a, Section 5.2.1.2 and Tables 5.2-5 and 5.2-8). The next closest station is the Calexico Monitoring Station, located approximately 22 miles southeast of the project site. Data from this monitoring site was used by the California Air Resources Board to calculate the total background cancer risk for the region, which was found to be 135 in one million (CARB 2009).

The use of reformulated gasoline, beginning in the second quarter of 1996, as well as other toxics reduction measures, have led to a decrease of ambient levels of toxics and associated cancer risk during the past few years in all areas of the state and the nation. For example, in the San Francisco Bay Area, cancer risk was 342 in 1 million based on 1992 data, 315 in 1 million based on 1994 data, and 303 in 1 million based on 1995 data. In 2002, the most recent year for which data is available, the average inhalation cancer risk decreased to 162 in 1 million (BAAQMD 2004b, p. 12).

Existing Public Health Concerns

When evaluating a new project, staff often conducts a detailed study and analysis of existing public health issues in the project vicinity. This analysis is prepared in order to identify the current status of respiratory diseases (including asthma), cancer, and childhood mortality rates in the population located near the proposed project. Assessing existing health concerns in the project area will provide staff with a basis on which to evaluate the significance of any additional health impacts from the proposed SES Solar Two project and evaluate any proposed mitigation. Because of the very low population in the immediate vicinity of the project and because no existing health issues within a 6-mile radius of the project have been identified by the applicant (SES 2008a, Section 5.16.1), staff did not conduct an analysis of existing public health issues.

C.6.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

DIRECT/INDIRECT IMPACTS AND MITIGATION

Proposed Project - Construction Impacts and Mitigation

Potential risks to public health during construction may be associated with exposure to toxic substances in contaminated soil disturbed during site preparation, as well as diesel exhaust from heavy equipment operation. Criteria pollutant impacts from the operation of heavy equipment and particulate matter from earth moving are examined in staff's **Air Quality** analysis.

Site disturbances occur during facility construction from excavation, grading, and earth moving. Such activities have the potential to adversely affect public health through various mechanisms, such as the creation of airborne dust, material being carried off site through soil erosion, and uncovering buried hazardous substances. A Phase I Environmental Site Assessment conducted for this site identified no "Recognized Environmental Conditions" per the American Society for Testing and Materials Standards (ASTM) definition. That is, there was no evidence or record of any use, spillage, or disposal of hazardous substances on the site, nor was there any other environmental concern that would require remedial action. One area of potential concern was identified off-site, consisting of waste disposal ponds that may have affected soil or groundwater at the SES Solar Two site (SES 2008a, Appendix T). In the event that any unexpected contamination is encountered during construction, proposed Conditions of Certification **Waste-1** and **Waste-2** (which require a registered professional engineer or geologist to be available during soil excavation and grading to ensure proper handling and disposal of contaminated soil) would ensure that contaminated soil does not affect the public. See the staff assessment section on **Waste Management** for a more detailed analysis of this topic.

The operation of construction equipment would result in air emissions from diesel-fueled engines. Diesel emissions are generated from sources such as trucks, graders, cranes, welding machines, electric generators, air compressors, and water pumps. Although diesel exhaust contains criteria pollutants such as nitrogen oxides, carbon monoxide, and sulfur oxides, it also includes a complex mixture of thousands of gases and fine particles. These particles are primarily composed of aggregates of spherical carbon particles coated with organic and inorganic substances. Diesel exhaust contains over 40 substances that are listed by the U.S. Environmental Protection Agency (U.S. EPA) as hazardous air pollutants and by the California Air Resources Board (ARB) as toxic air contaminants.

Exposure to diesel exhaust may cause both short- and long-term adverse health effects. Short-term effects can include increased coughing, labored breathing, chest tightness, wheezing, and eye and nasal irritation. Long-term effects can include increased coughing, chronic bronchitis, reductions in lung function, and inflammation of the lung. Epidemiological studies also strongly suggest a causal relationship between occupational diesel exhaust exposure and lung cancer.

Based on a number of health effects studies, the Scientific Review Panel on Toxic Air Contaminants recommended a chronic reference exposure level (see discussion of reference exposure levels in Method of Analysis section above) for diesel exhaust particulate matter of 5 micrograms of diesel particulate matter per cubic meter of air ($\mu g/m^3$) and a cancer unit risk factor of $3x10^{-4}$ $(\mu g/m^3)^{-1}$ (SRP 1998, p. 6).[1] The Scientific Review Panel did not recommend a value for an acute Reference Exposure Level since available data in support of a value was deemed insufficient. On August 27, 1998, ARB listed particulate emissions from diesel-fueled engines as a toxic air contaminant and approved the panel's recommendations regarding health effect levels.

Construction of the SES Solar Two project is anticipated to take place over a period of 40 months. Section 5.2.2 of the Responses to CEC and BLM Data Requests (SES 2009i) presents diesel exhaust emission factors and daily emissions from construction equipment. The applicant estimated worst-case emissions of 457 pounds per day of PM10 and 71 pounds per day of PM2.5 during construction (SES 2009i, Table 5.2-20 revised). The applicant has not estimated the health risks resulting from construction activities due to the short duration of this phase (SES 2008a, Section 5.16.2.2). Staff also did not conduct a quantitative assessment of construction impacts on public health because of the distance to the sparsely populated area surrounding the site and because staff has found numerous times using quantitative risk assessment tools that impacts due to construction vehicle diesel emissions are invariably less than significant even to close-in receptors. Also, as noted earlier, assessment of chronic (long-term) health effects assumes continuous exposure to toxic substances over a significantly longer time period, typically from 8 to 70 years.

Additionally, mitigation measures are proposed by both the applicant and Energy Commission staff to reduce the maximum calculated PM10 and PM2.5 emissions and thus reduce the potential impacts even further. These mitigation measures can be found in the **Air Quality** section of this document and include the use of extensive fugitive dust and diesel exhaust control measures. The fugitive dust control measures are assumed to result in 90% reductions of emissions. In order to further mitigate potential impacts from particulate emissions during the operation of diesel-powered construction equipment, Energy Commission staff recommends the use of ultra-low sulfur diesel fuel and Tier 2 or Tier 1 California Emission Standards for Off-Road Compression-Ignition Engines or the installation of an oxidation catalyst and soot filters on diesel equipment. The catalyzed diesel particulate filters are passive, self-regenerating filters that reduce particulate matter, carbon monoxide, and hydrocarbon emissions through catalytic oxidation and filtration. The degree of particulate matter reduction is comparable for both mitigation measures in the range of approximately 85–92%. Such filters will reduce diesel emissions during construction and reduce any potential for significant health impacts.

Proposed Project - Operation Impacts and Mitigation

Emissions Sources

The only stationary source of emissions at the proposed SES Solar Two would be one emergency diesel generator which would be operated once a week for about 15 minutes. This represents a modification of the original application in which the emergency fire water pump was also diesel-fueled (SES 2009q, Section 2.16.2). Mobile sources would have included diesel vehicles for washing the mirrors and other on-site maintenance vehicles. However, in order to reduce public health impacts during the operational phase of the project, the applicant proposes to use an electric fire water pump instead of a diesel pump, electric or hybrid vehicles instead of diesel or gasoline vehicles for mirror washing and other maintenance purposing, and reducing the number of trips and miles traveled during operations. Thus the only TAC that would be emitted from SES Solar Two from stationary and mobile sources would be diesel particulate matter from the emergency generator.

Emissions Levels

Once potential emissions are identified, the next step is to quantify them by conducting a “worst case” analysis. Maximum annual emissions are required to calculate cancer and chronic (long-term) noncancer health effects.

Table 5.16-1 and Appendix DD of the AFC provide the maximum hourly and annual emission rates of diesel particulate calculated for the two emergency engines originally proposed for this project based on emission factors obtained from the vendor.

The next step in the health risk assessment process is to estimate the ambient concentrations of toxic substances. This is accomplished by using a screening air dispersion model and assuming conditions that result in maximum impacts. The applicant’s screening analysis was performed using the SCREEN3 model. Ambient concentrations were used in conjunction with Reference Exposure Levels and cancer unit risk factors to estimate health effects that might occur from exposure to facility emissions. Exposure pathways, or ways in which people might come into contact with toxic substances, include inhalation, dermal (through the skin) absorption, soil ingestion, consumption of locally grown plant foods, and mother’s milk.

The above method of assessing health effects is consistent with OEHHA’s Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA, 2003) referred to earlier and results in the following health risk estimates.

Impacts

The applicant’s screening health risk assessment for the project as originally proposed (including two diesel emergency engines) resulted in a maximum chronic Hazard Index (HI) of 0.00003 and a worst-case individual cancer risk of 0.01 in 1 million at the location of maximum impact (SES 2008a, Table 5.16-2). As **PUBLIC HEALTH Table 2** shows, both the chronic hazard index and the cancer risk are below the level of significance, indicating that no long-term adverse health effects are expected. Since the results of the originally conducted HRA show that no significant public health effects would occur, the applicant did not revise the HRA to reflect the elimination of the diesel fire water pump in favor of an electric pump (SES 2009q, Section 2.16.2). The decrease in TAC emissions due to removal of the diesel-fueled fire water pump would only reduce the projected health impacts which are already found to be insignificant under worst-case conditions.

PUBLIC HEALTH Table 2
Operation Hazard/Risk at Point of Maximum Impact: Applicant Assessment

Type of Hazard/Risk	Hazard Index/Risk	Significance Level	Significant?
Chronic Noncancer	0.00003	1.0	No
Individual Cancer	0.01 in a million	10.0 in a million	No

Source: SES 2008a, Table 5.16-2

Staff conducted a quantitative evaluation of the risk assessment results presented in the SES Solar Two Project AFC (SES 2008a), the Supplement to SES Solar Two AFC (SES 2009q) and the applicant's responses to comments (SES 2009i).

Staff's quantitative analysis of facility operations included the following:

- Stack parameters, building parameters, emission rates and locations of sources were obtained from the AFC.
- Emissions from the diesel emergency generator were included in the analysis.
- Used a receptor grid of -10,000 to 10,000 m east and -10,000 to 10,000 m north, at 200 m increments. Also modeled risks at residential and sensitive receptors identified in the AFC, and at the on-site point of maximum impact and the on-site worker.
- Exposure pathways assessed include inhalation, ingestion of home-grown produce, dermal absorption, soil ingestion and mother's milk.

Atmospheric dispersion modeling was conducted using the CARB/OEHHA Hotspots Analysis and Reporting Program (HARP), Version 1.4a. Screening meteorological data was used, as local meteorological data compatible for use in the HARP ISCST analysis was not provided by the applicant.

The emission factors used in staff's analysis of cancer risk and hazard for diesel emissions from the emergency generator were obtained from the AFC and are listed below:

- Diesel annual emission rate from emergency generator: 0.14 lb/yr
- Diesel hourly emission rate from emergency generator: 0.01 lb/hr

For cancer risk calculations using the HARP model, staff used the "Derived(Adjusted)Method" and for chronic noncancer hazard staff used the "Derived(OEHHA)Method".

Results of staff's analysis are summarized in **PUBLIC HEALTH Table 3** and are compared to the results presented by the applicant for SES Solar Two.

The two parcels of private land that are surrounded by the project would have risks and chronic hazard less than the values determined for the on-site PMI and maximally exposed worker.

PUBLIC HEALTH Table 3: Results of Staff's Analysis and the Applicant's Analysis for Cancer Risk and Chronic Hazard Index (HI).

	Staff's Analysis *(emissions from diesel emergency generator only)*		Applicant's Analysis *(emissions from diesel emergency generator and diesel fire pump)*	
	Cancer Risk (per million)	Chronic HI	Cancer Risk (per million)	Chronic HI
PMI	0.23	0.00014	0.01	0.00003
MEIR	0.0020	0.0000012	n/a	n/a
MEIW	0.046	0.00015	n/a	n/a
Sensitive Receptor	0.00082	0.00000052	n/a	n/a

Note:

PMI= point of maximum impact determined in staff's analysis; the PMI is located on-site
MEIR = maximally exposed individual, residential is located at a residence approximately 3.7 miles west of the site of the diesel emergency generator
MEIW = maximally exposed individual, worker; the MEIW is located on-site
Sensitive Receptor is located at Westside Elementary School, located approximately 8.3 miles east of the site of the diesel emergency generator
n/a = not addressed

<u>Proposed Project - Closure and Decommissioning Impacts and Mitigation</u>

Closure of the proposed SES Solar Two (temporary or permanent) would follow a Project Closure Plan prepared by the applicant and designed to minimize public health and environmental impacts. Permanent closure would presumably occur 40 years after the start of operation unless the project remains economically viable. Decommissioning procedures would be consistent with all applicable LORS and would be submitted to the CEC for approval before implementation (SES 2008a, Section 3.12). Staff expects that impacts to public health from the closure and decommissioning process would represent a small fraction of the impacts associated with the construction or operation of the proposed SES Solar Two. Therefore based on staff's analysis for the construction and operation phases of this project, staff concludes that public health-related impacts from closure and decommissioning of the SES Solar Two would be insignificant.

C.6.5 300 MEGAWATT ALTERNATIVE

The 300 MW alternative would essentially be Phase 1 of the proposed 750 MW project (see Alternatives Figure 1), and would consist of 12,000 SunCatchers with a net generating capacity of approximately 300 MW occupying approximately 2,600 acres of land. This alternative would transmit power to the grid through the SDG&E Imperial Valley Substation and would require infrastructure similar to the proposed 750 MW project, including a water supply pipeline, transmission line, road access, operations facilities, substation, and hydrogen system (SES 2008a). Infrastructure associated with this alternative would require approximately 40 acres. This alternative would retain 40% of the SunCatchers and would affect 40% of the land of the proposed 750 MW project.

C.6.5.1 SETTING AND EXISTING CONDITIONS

The setting for this alternative would be approximately 2,600 acres or 40% of the lands affected by the proposed project. Lands affected by this alternative would be located on the western portion of the proposed project site, and would all be under the jurisdiction of the BLM. Please see the discussion existing conditions within affected BLM lands under Section C.8.4.1

C.6.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The types of construction and operational impacts of the 300 MW alternative would be the same as those of the proposed project, as described in Section C.5.4.2. The proposed project impacts are found to be less than significant, and impacts of this alternative would be even smaller – although marginally so - due to the smaller extent of construction disturbance and the smaller number of SunCatchers of the alternative.

C.6.6 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives developed to reduce impacts to the waters of the U.S. would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative is illustrated in **Alternatives Figure 1B**. This alternative would have the same outer project boundaries as the proposed project, but it would include prohibition of installing permanent structures within drainages, thereby reducing the available acreage for development to 4,690 acres, and reducing the number of SunCatchers from 30,000 under the proposed project to 25,290.

C.6.6.1 Setting and Existing Conditions

The setting for this alternative would be the same as for the proposed project, including all the area within the proposed project boundaries. While the alternative boundaries would be the same as for the proposed project, development within the boundaries would be less dense due to avoidance of primary drainages. All land would all be under the jurisdiction of the BLM. Please see the discussion existing conditions within affected BLM lands under Section C.8.4.1

C.6.6.2 Assessment of Impacts and Discussion of Mitigation

The types of construction and operational impacts of the Drainage Avoidance #1 alternative would be the same as those of the proposed project, as described in Section C.5.4.2. The proposed project impacts are found to be less than significant, and impacts of this alternative would be even smaller – although marginally so - due to the smaller extent of construction disturbance and the smaller number of SunCatchers of the alternative.

C.6.6.3 CEQA Level of Significance

Like the proposed project, emissions from the Drainage Avoidance #1 alternative would not contribute significantly to morbidity or mortality in any age or ethnic group residing in the project area. No construction or operational impacts are found to be significant, and no mitigation measures (Conditions of Certification) are required.

C.6.7 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative would eliminate both the eastern and westernmost portions of the proposed project, where the largest drainage complexes are located. This alternative is shown in **Alternatives Figure 1C**. It would reduce the overall size of the project site by 3,347 acres (from 6,500 acres to 3,153 acres) It would also reduce the number of SunCatchers from 30,000 under the proposed project to 16,915. In this alternative, permanent structures would be allowed within all drainages inside the revised project boundaries.

C.6.7.1 Setting and Existing Conditions

The setting for this alternative would be the same as for the proposed project, except that for the Drainage Avoidance #2 alternative, the areas at the western and eastern ends of the proposed project would be excluded from the developed area. Development within the smaller site boundaries would be at the same density as the proposed project. All land would all be under the jurisdiction of the BLM. Please see the discussion existing conditions within affected BLM lands under Section C.8.4.1

C.6.7.2 Assessment of Impacts and Discussion of Mitigation

The types of construction and operational impacts of the Drainage Avoidance #2 alternative would be the same as those of the proposed project, as described in Section C.5.4.2. The proposed project impacts are found to be less than significant, and impacts of this alternative would be even smaller due to the much smaller extent of construction disturbance and the smaller number of SunCatchers of the alternative.

C.6.7.3 CEQA Level of Significance

Like the proposed project, emissions from the Drainage Avoidance #2 alternative would not contribute significantly to morbidity or mortality in any age or ethnic group residing in the project area. No construction or operational impacts are found to be significant, and no mitigation measures (Conditions of Certification) are required.

C.6.8 NO ACTION ALTERNATIVE

There are three No Project/No Action Alternatives evaluated in this section, as follows:

NO PROJECT/NO ACTION ALTERNATIVE #1:

<u>No Action on SES Solar Two project application and on CDCA land use plan amendment</u>

Under this alternative, the proposed SES Solar Two 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.

C.6.8.1 SETTING AND EXISTING CONDITIONS

The land use setting for the No Project/No Action Alternative would include lands that would contain the proposed project site, and associated linear facilities. Subsection C.8.4.1 (above) describes in detail the lands that would be affected.

C.6.8.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan. For example, there are seven large solar projects proposed on BLM land within the area served by the BLM El Centro Field Office, and there are currently 70 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District.

Under the No Project/No Action alternative, the public health-related impacts of the SES Solar Two project would not occur at the proposed site. In addition, the benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

C.6.8.3 CEQA LEVEL OF SIGNIFICANCE

Under the No Project/No Action alternative, public health impacts to the proposed project site and area would be similar as those currently occurring under the existing conditions in the area. Given that there would be no significant change over the existing conditions, the public health impacts of the No Project/No Action alternative would be less-than-significant.

NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on SES Solar Two project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed SES Solar Two 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. It is expected that public health-related impacts would result from the construction and operation of the solar technology and would likely be similar to the public health-related impacts from the proposed project. As such, this No Project/No Action Alternative could result in the public health-related impacts similar to the impacts under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on SES Solar Two project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed SES Solar Two 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, this No Project/No Action Alternative would not result in public health-related impacts. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.6.9 CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

Geographic Extent

Cumulative impacts can occur if implementation of the SES Solar Two project could combine with those of other local or regional projects. Cumulative impacts would occur locally if SES Solar Two project impacts combined with impacts of projects located within the same air basin. Cumulative impacts could also occur as a result of development of some of the many proposed solar and wind development projects that have been or are expected to be under consideration by the BLM and the Energy Commission in the near future. Many of these projects are located within the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona.

For purposes of the cumulative analysis, the emissions from construction or operation of the SES Solar Two project could potentially combine with emissions from present and reasonably foreseeable projects to result in adverse health effects to the public. Cumulative impacts to public health could occur as a result of implementation of the SES Solar Two project on both a local and regional level. The geographic extent for the analysis of local cumulative impacts associated with the SES Solar Two project includes the Salton Sea Air Basin (SSAB), which contains all of Imperial County and parts of Riverside County.

Cumulative Impact Analysis

Cumulative impacts of the proposed project and other projects within a 6-mile radius were not evaluated by the applicant. The applicant has stated that there are no current or future projects within a 6-mile radius that could contribute to a public health cumulative impact, and therefore no further analysis was conducted (SES 2008a, Section 5.16.3). Nevertheless, there is a potential for substantial future development in the project area and throughout the southern California desert region, as indicated by the list of planed projects within a 10-mile radius (provided by the applicant), which includes several energy generating projects employing solar or wind technologies (SES 2008a, Table 5.18-3). Staff has analyzed the public health and safety effects of existing and foreseeable projects listed in the Cumulative Impacts section of the AFC (SES 2008a, Section 5.18) as follows.

Local Projects

The maximum cancer risk for emissions from SES Solar Two (calculated by staff) is 0.23 in one million at a point located on-site. The maximum impact location occurs where pollutant concentrations from SES Solar Two would theoretically be the highest. Even at this location, staff does not expect any significant change in lifetime risk to any person and the increase does not represent any real contribution to the average lifetime cancer incidence rate due to all causes (environmental as well as life-style and genetic). Modeled facility-related residential risks are even lower at more distant locations and actual risks are expected to be much lower since worst-case estimates are based on conservative health-protective assumptions and thus overstate the true magnitude of the risk expected. Therefore, staff does not consider the incremental impact of the additional risk posed by SES Solar Two to be either individually or cumulatively significant.

Regional Projects

The nature of public health impacts from exposure to materials that could result in negative health effects combined with the vast area over which the future solar and wind development projects would be built in southeastern California, southern Nevada, and western Arizona, as well as the relative isolation of these projects from sensitive receptors, precludes the potential for impacts of these projects to combine with each other to result in significant impacts. Any emission from construction of these projects would be dispersed over these areas and would not be expected to result in chronic health problems to sensitive receptors. Operation of the future solar and wind energy projects would result in negligible emissions, mostly related to worker vehicles and maintenance trucks, therefore, operation of these future projects would not result in negative regional health effects.

Cumulative Impact Conclusion

Public health impacts of the SES Solar Two project would not combine with impacts of any past, present, or reasonably foreseeable projects to result in cumulatively considerable local or regional impacts. Therefore, no mitigation is recommended to address potential cumulative project impacts.

C.6.10 NOTEWORTHY PUBLIC BENEFITS

It is noteworthy that a solar electric generating facility such as the proposed SES Solar Two project would emit significantly less TACs to the environment than other energy sources available in California such as natural gas or biomass, thereby reducing the health risks that would otherwise occur with these non-renewable energy sources. At the same time, the proposed SES Solar Two would provide much needed electrical power to California residences and businesses, and will contribute to electric reliability. Electrical power is not only necessary to maintain a functioning society, but it also benefits many individuals who rely on powered equipment for their health (such as dialysis equipment and temperature control equipment). For example, it is documented that during heat waves in which elevated air-conditioning use causes an electrical blackout, hospitalizations and deaths due to heat stroke are increased and injury/deaths rise from indirect impacts when public safety measures are lost (traffic lights, elevators, etc.).

C.6.11 COMPLIANCE WITH LORS

Staff has considered the minority population as identified in **Socioeconomics Figure 1** in its impact analysis and has found no potential significant adverse impacts for any receptors, including environmental justice populations. In arriving at this conclusion, staff notes that its analysis complies with all directives and guidelines from the Cal/EPA Office of Environmental Health Hazard Assessment and the California Air Resources Board. Staff's assessment is biased toward the protection of public health and takes into account the most sensitive individuals in the population. Using extremely conservative (health-protective) exposure and toxicity assumptions, staff's analysis demonstrates that members of the public potentially exposed to toxic air contaminant emissions of this project—including sensitive receptors such as the elderly, infants, and people with pre-existing medical conditions—will not experience any significant chronic or cancer health risk as a result of that exposure. Staff believes that it incorporated every conservative health-protective assumption called for by state and federal agencies responsible for establishing methods for analyzing public health impacts. The results of that analysis indicate that there would be no direct or cumulative significant public health and safety impact to any population in the area. Therefore, given the absence of any significant health impacts, there are no disparate health impacts and there are no environmental justice issues associated with **PUBLIC HEALTH AND SAFETY**.

Staff concludes that construction and operation of the SES Solar Two will be in compliance with all applicable LORS regarding long-term and short-term project impacts in the area of **PUBLIC HEALTH AND SAFETY**.

C.6.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

No conditions of certification or mitigation measures are proposed.

C.6.13 CONCLUSIONS

Staff has analyzed potential public health risks associated with construction and operation of the SES Solar Two project and does not expect any significant adverse cancer or long-term health effects to any members of the public, including low income and minority populations, from project toxic emissions. Staff also concludes that its analysis of potential health impacts from the proposed SES Solar Two uses a conservative health-protective methodology that accounts for impacts to the most sensitive individuals in a given population, including newborns and infants. According to the results of staff's health risk assessment, emissions from SES Solar Two would not contribute significantly or cumulatively to morbidity or mortality in any age or ethnic group residing in the project area.

C.6.14 REFERENCES

BAAQMD (Bay Area Air Quality Management District) 2004b – Toxic Air Contaminant Control Program Annual Report 2002. Volume I. June.

California Air Resources Board (CARB) 2002 – California Air Quality Data, http://www.arb.ca.gov/aqd/aqd.htm.

California Air Resources Board (CARB) 2009 – Annual Toxics Summaries. http://www.arb.ca.gov/adam/toxics/toxics.html

CAPCOA (California Air Pollution Control Officers Association)1993 – CAPCOA Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines. Prepared by the Toxics Committee. October.

OEHHA (Office of Environmental Health Hazard Assessment) 2003 – *Air Toxics Hot Spots Program Risk Assessment Guidelines*. The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. August.

SES (Stirling Energy Systems Solar Two, LLC) 2008a – Application for Certification for the Stirling Energy Systems (SES) Solar Two Project, Volumes 1 and 2 (tn: 46819). Submitted to the California Energy Commission, June 30, 2008.

SES 2009i –Applicant's Response to BLM and Energy Commission Data Requests 53-110 (tn: 50750), March 26, 2009.

SES 2009q –Supplement to the Application for Certification for the SES Solar Two Project. Submitted to the California Energy Commission (tn: 51973), June 12, 2009.

SRP (Scientific Review Panel on Toxic Air Contaminants) 1998 – Findings of the Scientific Review Panel on The Report on Diesel Exhaust as adopted at the Panel's April 22, 1998, meeting.

C.7 - HYDROLOGY, WATER USE, AND WATER QUALITY (SOIL AND WATER RESOURCES)

Testimony of Philip Lowe, P.E.

C.7.1 SUMMARY OF CONCLUSIONS

With the information provided to date, staff has determined that construction, operation, and decommissioning of the proposed project could potentially impact soils, surface water, flooding, surface water quality, ground water quality, and water supply. Where these potential impacts have been identified, staff has proposed mitigation measures to reduce identified impacts to levels that are less than significant. The mitigation measures, as well as specifications for laws, ordinances, regulations and standards (LORS) conformance, are included herein as conditions of certification. The conditions of certification referred to herein address the California Environmental Quality Act (CEQA) requirements for the Energy Commission's analysis and BLM's needs for a National Environmental Policy Act (NEPA) analysis. With the possible exception of Section 404 of the Clean Water Act, the project would conform with all applicable LORS. Staff's conclusions based on analysis of the information submitted to-date are as follows:

1. The proposed project would be located in the Yuha Desert of Imperial County in an area characterized by braided, erosive stream channels, flash flooding, alluvial fan conditions, low rainfall, sparse vegetation, and the potential for wind erosion.
2. The project would place more than 5,000 solar dishes, known as SunCatchers, within areas known to be subject to flash flooding and erosion. Project-related changes to the braided and alluvial fan stream hydraulic conditions could result in on-site erosion, stream bed degradation or aggradation, and erosion and sediment deposition impacts to adjacent land. SunCatchers within the floodplain could be subject to destabilization by stream scour. Impacts to soils related to wind erosion and runoff erosion are potentially significant, as are impacts to surface water quality from sedimentation and the introduction of foreign materials, including potential contaminants, to the project area.
3. The applicant completed a hydrologic study and hydraulic modeling of the major stream channels on the project. Based on this work and subsequent analysis by staff, scour analyses have been performed to support development of a project design that can withstand flash flood flows with minimal damage to SunCatchers. Condition of Certification **SOIL&WATER-7** ensures no significant impact for SunCatchers placed in the floodplain.
4. A Drainage, Erosion, and Sedimentation Control Plan (DESCP) has been developed to mitigate the potential storm water and sediment project-related impacts. However, the calculations and assumptions used to evaluate potential storm water, geomorphic, and sedimentation impacts are imprecise and have limitations and uncertainties associated with them. Given the uncertainty associated with the calculations, the magnitude of potential impacts that could occur cannot be determined precisely without additional detailed numeric modeling of project effects. Based on an independent preliminary assessment by staff, staff has determined the proposed project could result in erosion and stream morphology impacts that would be significant with respect to CEQA significance criteria specified herein and NEPA

significance criteria specified in 40 CFR 1508.27. Conditions of Certification **SOIL&WATER-1, SOIL&WATER-5, SOIL&WATER-7** and **SOIL&WATER-10** have been developed that require development of best management practices and monitoring and reporting procedures to mitigate impacts related to flooding, erosion, sedimentation, and stream morphological changes. These conditions of certification would minimize impacts, but due to the uncertainty associated with the existing analysis, impacts related to erosion, sedimentation and stream morphological changes are considered significant after mitigation.

5. Surface water and ground water quality could be affected by construction activities, ongoing activities on the project site including mirror washing, vehicle use and fueling, storage of oils and chemicals, the proposed septic and leach field system for sanitary wastes, and wastes from the water treatment system. These impacts are potentially significant. Compliance with LORS and Conditions of Certification **SOIL&WATER-1**, **SOIL&WATER-3**, **SOIL&WATER-5**, **SOIL&WATER-6**, **SOIL&WATER-7**, and **SOIL&WATER-8** would mitigate these impacts to a level less than significant in all areas except those associated with the sediment content of water related to stream morphological changes described under Conclusion #4 above. Uncertainty regarding sediment content of runoff water results in a conclusion of potential significant adverse water quality impact.

6. The U.S. Army Corps of Engineers has determined that 840 acres of the project site are jurisdictional waters of the U.S. under Clean Water Act (CWA) Section 404, all of which would be permanent impacts. The U.S. Environmental Protection Agency (USEPA) Section 404(b)(1) Guidelines (40 Code of Federal Regulations [CFR] 230 *et seq.*) are substantive environmental criteria used by the USACE to evaluate permit applications. Under these guidelines, an analysis of practicable alternatives is the primary tool used to determine whether a proposed discharge can be authorized. An alternative is considered practicable if it is available and capable of being implemented after considering cost, existing technology, and logistics in light of the overall project purpose (40 C.F.R. Part 230[a][2]). The guidelines suggest a sequential approach to project planning such that the Corps of Engineers must first consider avoidance and minimization of impacts to the extent practicable. Mitigation for unavoidable impacts to waters of the U.S. is addressed only after the analysis has determined the Least Environmentally Damaging Practicable Alternative (LEDPA). A formal 404(b)(1) analysis has not yet been completed; however, the analysis presented herein will aid the Corps in the preparation of a draft analysis to be included in the FEIR/EIS. Nonetheless, without a determination from the Corps of Engineers, Staff cannot determine at this time whether the project would comply with Section 404.

7. The proposed project would not require cooling water. However, SunCatcher mirrors would be washed on a regular basis. Mirror washing and dust control watering would comprise the primary water use for the project, which is estimated at 33,550 gallons per day (gpd), with total annual use approximately 32.7 acre feet. The project owner proposes to upgrade the Seeley Waste Water Treatment Plant (SWWTP), approximately 12 miles east of the site, to provide up to 200,000 gpd of treated wastewater for project use. Wastewater from SWWTP would be treated on the project site for use in mirror washing. By using SWWTP water, the project would comply with State policies regarding the use of recycled water for power plants where practicable.

Potable water would be supplied by a local water supplier yet to be determined. Conditions of Certification **SOIL&WATER-2**, **SOIL&WATER-3**, **SOIL&WATER-7** and **SOIL&WATER-9** are proposed by staff to ensure and monitor an adequate water supply and to ensure that the water supply and treatment system comply with LORS and do not create adverse water quality or supply impacts.

8. Impacts to groundwater supply and quality would be less than significant. No groundwater would be used by the project and the effect on groundwater infiltration would be negligible.
9. Three on-site alternatives have been evaluated in addition to the No Action alternative. Drainage Alternative #1, developed in an effort to avoid significant stream morphological and sediment transport impacts, and to avoid impacts to waters of the U.S. under Section 404 of the Clean Water Act, would successfully avoid significant impacts and is the least environmentally damaging alternative to soil and water resources. This alternative avoids the major watercourses on the site. Other on-site alternatives evaluated have smaller project footprints, but do not avoid major watercourses and do not avoid significant impacts.

C.7.2 INTRODUCTION

This section analyzes potential impacts to soil and water resources from the construction and operation of the proposed SES Solar Two Project (SES Solar Two or "proposed project"). The analysis specifically focuses on the potential for SES Solar Two to:

- Cause accelerated wind or water erosion and sedimentation;
- Exacerbate flood conditions in the vicinity of the project;
- Adversely affect surface or groundwater supplies;
- Degrade surface or groundwater quality; and
- Comply with all applicable laws, ordinances, regulations, and standards (LORS) and state policies.

Where the potential for significant adverse impacts are identified, staff has proposed mitigation measures to reduce the significance of the impact, if possible, and has recommended conditions of certification.

C.7.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Thresholds for determining significance in this document are based on Appendix G of the CEQA Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission staff. In addition, staff's evaluation of the significance of the impact of the proposed project on soil and water resources (i.e., those listed below) includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27. An impact may be considered significant if the proposed project results in the effects listed below.

To evaluate if significant impacts to soil and water resources would occur, staff assessed:

- Whether the project would violate water quality standards or waste discharge requirements.
- Whether the project substantially depletes groundwater supplies or interferes substantially with groundwater recharge such that there is a net deficit in aquifer volume.
- Whether the project substantially alters existing site or area drainage patterns, including the alteration of stream or river courses, or substantially increases the rate or amount of surface runoff in a manner that results in on- or off-site flooding or substantial erosion or siltation.
- Whether the project would create or contribute runoff water that exceeds existing or planned storm water-drainage system capacity or provides substantial additional sources of polluted runoff.
- Whether the project would place structures within a 100-year flood hazard area and impede or redirect flood flows.
- Whether the project would lower groundwater levels such that protected species or habitats are affected.
- Whether the project would substantially degrade surface water or groundwater quality.

C.7.4 PROPOSED PROJECT

C.7.4.1 SETTING AND EXISTING CONDITIONS

Proposed Project

The proposed SES Solar Two site is approximately 6,500 acres located in the southwest region of Imperial County. The site consists of an estimated 6,140 acres of public land administered by the Bureau of Land Management (BLM), and approximately 360 acres of private land under the jurisdiction of Imperial County.

The proposed project includes two laydown areas. One is a 100-acre laydown area located east of the project site on Dunaway Road and north of Highway 8. The second laydown area is 11.04 acres located within the project site boundaries just south of the Main Services Complex. In addition to the proposed SES Solar Two site and construction areas, there are other features and facilities associated with the proposed project, the majority of which are located on the proposed project site or construction laydown area, including:

- Approximately 30,000 38-foot-diameter solar disks, referred to as SunCatchers, and associated equipment and infrastructure within a fenced boundary;
- A 12-mile, 6-inch water pipeline approximately 30 inches underground off-site in the existing Evan Hewes Highway right-of-way (ROW). The pipeline would provide

recycled waste water from the SWWTF located approximately 12 miles east of the proposed project site;

- An onsite, 24.27-acre Main Services Complex located generally in the center of the site for administration and maintenance activities. The complex would include project administration, storage, maintenance and water treatment buildings, parking areas, water storage tanks, access roads, and evaporation ponds;
- An onsite, 6-acre 750-MW Substation located generally in the center of the site, near the Main Services Complex;
- A 10.3-mile 730-MW/230-kV transmission line intended to connect to the existing San Diego Gas & Electric (SDG&E) Imperial Valley Substation located southeast of the project site. The proposed transmission line would parallel the existing Southwest Powerlink transmission line in the existing ROW; and
- Approximately 27 miles of unpaved arterial roads, approximately 14 miles of unpaved perimeter roads, and approximately 234 miles of unpaved access roads.

Project Site and Vicinity

The project site, located in the Yuha Desert of the southwestern corner of Imperial County approximately 18 miles west of the city of El Centro, consists of undeveloped desert land with sparse vegetation and crossed by numerous well-defined dry wash drainageways. The Yuha Desert, part of the larger Sonoran Desert, is one of the hottest deserts in North America, with very sparse rainfall.

The site is on a north-sloping alluvial surface with ground elevations ranging from approximately 320 feet above mean sea level (msl) along the southern boundary of the western half of the property (Phase 1 construction area), to approximately 40 feet msl at the eastern boundary (Phase 2 construction area). The proposed laydown area to the east of the site is approximately 10 feet msl. Site topography is gently rolling to relatively flat, with more pronounced slopes and canyons in the western half of the site, roughly corresponding to the Phase I area. Canyons in this western portion of the site are generally not more than 20 to 40 feet deep with mildly sloping sides. The eastern portion of the site, roughly corresponding to the Phase 2 area, is generally flatter, more uniform, and without the shallow canyons of the western half.

The vicinity surrounding the project site is desert similar to the project site. To the east the desert ground slopes away, dropping below sea level, to the irrigated agricultural area of the Imperial Valley approximately 2.5 miles east of the Phase 2 site boundary. This agricultural area extends east to a point approximately 30 miles east of the project site. North, west, and south of the site are comprised of desert extending beyond the Mexican border 15 miles to the south, north to the Salton Sea roughly 25 miles from the site, and 15 miles west to the foothills of the Peninsular Mountain Range.

The Westside Main Canal is located at the edge of the agricultural area 2.5 miles east of the project site. This irrigation supply canal, operated by the Imperial Irrigation District, receives water from the All-American Canal and distributes it north to smaller irrigation canals within the Imperial Irrigation District (IID) system. Further east, approximately 7 miles from the project site, is the New River, flowing north from Mexico to the

Salton Sea. The Coyote Wash, a large, dry desert wash, runs southwest to northeast roughly parallel to and north of the site at a distance of approximately 1 mile.

Immediately adjacent to the northern boundary of the proposed project site is the USG Corporation Gypsum Wallboard Manufacturing Facility, known as Plaster City. The small communities of Edgar and Coyote Wells are located approximately 5 miles east and 4 miles west of the project site, respectively. A small water ski community known as Imperial Lakes is located about 2 miles northeast of the project site, and about 0.7 miles north of the project laydown area. The California State Centinela Prison is located approximately 1.5 miles north of Imperial Lakes.

Two private parcels of land, one owned by a recreational vehicle club and one by a private landowner, are surrounded by the proposed project and are not a part of the project. These parcels are separate from the 360 acres of private land described above which will be incorporated into the project by purchase or lease. The 360 acres of private land to be incorporated into the project are located to the southwest of Plaster City, are currently vacant and in a natural condition, and designated as open space by Imperial County. The northern boundary of the proposed project site is adjacent to Imperial County Route S80 and Plaster City, and the southern boundary is adjacent to Interstate Highway 8.

Soils

With the exception of approximately the easternmost 300 acres of Phase II, the laydown area, and portions of the transmission line and water line, the soils on the site are classified by the Natural Resource Conservation Service (NRDC) as Rositas-Carrizo-Orita soils. Soils in the eastern 300 acres of Phase II, the laydown area, and portions of the proposed water line are classified as Meloland-Vint-Indio or Imperial-Glenbar-Gilman soils, with a small segment of Badland-Beeline-Rillito soils along the proposed transmission line route. **Soil and Water Resources Table 1** provides a summary of selected characteristics of these soils.

Soil and Water Resources Table 1
Summary of Soil Characteristics

Soil	Texture	Depth of Surface Layer in Inches	Land Capability Class[1]	Wind Erodibility Group[2]	Erosion (K) Factor[3]	Erosion Hazard – Roads & Trails[4]	Permeability in inches per hour[5]
Rositas-Carrizo-Orita	Gravelly loam, sandy loam	11	7	3	0.15	Slight	6.0 – 20.0
Meloland-Vint-Indio	Loam, silt loam, sandy loam	11	7	4L	0.43	Slight	0.6 – 6.0
Badland-Beeline-Rillito	Ranges from clay to gravelly sand; fine textures predominate	12	8	8	0.15	Severe	N/A[6]
Imperial-Glenbar-Gilman[5]	Silty clay loam to clay loam	12 - 13	See Report Text	4 – 4L	0.37 – 0.43	See Report Text	0.2 – 2.0

Source: Except as otherwise indicated, table source is AFC Section 5.4 (SES, 2008a).

Notes:

1 - Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat. Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.
2 - Wind erodibility groups range from 1 to 8, with 1 being highly erodible and 8 having low erodibility. L denotes calcareous soil.
3 - This is an index of erodibility for standard condition and includes susceptibility of soil to erosion and rate of runoff. Low K values (below 0.15) indicate low erosion potential. High K values (above 0.4) are highly erodible. See report text for additional information.
4 - Qualitative descriptors of erosion hazard: Slight = little or no erosion is anticipated, Moderate = some erosion anticipated, Severe = significant erosion potential exists.
5 - Data Source: Soil Survey of Imperial County California Imperial Valley Area. U.S. Department of Agriculture Soil Conservation Service, 1981.
6 - N/A = not applicable or not available.

Rositas-Carrizo-Orita soils are sandy to gravelly loam in texture, highly permeable, with high potential for wind erosion. They typically form on alluvial fans, floodplains and alluvial basin floors. These soils are highly susceptible to wind erosion. As shown in Table 1, the erosion factor (K) is relatively low, indicating a low potential for erosion-related soil loss. However, since this factor also takes into account total runoff, which is low in this area, a low K value does not necessarily indicate the soils are resistant to erosion in the event of runoff. These soils are typically sandy and can contain fine sands which are very susceptible to erosion. Runoff potential is relatively low due to high permeability.

Meloland-Vint-Indio soils are formed in recent mixed alluvium on floodplains and alluvial basin floors. They consist of sand, sandy loam, or silt loam materials. These soils are moderately permeable and moderately susceptible to wind erosion. The erosion factor is high. Runoff potential is low to moderate.

Badland soils are steep to very steep barren land soils dissected by drainageways in local steep topography. Consistency is clay to gravelly sand. Surface runoff is rapid or very rapid and the hazard of erosion is high.

Imperial-Glenbar-Gilman soils are the soils of the adjacent agricultural area of Imperial County. Wind erosion potential is moderate with high runoff erosion potential. Permeability is relatively low. These soils are highly productive for farmland. Glenbar and Gilman soils have been listed by the California Department of Conservation as meeting the criteria for prime farmland. Imperial soils are designated by the same agency as meeting the criteria for farmland of statewide importance.

Soil characteristics indicate that approximately the western 80% of the solar field site is susceptible to wind erosion, with highly permeable soils that produce relatively low amounts of annual soil loss erosion, but could be highly erodible locally during flood events. The eastern 20% of the solar field site is moderately permeable, moderately subject to wind erosion and moderately susceptible to runoff erosion. The proposed water pipeline and transmission line traverse similar soils, with the pipeline crossing high-quality farmland soils.

Climate

The climate of the site vicinity is hot during summer, with temperatures commonly above 100 degrees, and moderate during winter with temperatures in the 40 to 70 degree range. Based on information from the Western Regional Climate Center (WRCC) for El Centro, approximately 18 miles east of the project site (period of record 1932 to 2009), the warmest month of the year is July with an average maximum temperature of 108 degrees Fahrenheit. Average maximum temperatures exceed 100 degrees for June, July, August, and September. The coldest month of the year is December with an average minimum temperature of 40 degrees.

Precipitation is very sparse. Annual average precipitation at El Centro (WRCC data) is 2.65 Inches. Rainfall primarily occurs December to March in the form of widespread winter storms. Approximately 53% of total yearly rainfall occurs during those months. Summer monsoon storms generally occur from August to October, when approximately 34% of total yearly rainfall occurs. There is very little precipitation during the months of April to July (about 6% of the yearly total). The wettest month of the year is December with an average rainfall of 0.42 Inches.

Hydrology

The project site lies within the Imperial Subregion of the Colorado River RWQCB. There are no perennial or intermittent drainages on the project site. The closest perennial drainage to the project site is the New River, created in the early 1900’s when the Colorado River overflowed a dike, and with the Alamo River further east, flowed through the Imperial Valley to form the Salton Sea. Currently, the highly polluted New River obtains its flow primarily from agricultural irrigation return.

Numerous ephemeral drainages traverse the SES Solar Two site from the south to north in the western portion of the site and toward the northeast in the eastern half of the site. Headwaters for these drainages are gently sloping upland areas located to the south and west. Culverts under the I-8 Freeway allow flows from south of the freeway to flow across and into the site.

The ephemeral site drainages are normally dry. They contain water only infrequently following precipitation events large enough to produce runoff. Rainfall is scant in this area so long periods of time may occur between runoff events. When it does occur, runoff is generally activated by intense summer monsoon rains that produce short-duration flash flooding that can have high flow peaks. Winter storms, although producing more rain on average than the summer monsoons, are widespread and low-intensity, producing little runoff except on watersheds much larger than those affecting the project site. By illustration, stream gage records for San Felipe Creek approximately 20 miles north of the site show that August and September flows are nearly 5 times higher than the winter (December-February) flows. Although the majority of the rainfall occurs during winter, the majority (65%) of annual runoff occurs during the summer months of July to September. This pattern could be expected to be more pronounced on the project site due to smaller watershed size.

Soil and Water Resources Figure 1 shows the location, watershed areas, and estimated 100-year peak discharges of 12 drainageways entering the project site from the south as mapped by the project applicant. Stream flow estimates have been made for these watersheds using a rainfall/runoff model (SES, 2008a). This model uses rainfall estimates (2.62 inches over a 6-hour period for a 100-year event), soil type, and area and topographic information to estimate peak runoff. Watershed areas for the drainageways shown in **Soil and Water Resources Figure 1** range from 58 to 1,574 acres, averaging 548 acres. The estimated 100-year discharges range from 57 cubic feet per second (cfs) to 777 cfs.

The 100-year discharge represents the discharge from a flood event with an annual probability of occurrence of 1%. Commonly called the 100-year flood, a flood of this magnitude is expected to occur, on average, once every 100 years. Since there is a 1% chance this flood occurs every year, it is possible for more, or fewer, than one flood of this magnitude to occur in a 100-year period. The 100-year flood has been designated by the Federal Emergency Management Agency (FEMA) as the national regulatory flood for flood insurance and floodplain management purposes.

As the ephemeral watercourses pass through the project site, some combine and new watersheds form. **Soil and Water Resources Figure 1** shows the location, watershed areas, and 100-year peak discharges for 9 watercourses exiting the site toward the north and east. Watersheds for these drainageways range from 147 to 18,856 acres in area, averaging 3,246 acres (median 1,274 acres). The 100-year discharge for these watersheds ranges from 126 cfs to 4,223 cfs.

Discharges for more frequent floods have been determined. The 25-year peak discharges, with 4% chance of occurrence in any given year, are roughly 50% of the 100-year peaks given in **Soil and Water Resources Figure 1**. The 10-year discharges, with 10% chance of occurrence per year, are roughly 30% of the 100-year peaks. The 5-year discharges, with 20% chance of occurrence per year, are roughly 15% to 20% of the 100-year peaks. For instance, for concentration point, CS, the estimated discharges are: 100-year = 777 cfs, 25-year = 397 cfs, 10-year = 217 cfs, and 5-year = 119 cfs.

Flows exiting the site on the north in the Phase I area are returned to the site at a point east of Plaster City, where they join other on-site flow in the Phase II area. All Phase II flows eventually exit the site on the east, overtop Dunaway Road, and make their way to the Westside Main Canal This large drainage feature located south of Plaster City consolidates flows from much of the eastern portion of the property and is mapped as a Federal Emergency Management Agency floodplain (see Stormwater Section – Flooding, below. Flows of sufficient volume and discharge to cross the canal would be conveyed either north through the Westside Main Canal, north and east through local drainage and irrigation ditches, or overland east to the New River to be eventually deposited in the Salton Sea. It is likely that most flows would infiltrate the soil prior to reaching the New River or the Salton Sea.

Flooding

Flooding, for the purpose of this report, is considered to be that area of a channel or area adjacent to a channel that is subject to inundation by channel flows. Flooding can occur anywhere there is a natural drainageway on the project site.

The Federal Emergency Management Agency prepares 100-year flood maps for flood insurance purposes and for floodplain management use by local agencies. FEMA map panels 06025C-1650C and 06025C-1675C cover the project site. Two watercourses, corresponding to E2 to Dunaway and C North on **Soil and Water Resources Figure 1** have been mapped by FEMA as Zone A, which means 100-year flood zone with no base flood levels determined. These are considered approximate flood zones. **Soil and Water Resources Figure 2** shows the location of the FEMA-mapped floodplain on the project site.

FEMA maps do not cover all floodplains. Rural areas, such as the project site, are commonly not mapped. The project applicant has performed independent floodplain mapping based on the discharges given in **Soil and Water Resources Figure 1**. This flood mapping is shown in **Soil and Water Resources Figure 3** and shows floodplains associated with 24 drainageways and one sink area (Basin D Lake) on the project site.

Groundwater

The project site lies primarily over the Coyote Wells Valley Groundwater Basin. This 100-square-mile basin is bounded on the north by the Coyote Mountains and the Elsinore fault zone, on the west and southwest by the Jacumba Mountains, by the United States-Mexico border on the southeast (Note that the border is a jurisdictional boundary. The groundwater basin actually extends into Mexico.), and by the Imperial Valley Groundwater Basin on the east

The boundary between the Coyote Wells Valley Groundwater Basin and the Imperial Valley Groundwater Basin begins near the intersection of Interstate 8 and the existing SDG&E Southwest Powerlink Transmission line at the southeastern portion of the project site, and extends north-northeast through the project site. The easternmost portion of project construction Phase II, the easternmost 7.5 miles of the proposed 750-MW transmission line, the easternmost 3.2 miles of the proposed waterline, and the laydown area are over the Imperial Valley Groundwater Basin. The rest of the project site is over the Coyote Wells Valley Groundwater Basin.

The Coyote Wells Valley Groundwater Basin, with storage capacity of approximately 1.7 million acre feet, lies primarily within Holocene alluvium 100 to 300 feet below the ground surface, although unconsolidated alluvium extends to a depth of 650 feet (California Department of Water Resources, 2003). This basin receives recharge from the percolation from ephemeral runoff from the surrounding mountains. Groundwater levels have been declining due to pumping and underflow to the Imperial Valley Groundwater Basin and to Mexico. Groundwater quality is characterized by sodium bicarbonate-chloride with high fluoride levels in some areas. Groundwater uses include municipal, irrigation and domestic uses.

The 1,870-square-mile Imperial Valley Groundwater Basin covers all of the agricultural area of Imperial County south of the Salton Sea from the Sand Hills on the east to the Coyote Wells Valley Groundwater Basin on the west. Total storage capacity is approximately 14 million acre feet. This basin has two major aquifers, with the upper averaging 200 feet in thickness and the lower 380 feet. Recharge is primarily from irrigation return, underflow from adjacent groundwater basins and seepage from unlined irrigation canals. Some recharge occurs from infiltration of natural stream flow on the West Mesa, on which the proposed project is located. Groundwater recharges and inflow are roughly balanced with outflow and pumping, with a net loss of approximately 17,000 acre feet per year. Groundwater quality is variable and generally the water is unsuitable for domestic and irrigation purposes without treatment. High fluoride levels occur in parts of the basin. Uses include municipal, domestic and irrigation (California Department of Water Resources, 2003).

Geotechnical drilling by the applicant found groundwater at 45 feet below the ground surface along Dunaway Road, and at a depth of 50 feet near the U.S. Gypsum Property. A test well by the applicant on the eastern part of the site in the Imperial Valley Groundwater Basin found groundwater at more than 90 feet depth. Total dissolved solids were very high (20,000 ppm) and groundwater production low.

Water Quality

There are no perennial or intermittent drainageways on the project site. Water quality of surface runoff flows would be dependent on materials picked up on the ground surface, which is currently natural desert. The downstream disposition of surface runoff from the site is the desert area west of the Westside Main Canal, possibly the Westside Main Canal itself, local drainage and irrigation ditches west of the Westside Main Canal, the New River, and eventually the Salton Sea.

The New River is highly polluted from agricultural runoff, sewage from Mexico, and discharges from manufacturing plants in Mexico, and is listed as impaired under Section 303(d) of the Clean Water Act (See Laws, Ordinances, Regulations and Standards) for a wide range of pollutants including, but not limited to, trimethylbenzene, chlordane, chloroform, chlorpyifos, copper, DDT, diazinon, dieldrin, mercury, meta-para xylenes, nutrients, organic enrichment, pesticides, and selenium. The Salton Sea is listed as impaired for nutrients, salinity, and selenium.

The California Regional Water Quality Control Board identifies beneficial uses of waters of the State that may be protected against water quality degradation. These include such uses as domestic, municipal, agricultural, recreation, natural resources, and aesthetic enjoyment. Beneficial uses identified for washes in the west Colorado River basin (California Regional Water Quality Control Board, 2006) include groundwater recharge (GWR), non-contact water recreation (RECII), and wildlife habitat (WILD).

Groundwater in the Coyote Wells Valley Groundwater Basin is type sodium bicarbonate-chloride. Total dissolved solids content ranges from 750 to 1,240 mg/L in shallow wells to 300 to 450 mg/L in deeper wells (DWR 1973). Fluoride levels in some wells are as high as 3.5 mg/L (California Department of Water Resources, 2003).

Imperial Valley Groundwater Basin quality varies extensively throughout the basin. TDS content ranges from 498 to 7,280 mg/L in the basin. Department of Health Services data from 5 public supply wells show an average TDS concentration of 712 mg/L and a range from 662 to 817 mg/L. In general, groundwater beneath the basin is unusable for domestic and irrigation purposes without treatment. TDS values typically exceeding 2,000 mg/L are reported from a limited number of test wells drilled in the western part of the basin. Groundwater in areas of the basin has higher than recommended levels of fluoride and boron. Approximately 7,000 acre feet per year of groundwater is estimated to recharge the basin from the New River which drains the Mexicali Valley. This groundwater is related to surface flow from the highly polluted New River and negatively affects groundwater quality in the basin (California Department of Water Resources, 2003).

Groundwater beneficial uses in the project area include municipal and domestic supply (MUN) and industrial service supply (IND).

Project Features

SunCatcher foundations would be metal pipe pedestals 24 inches in diameter secured in place using metal fins for stabilization and driven hydraulically into the ground. The 30,000 SunCatchers would be installed in straight, parallel rows. Each row would consist of a series of SunCatchers in pairs, one on each side of a central access road. The distance between paired dishes along a row would be 112 feet. The distance between successive pairs in a row would be approximately 55 feet. Thus, a row 1,000 feet long would have approximately 38 SunCatchers. A 12-foot-wide unpaved access road would run along the centerline of each row, with a 15-foot unpaved maintenance road extending 60 feet to each side of the maintenance road at each SunCatcher pair. A row 1000 feet long would be serviced by approximately 28,200 square feet of unpaved roadway. The distance between rows would be 72 feet.

Foundation elements for the SunCatchers would typically be mounted on a foundation consisting of a metal fin-pipe that is hydraulically driven into the ground. This foundation requires no concrete, generates no spoils, and the foundations can be completely removed when the Project is decommissioned. The metal fin-pipe foundation eliminates conventional drilling techniques that would generate soil cuttings, require dust suppression, and require the trucking and disposal of the cuttings. When conditions are not conducive to the use of the metal fin-pipe foundation, the foundation would consist of rebar-reinforced concrete constructed below grade.

The site layout would maintain pre-development drainage patterns where feasible. Grading would mostly be limited to smoothing of local surface undulations for

SunCatcher and access road construction. Paved roadways would utilize roadway dip crossings, referred to as Arizona Crossings, or low-flow culverts, at watercourse crossings. The Arizona Crossings would be at-grade and protected from erosion upstream and downstream by at-grade riprap blankets. The low-flow culverts would be 8- to 24-inch-diameter circular pipes buried beneath an above-grade roadway surface. The east-west on-site paved arterial roadway between the Main Services Complex and Dunaway Road would be designed as an evacuation route. Culverts on this roadway would have capacity for a 25-year flood, leaving the roadway surface drivable for all flows less than a 25-year return period.

Maintenance after flood events would consist of sediment removal from roadway surfaces and removal of sediment from around stem pipe risers upstream of low-flow culverts. More extensive roadway repairs may be required after major flow events. Sediment (desilting) basins are proposed upstream of 100 low flow crossings and at other areas within the project and at project boundaries for collection of sediment. Sediment basins are intended as best management practice for water quality and to minimize roadway maintenance (sediment clearing) after minor runoff events. Sediment periodically removed from these basins would be distributed on-site at undetermined locations as deemed necessary by the project owner. Basin sizes would range from 200 cubic yards to 600 cubic yards, with several larger basins to be sized at the time of final design. Sizing is intended to collect estimated annual sediment production for two years using a regional procedure developed for the Mojave Desert (USGS, 2006).

Although the SunCatcher arrangement would be designed to fit the local contours of the site, the density of dishes and the arrangement in straight parallel rows would result in many SunCatchers being installed directly into flood hazard areas and channels. Staff estimates, using a rough grading plan and flood hazard information provided by the applicant (**Soil and Water Resources Figure 3**), that approximately 5,150 SunCatchers would be placed in flood hazard areas, including active channels. The actual number of SunCatchers subject to flooding is expected to be higher considering the flood-prone areas not mapped in **Soil and Water Resources Figure 3**.

Access would be provided by approximately 27 miles of paved arterial roads, approximately 14 miles of unpaved perimeter roads, and approximately 234 miles of unpaved access roads. Arterial roads would be 24 feet in width, unpaved perimeter roads would be 12 feet in width. **Soil and Water Resources Table 2** provides a summary of roadway surfaces that would be installed in flood hazard areas based on rough grading plans and flood hazard information provided by the applicant. In total, approximately 92 miles of roadways, comprising 164 acres of area, would be installed in flood hazard areas. Most, approximately 90% by area, would be unpaved roads.

Soil and Water Resources Table 2
SES Solar Two Roadways in Flood Hazard Areas

Road Type	Road Length, in Feet	Road Length, in Miles	Road Width, in Feet	Road Area, in Acres
Paved Roads				
Arterial Main Access	31,002	5.9	24	17.1
Unpaved Roads				
Perimeter	12,013	2.3	12	3.3
SunCatcher Access	136,082	25.8	12	37.5
SunCatcher Maintenance	309,206	58.6	15	106.5
Total Unpaved Roads	457,301	86.6		147.3
All Roads				
Total	488,303	92.5		164.4

Note: These estimates are based on the floodplain mapping in **Soil and Water Resources Figure 3**. The final numbers for roadways in flood hazard areas is expected to be higher given the flood areas not mapped in **Soil and Water Resources Figure 3**.

The total land area disturbed by the construction of the SunCatcher field would be approximately 3,160 square feet per SunCatcher, including roadway construction, clearing, and grading. Assuming a minimum of 5,150 SunCatchers in flood hazard areas, total construction disturbance for the 30,000 SunCatcher array would be at least 374 acres in the floodplain. Approximately 164 acres of this would be permanent disturbance in the form of roads and SunCatcher foundations. This estimate is based on the flood hazard delineation provided by the applicant. The actual floodplain disturbance will be greater due to features placed in flood hazard areas not mapped by the applicant, as is described in the impacts section.

Additional project features would include:

- A 12-mile, 6-inch water pipeline approximately 30 inches underground off-site in the existing Evan Hewes Highway right-of-way (ROW). The pipeline would provide recycled waste water from the Seeley Waste Water Treatment Facility (SWWTF) located approximately 12 miles east of the proposed project site.
- An onsite, 42-acre Main Services Complex located generally in the center of the site for administration and maintenance activities. The complex would include an administration building, a maintenance building, a solar disk assembly building, a water treatment facility (described below), a perimeter fence, parking areas, a vehicle washing area, a 5,000-gallon fuel storage tank for vehicles, a 1-acre storm water retention pond, a chemical storage area, access roads, a storage area for hydrogen bottles, a water treatment facility, a lubricating oil recycling tank, a waste water treatment facility (or sewage holding tank), and various ancillary features.
- An onsite, 6-acre 750-MW Substation located generally in the center of the site, near the Main Services Complex.
- A 10.3-mile 730-MW/230-kV transmission line intended to connect to the existing San Diego Gas & Electric (SDG&E) Imperial Valley Substation located southeast of

the project site. The proposed transmission line would parallel the existing Southwest Powerlink transmission line in the existing right of way.

Water Supply and Use

Water for construction and operation of the SES Solar Two would be supplied by the SWWTP in Seeley, California, approximately 13 miles east of the project site. The existing SWWTP provides secondary treatment of municipal wastewater from the town of Seeley and the surrounding unincorporated area within Imperial County. The SWWTP currently processes approximately 150,000 gallons per day (gpd) of municipal wastewater, with capacity for 200,000 gpd. The secondary treated wastewater is currently discharged directly into the adjacent New River.

SES Solar Two has agreed to finance upgrades to the existing SWWTP to enable the plant to produce up to 250,000 gpd meeting California Code of Regulations Title 22 requirements regarding the quality of treated wastewater. The agreement entitles SES to acquire at least 150,000 gallons and up to 200,000 gallons of recycled water per day for project uses.

To access the recycled water, SES Solar Two would construct a 12-mile-long pipeline from the SWWTP, along Evan Hewes Highway, to the SES Solar Two facility. The pipeline would be buried within the road way right-of-way to a depth of 30 inches.

Water from the SWWTP would be treated at an on-site facility adjacent to the on-site substation to produce demineralized water for mirror washing. The water treatment system would consist of a reverse-osmosis water treatment complex, a hydrogen complex, two 175,000-gallon raw water storage tanks, a 140,000 fire flow tank, two 17,500-gallon demineralized water tanks, a 5,500-gallon potable water tank (potable water would be trucked in), and two 1-acre concrete lined evaporation ponds for brine from the demineralization process. The hydrogen complex would produce hydrogen from demineralized water.

Potable water for construction workers and for operations, including water for hand washing and other uses requiring potable water would be supplied by a local water supplier that has yet to be selected

Construction Water

Water demands during construction of the SES Solar Two project would be relatively light for an effort as large as that proposed. Water use during construction would be approximately 45,000 gpd on average, primarily for dust control. Peak water use during construction would be approximately 90,000 gpd, with approximately half used for dust control and half used for soil preparation on concrete pours. Fifteen peak days are expected during construction. Assuming a 39-month construction period, with 15 peak days, total construction water use would be approximately 54 million gallons (166 acre feet).

Upgrades to the SWWTP would be complete prior to initiation of project construction. The on-site concrete-lined evaporation ponds would be constructed in a timely manner and used as storage reservoirs for construction water from SWWTP, which would be trucked in to the site prior to completion of the water pipeline.

Operations Water

Operations water use after full construction would be approximately 33,550 gpd, with total annual use approximately 32.7 acre feet. The largest water use, approximately 14,980 gpd, would be solar mirror washing. Each mirror would be washed using an average of 14 gallons of water once per month, with another wash of approximately 42 gallons every 3 months. Other operations water uses include: 184 gpd for production of hydrogen through electrolysis in the hydrogen generator (hydrogen gas is used in the Solar Stirling Engine); 7,920 gpd of brine resulting from the water demineralization process; 5,600 gpd for on-site staff for drinking and sanitary purposes; and 5,000 gpd for dust control. **Soil and Water Resources Table 3** provides a summary of water use in gallons per minute and annual use in acre feet.

Soil and Water Resources Table 3
Water Usage Rates for Solar Two Project Operations

Water Use	Daily Average, in gallons per minute	Daily Maximum, in gallons per minute	Annual Usage, in acre feet
Equipment Water Requirements			
Sun Catcher mirror washing	10.4[1]	17.4[2]	14.2[3]
Hydrogen System	0.13[11]	0.13[11]	0.0133
Water Treatment System Discharge			
Brine from Demineralization Process	5.5	10.2[4]	7.5
Potable Water Use			
For drinking and sanitary water requirements	3.9[5]	4.7[6]	5.4[7]
Dust Control			
Raw water for dust control during operations	3.5[8]	6.9[9]	5.6[10]
Totals	23.3	39.2	32.7

Notes:
1 - Based on 30,000 SunCatchers requiring a monthly wash with an average of 14 gallons of demineralized water per spray wash and a 5-day work week (21 work days per month).
2 - During a 3 month period, all SunCatcher mirrors are given a scrub wash requiring up to 3 times the normal wash of 14 gallons per SunCatcher. Therefore, the Daily Maximum usage rate is based on two-thirds of the SunCatchers receiving a normal wash and one-third receiving a scrub wash.
3 - Based on every SunCatcher having approximately 8 normal washes per year with one additional scrub wash.
4 - Based on the maximum amount of demineralized water required for mirror washing and assumes a decrease in raw water quality requiring an additional 20% of system discharge.
5 - Assumes 30 gallons per person per day for 188 people.
6 - Maximum amount assumes a 20% contingency over the Daily Average.
7 - Assumes a 6-day work week and average daily usage.
8 - Assumes 5,000 gallons per day.
9 - Assumes up to 10,000 gallons per day.
10 - Assumes daily average dust control operations.
11 - Hydrogen system would require approximately 184 gallons of water per day or about 0.0133 acre feet per year.

Wastewater

Construction

Construction wastewater would consist primarily of storm water runoff from the site during construction, and sanitary wastes from portable toilets. Storm water runoff could be contaminated by excess sediment, trash, fuels, oils, grease, coolants, vehicle fluids, paints, solvents, and other construction-related pollutants. The applicant has developed a Storm Water Pollution Prevention Plan (SWPPP) that addresses construction pollutants. Construction waste material including recyclable scrap wood, steel, glass, plastic and paper would be collected and taken to a recycling facility at regular intervals not to exceed 30 days. Hazardous construction waste including empty containers, solvents, oils, paint, cleaners and adhesives would be collected on site and returned to the vendor or taken to a hazardous waste facility at regular intervals not to exceed 90 days. Waste oil and other fluids from construction vehicles would be collected on site and recycled or disposed of at a hazardous waste facility at regular intervals not to exceed 90 days. Lead acid, alkaline, gel cell, nickel, and cadmium batteries would be stored on site and taken to an authorized waste recycling facility at regular intervals not to exceed 90 days.

Non-hazardous residual solids (dirt and concrete particles) from the retention pond would be excavated at the end of construction and spread on-site. Non-hazardous trash including paper, wood, plastic and cardboard would be stored onsite and taken to approved recycling or waste disposal facilities at regular intervals not to exceed 90 days.

Sanitary wastewater from portable chemical toilets would be periodically pumped to a tanker truck by a licensed contractor and shipped to a sanitary water treatment plant. Construction storm water best management practices would include temporary soil stabilization techniques such as scheduling activities to minimize land disturbance during the rainy season, marking areas not to be disturbed, using geotextiles, mats, plastic covers, or erosion blankets to stabilize disturbed areas, soil binders, earth dikes, drainage swales, lined ditches, flow velocity protection measures, silt fences, straw bales, fiber rolls, dust palliatives, tracking control at site entry/exit points and stabilized construction roadways.

Operations

Operations wastewater would consist of onsite runoff which may be contaminated with excess sediment, trash and fluids from vehicles, the Main Services Complex and the substation, wastewater (brine from the reverse osmosis process), and sanitary wastes.

A SWPPP has been developed which addresses operations best management practices for storm water pollution control. This SWPPP is in the process of being updated by the applicant for operations conditions.

Brine from the reverse osmosis process, which would be high in total dissolved solids, would be discharged to one of two concrete-lined evaporation ponds. Ponds would be sized for one year of discharge, after the first pond is full, discharge would be transferred to the second pond while the first pond evaporates. The ponds would alternate on an annual basis. Solids from the evaporation process would be removed to a non-hazardous waste disposal facility.

Sanitary wastewater from the Main Services Complex would be discharged into a septic system with sanitary leach fields adjacent to the Main Services Complex. Two leach fields would be used, each designed for 100% of the waste water. These would be alternated in use every two years to allow recovery from bacterial loading. Sewer sludge would be pumped and disposed of by trucks to an approved off-site disposal facility.

Laws, Ordinances, Regulations, and Standards (LORS)

Soil and water resources LORS directly applicable to the proposed project and the surrounding area include Federal, State and local (Imperial County) laws and regulations. **SOIL AND WATER RESOURCES Table 4** provides a general description of Soil and Water Resources LORS applicable to the proposed project and surrounding lands.

Soil and Water Resources Table 4
Laws, Ordinances, Regulations, and Standards

Applicable LORS	Description
Federal	
Clean Water Act (33 U.S.C. Section 1251 et seq.)	The Clean Water Act (33 USC § 1257 et seq.) requires states to set standards to protect water quality, which includes regulation of storm water and wastewater discharges during construction and operation of a facility. California established its regulations to comply with the Clean Water Act under the Porter-Cologne Water Quality Control Act of 1967. The Clean Water Act (CWA) establishes protection of waters of the United States such as perennial and ephemeral drainages, streams, washes, ponds, pools, and wetlands through CWA Sections 401 and 404. Section 401 of the CWA requires that any activity which may result in a discharge into waters of the U.S. must be certified by the California State Water Resources Control Board (SWRCB) as administered by the Regional Water Quality Control Boards (RWQCB). This certification ensures that the proposed activity does not violate State and/or federal water quality standards. The SES Solar Two project is within the jurisdictional area of the Colorado River RWQCB. Section 404 of the CWA authorizes the U.S. Army Corps of Engineers (Corps of Engineers) to regulate the discharge of dredged or fill material to the waters of the U.S. and adjacent wetlands. The Corps of Engineers issues individual site-specific or general (Nationwide) permits for such discharges. Section 404 Permits are not granted without prior 401 certification (see above paragraph). Section 303(d) requires states to develop a list of impaired waters that do not meet water quality standards, establish priority rankings, and develop action plans, called Total Maximum Daily Loads (TMDLs) to improve water quality. Section 311 prohibits the discharge of oil or hazardous materials to waters of the U.S.
State	

Applicable LORS	Description
California Constitution, Article X, Section 2	This section requires that the water resources of the State be put to beneficial use to the fullest extent possible and states that the waste, unreasonable use or unreasonable method of use of water is prohibited.
The Porter-Cologne Water Quality Control Act of 1967, Water Code Sec 13000 et seq.	The Porter Cologne Water Quality Control Act of 1967, Water Code Section 13000 et seq., requires the SWRCB) and the nine RWQCBs (specifically the Colorado River RWQCB for the SES Solar Two site) to adopt water quality criteria to protect State waters (Waters of the State), defined in Section 13050 as “any surface water or groundwater, including saline waters, within the boundaries of the state.” Water quality criteria include the identification of beneficial uses, narrative and numerical water quality standards, and implementation procedures. Section 13260 sets reporting requirements for waste discharge to waters of the State. Section 13263 authorizes the RWQCBs to issue Waste Discharge Requirements specifying conditions for protection of water quality. Section 13181 of the act requires the SWRCB to develop water quality reports and lists required under Section 303(d) of the Federal Clean Water Act.
State Water Resources Control Board WQO 99-08	The SWRCB regulates storm water discharges associated with construction projects affecting areas 1 acre or larger to protect state waters. Under Order 99-08, the SWRCB has issued a National Pollutant Discharge Elimination System (NPDES) General Permit for storm water discharges associated with construction activity for which applicants can qualify if they meet the criteria and upon preparing and implementing an acceptable Storm Water Pollution Prevention Plan (SWPPP) and notifying the SWRCB with a Notice of Intent. A new General Permit is proposed to become effective July 1, 2010. This new permit would modify compliance and notification requirements based in part upon a water quality risk level assessment for each site.
State Water Resources Control Board WQO 2003-0003 – DWQ	This general permit applies to the discharge of water to land that has a low threat to water quality. Categories of low threat discharges include water storage tank flushing and testing.
California Code of Regulations, Title 17	Requires prevention measures for backflow and cross connections of potable and non-potable water lines.
California Code of Regulations, Title 22	Title 22, Division 4, Chapter 15 regulates the quality and use of recycled water and specifies Primary and Secondary Drinking Water Standards in terms of Maximum Contaminant Levels.
California Code of Regulations, Title 23	Title 23, Division 3, Chapter 15 applies to waste discharges to land and requires the Regional Board issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable.
Title 27, California Code of Regulations Division 2. Section 20375	Title 27 regulates and gives design requirements for surface impoundments used for waste management.

Applicable LORS	Description
California Plumbing Code. California Code of Regulations Title 24, Part 5	Appendix K relates to private sewage disposal systems. Regulates septic tank capacity, disposal fields and seepage pits, Requires: a) septic tank and disposal field system where groundwater is within 12 feet of the ground surface; b) disposal systems shall not be located in flood hazard areas; c) additional systems be installed if the original system is unable to absorb all of the sewage; and, c) leach lines must be more than 5 feet above groundwater (10 feet if groundwater is degraded).
State Water Board Resolution No. 68-16	Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings or facts.
California Water Code Section 1211	Section 1211 of the Water Code requires that before making a change in the point of discharge, place of use, or purpose of use of treated wastewater, the owner of the treatment plant must seek approval from the Division of Water Rights, which is accomplished by filing a Petition for Change for Owners of Waste Water Treatment Plants (Petition for Change).
Local	
Imperial County Land Use Ordinance, Title 9	Division 16 is the flood damage prevention regulation. Restricts floodplain uses, requires that floodplain uses be protected against flood damage, controls alteration of floodplains and stream channels, controls filling and grading in floodplains, prevents diversion of flood flows where these would increase flood hazards in other areas. Division 22 is the groundwater ordinance. Intended to preserve, protect and manage groundwater within the county. Division 10 regulates building, sewer and grading. Includes regulations on septic tanks.
State Policies and Guidance	
Water Quality Control Plan Colorado River – Region 7	The Water Quality Control Plan (also known as the Basin Plan) establishes beneficial uses, water quality objectives that protect the beneficial uses of surface water and groundwater, and describes an implementation plan for water quality management in the Colorado River Region. The Basin Plan describes measures designed to ensure compliance with statewide plans and policies and provides comprehensive water quality planning.
Integrated Energy Policy Report (Public Resources Code, Div. 15, Section 25300 et seq.)	In the 2003 Integrated Energy Policy Report, consistent with SWRCB Policy 75-58 and the Warren-Alquist Act, the Energy Commission adopted a policy stating they would approve the use of fresh water for cooling purposes by power plants only where alternative water supply sources and alternative cooling technologies are shown to be “environmentally undesirable” or “economically unsound.”
SWRCB Sources of Drinking Water Policy / Res. No. 88-63	States that all groundwater and surface water of the State are considered to be suitable for municipal or domestic water supply with the exception of those waters that meet specified conditions.
SWRCB Res. No. 2005-0006	Adopts the concept of sustainability as a core value for State Water Board programs and directs its incorporation in all future policies, guidelines, and regulatory actions.

Applicable LORS	Description
SWRCB Res. No. 2008-0030	Requires sustainable water resources management such as low impact development (LID) and climate change considerations (all future policies, guidelines, and regulatory actions. Directs Regional Water Boards to “aggressively promote measures such as recycled water, conservation and LID Best Management Practices where appropriate and work with Dischargers to ensure proposed compliance documents include appropriate, sustainable water management strategies.”
California Water Code Section 13523	Requires that a RWQCB shall prescribe water reuse requirements for water, which is to be used or proposed to be used as recycled water after consultation with and upon receipt of recommendations from the State Department of Public Health, and if it determines such action to be necessary to protect the public health, safety, or welfare.
The California Safe Drinking Water and Toxic Enforcement Act	The California Health & Safety Code Section 25249.5 et seq. prohibits actions contaminating drinking water with chemicals known to cause cancer or possessing reproductive toxicity. The RWQCB administers the requirements of the Act.
Local Policies and Guidance	
County of Imperial Engineering Design Guidelines Manual for the Preparation and Checking of Street Improvements, Drainage and Grading Plans Within Imperial County	Provides drainage design standards for development within Imperial County. These include: • Retention volume of 3 inches rainfall with no assumed infiltration or evaporation for development impervious areas. Retention basins are to empty within 72 hours after receiving water. • Finished pad elevations for buildings shall be at or above the 100-year flood elevation. Finished floors shall be 6 inches above the 100-year flood. • Drainage report required for all developments.

C.7.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section provides an evaluation of the expected direct, indirect, and cumulative impacts to soil and water resources quality caused by project construction, operation, and maintenance. Staff’s environmental impact analysis consists of a brief description of the potential effect, an analysis of the relevant facts, and application of threshold criteria for significance to the facts. If mitigation is warranted, staff provides a summary of the Applicant’s proposed mitigation and a discussion of the adequacy of the proposed mitigation. If necessary, staff presents additional or alternative mitigation measures and refers to specific conditions of certification related to a potential impact and the required mitigation measures. Mitigation reduces potentially significant environmental impacts to less than significant levels.

DIRECT/INDIRECT IMPACTS AND MITIGATION

The direct and indirect impact and mitigation discussion presented below is divided into a discussion of impacts related to construction and a discussion of impacts related to operation. For each potential impact evaluation, staff describes the potential effect and applies the threshold criteria for significance to the facts. If mitigation is warranted, staff provides a summary of the applicant's proposed mitigation and a discussion of the adequacy of the proposed mitigation. In the absence of an applicant-proposed mitigation or if mitigation proposed by the applicant is inadequate, staff mitigation measures are recommended. Staff also provides specific conditions of certification related to a potential impact.

Proposed Project – Construction Impacts and Mitigation

Soil Erosion Potential by Water and Wind

Construction of the project is expected to take approximately 40 months to complete. Construction would include soil excavation, clearing, grading, installation of solar disks, installation of the laydown area, and construction of the Main Services Complex, roads, utilities, water pipeline, transmission line, sediment and retention basins, substation, and other ancillary features. Groundwater would not be used. Water from the Seeley Wastewater Treatment Plant would be used for dust control and concrete pours.

Potential impacts to soils related to increased erosion from wind and runoff on disturbed areas, or release of hazardous materials, are possible during construction. Potential storm water impacts could result if increased runoff flow rates and volume discharge from the site were to increase flooding and sedimentation downstream. Dunaway Road and the area upstream of the Westside Main Canal could be affected by increased sediment deposition. Water quality could be impacted by increased sediment load from the ground surface and from discharge of hazardous materials released during construction. Site preparation would consist of brush trimming between alternating rows of SunCatchers and grading for roadways and foundations. Grading within the SunCatcher array would consist of limited removal of terrain undulations and localized rises or depressions.

Table 5 provides a summary of the expected disturbance on the site. Total construction disturbance would be 3,000 acres, of which 2,175 acres would be in the SunCatcher array, the rest in other construction as detailed in **Soil and Water Resources Table 5.**

Soil and Water Resources Table 5
Estimated Disturbed Area Summary

Project Component	Area		Proposed Length	Comments
	Construction Disturbance	Operations Permanent Disturbance		
Off-Site Development				
Off-site access road	4.5 acres	3.6 acres	1.3 miles	30-foot width for roadway and drainage
Off-site transmission line	91.6 acres	Included below	7.6 miles	50 feet each side of center
Tower structures	Included above	1.2 to 1.4 acres	Not Applicable	85 to 100 towers x 1,024 SF per tower
Waterline and pumping station	8.0 acres	1 acre	3.4 miles	9.5 feet each side of center

Project Component	Area		Proposed Length	Comments
	Construction Disturbance	Operations Permanent Disturbance		
Off-site electrical and communications overhead service	0.3 acre	Included below	539 feet	12 feet each side of center
Poles	Included above	26 SF	Not Applicable	2 poles x 13 SF per pole
Subtotal	104.4 acres	4.6 acres		
On-Site Balance-of-Plant Development				
Construction staging and construction administration area east of Dunaway Road	100 acres	Not Applicable	Not Applicable	Not Applicable
On-site construction laydown area	12 acres	Not Applicable	Not Applicable	Not Applicable
Site boundary fence line	29.9 acres	14.9 acres	20.5 miles	12-foot width construction access; 3 feet each side of the fence
Site paved roadways	137.6 acres	137.6 acres	25.2 miles	45-foot width for roadway & drainage
Unpaved perimeter roadways	16.2 acres	16.2 acres	11.2 miles	12 feet wide
Main Services Complex, parking and services	14.4 acres	14.4 acres	Not Applicable	Not Applicable
Assembly buildings and storage	14 acres	Not Applicable	Not Applicable	Not Applicable
On-Site Wet and Dry Utilities Access				
Water pipeline	8.7 acres	Not Applicable	3.8 miles	9.5 feet each side of center
On-site electrical and communications overhead service	3.8 acres	Not Applicable	6,914 feet	12 feet each side of center
Solar Two Substation	7.7 acres	5.2 acres	Not Applicable	650 feet by 350 feet
On-site transmission line 34.1 acres N/A 2.8 miles 50 feet each side of center line	34.1 acres	Not Applicable	2.8 miles	50 feet each side of center
Transmission access road	Included above	4.1 acres	2.8 miles	12 feet wide
Transmission tower structures	Included above	0.5 to 0.7 acre	Not Applicable	35 to 40 towers at 1,024 SF per tower

Project Component	Area		Proposed Length	Comments
	Construction Disturbance	Operations Permanent Disturbance		
34.5-kV overhead runs to Solar 2A Substation	4.0 acres	Not Applicable	Not Applicable	10.95 miles by 12 feet wide with a significant portion overlapping other construction disturbed areas (75%)
Poles	Included above	0.1 acre	Not Applicable	Not Applicable
34.5-kV runs to overhead lines	5.2 acres	Not Applicable	Not Applicable	Not Applicable
Subtotal	271.31 acres			
Solar Field Development = 500 by 1.5-MW Solar Groups 2,3				
North-south access routes	245 acres	245 acres	168 miles	1,709 feet per 1.5 MW (0.47 acre total) based on 12-foot-wide road
East-west access routes	148.3 acres	148.3 acres	102 miles	1,033 feet per 1.5 MW (0.28 acre total)
Electrical Collection System				
600 V underground	35 acres	Not Applicable	576 miles	5,850 feet per 1.5 MW (0.52 acre total) based on 2-foot each side of center
34.5 kV underground	20 acres	Not Applicable	45 miles	460 feet per 1.5 MW (0.06 acre total) based on 3-foot each side of center
SunCatcher Installation				
North-south access/ SunCatcher	440 acres	440 acres	See total area	1,600 feet per 1.5 MW (0.88 acre total) based on 20-foot by 32-foot access/unit
East-west access/ SunCatcher	1,735 acres	1,735 acres	See total area	4,200 feet per 1.5 MW (3.47 acres total) based on 36-foot by 70-foot access/unit
Subtotal	2,623.4 acres	2,568.4 acres		
Total Area	3,075.1 acres	2,746.6 acres		

Source: SES, 2008a, SES, 2009a.
Notes: 1 - Refer to AFC Figures 3-1 through 3-3 for locations of Project components.
2 - Assumes 750-MW net development of 30,000 SunCatchers.
3 - Reference AFC Figure 3-28, 1.5-MW Solar Two Construction Disturbance Plan.

During installation of the SunCatchers, only 50% of the total land would be disturbed. The modularity of the SunCatcher design and off-site manufacturing would enable a phased deployment, thereby minimizing the proportion of the overall site that is disturbed at any give time during construction.

The plan site layout minimizes traffic road operations of the Project.

kV = kilovolt
MW = megawatt
N/A = not applicable
SF = square feet
V = volts

The soils on the project site (See **Soil and Water Resources Table 1** and associated text) are highly susceptible to wind erosion under normal conditions. The paucity of vegetation on the site contributes to a natural propensity for wind erosion, although the potential for wind erosion is expected to be less in the watercourses than in the upland areas due to much higher density of vegetation in the riparian areas. The Applicant estimates that potential soil loss due to wind under existing conditions to be more than 100 tons per acre per year for the SES Solar Two site. This soil loss may more accurately be considered displacement, since soil lost by wind in one area of the Yuha Desert would likely settle in another, so under natural conditions, there is no overall net loss of soil in any given area. Disturbance by grading and vegetation removal in a specific area leaves soil particles in that area more vulnerable to detachment by wind, resulting in more net loss, or displacement. Wind-related soil loss is expected to occur on the site, and given the overall size of the disturbed area could be substantial during construction depending on wind conditions. This could result in the net loss or displacement of topsoil on the site, as well as air quality and dust nuisance problems. Since the prevailing wind in the area for 11 months of the year is toward the east, dust from the site could reach Seeley, El Centro and the neighboring agricultural area.

The applicant proposes the following measures to reduce wind-related erosion:

Soil-1: Conduct grading operations consistent with the Imperial County Grading Ordinance.

Soil-2: Prepare and implement a detailed Erosion Control Plan before construction, which may be a component of the Storm Water Pollution Prevention Plan.

Soil-3: Limit soil erosion/dust generation by wetting active construction areas (including roads) with water or by applying dust palliatives (soil binders).

Soil-4: Stabilize disturbed areas that would not be covered with structures (e.g., buildings or collectors) or pavement after grading and/or cut-and-fill operations. Stabilization methods would include moisturizing and compacting and/or application of polymeric soil stabilizers. The disturbed areas of the water line route would be reseeded using a seed mixture native to the area.

Soil-5: Minimize disturbance of soils and vegetation by reducing access and construction areas to smallest practical dimensions.

Soil-6: Cut/mow vegetation when removal is necessary; clear vegetation only to the extent necessary during construction activities.

Soil-7: Segregate and stockpile removed topsoil for reuse if practicable.

Soil-8: Implement drainage control measures and grade the Project Site to direct surface water into the retention basins.

Soil-9: Conduct post-construction monitoring of areas that were disturbed during the construction phase.

In addition to the soil mitigation measures identified above, the applicant has proposed the following BMPs for consideration:

- Temporary soil stabilization (SS) techniques, such as scheduling construction sequences to minimize land disturbance during the rainy and non-rainy seasons and employing BMPs appropriate for the season; preserving existing vegetation by marking areas of preservation with temporary orange propylene fencing; using geotextiles, mats, plastic covers, or erosion control blankets to stabilize disturbed areas and protect soils from erosion by wind or water; using earth dikes, drainage swales, or lined ditches to intercept, divert, and convey surface runoff to prevent erosion; using outlet protection devices and velocity dissipation devices at pipe outlets to prevent scour and erosion from storm water flows; and/or using slope drains to intercept and direct surface runoff or groundwater to a stabilized water course or retention area.
- Sediment Control (SC) techniques, such as using silt fences, straw bales, and/or fiber rolls to intercept and slow the flow of sediment-laden runoff such that sediment settles before runoff leaves the site.
- Wind Erosion (WE) control by applying water or dust palliatives, as required, to prevent or alleviate windblown dust.
- Tracking Control (TC) techniques to limit track-out of soil by vehicles, such as using stabilized points of entering and exiting the Project Site and stabilized construction roadways on the site.
- Other measures, as appropriate, to comply with the regulations.

The applicant has prepared a draft Drainage, Erosion and Sediment Control Plan/SWPPP (DESCP) which describes a series of best management practices intended to reduce wind erosion during construction, including applying water or other dust palliatives as to prevent or alleviate dust nuisance generated by construction activities, covering small stockpiles or other areas subject to wind erosion, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, haul truck covers, installing vegetation, mulching, minimizing surface areas to be disturbed, limiting on-site vehicle traffic speed, controlling the number and activity of vehicles on the site, and application of soil binders.

Staff recommends implementation of a final (DESCP) in accordance with Condition of Certification **SOIL&WATER-1** to ensure adequate BMPs are in place to address and mitigate potential erosion and loss of soil from wind.

The erosion potential by water during construction is expected to increase as a result of loss of vegetative cover, removal of surface crust and desert pavement, and increased local sediment transport through creation of localized gullies and rills on newly graded slopes. The Applicant proposed measures listed above are intended to mitigate erosion by storm water during construction. The DESCP by the Applicant includes best management practices for water erosion control which include such measures as silt fences, sediment barriers, grading restrictions, soil binders, temporary stabilized drains, brush barriers, sediment basins, strawbale barriers, fiber rolls, and sand bags.

The Applicant has made an estimate of soil erosion rates using the Revised Universal Soil Loss Equation (RUSLE2). The RUSLE2 equation estimates erosion-related soil loss from a land surface using climate, soil conditions, topography, land cover, support (best management) practices, and hydraulic resistance. The results are presented in Table 6.

The RUSLE2 analysis results shows that the Rositas soil association, which covers all of the Phase I area and most of the Phase II area, has the potential for producing approximately 0.042 to 0.42 tons per acre of water-borne sediment per year. Assuming Rositas Silt Loam soils, this amounts to only about 8.4 cubic feet per year per acre, which is a reflection of the very low rainfall of the area. At this rate, the worst-case annual watershed sediment production potential from the 3,075-acre disturbed area would be approximately 950 cubic yards. The analysis also shows that the proposed BMPs would be sufficient to mitigate sediment production during construction. Staff has made an independent RUSLE2 evaluation using very preliminary and simplified BMP inputs, with similar preliminary results. Results should be revisited at the time of final design and based on specific BMPs and monitoring procedures.

The erosion-control plan by the applicant includes the construction of approximately 100 sediment basins throughout the project. These would be designed to collect two or more years of sediment accumulation as estimated according to a procedure developed by the United States Geological Survey (USGS, 2006). These sediment basins would have an aggregate capacity of at least 21,000 cubic yards. According to this estimate, the project site would produce approximately 1 cubic yard (1.35 tons) of sediment per acre per year, which is roughly equivalent to the annual estimate for Rositas Silt Loam under construction conditions with no BMPs in **Soil and Water Resources Table 6**. With these basins in place, along with other construction-related best management practices proposed in the DESCP, construction-related sediment production from the site, as modeled by the RUSLE2 analysis, is expected to be less than the existing sediment production from the site.

The sediment basins would be located in the bed of stream channels and are expected to prevent excess sediment from normal site flows from being transported downstream to the detriment of downstream areas such as Dunaway Road and adjacent property. They would not mitigate surface detachment and rill erosion on the watershed surface within the solar disk array and other disturbed areas. Silt fencing, soil binders and other best management practices proposed in the DESCP are intended to mitigate these impacts. Condition of Certification **SOIL&WATER-1** would ensure that sediment basins and other construction BMPs are constructed in a timely manner to mitigate potential runoff erosion and loss of soil from wind.

Soil and Water Resources Table 6
Soil Erosion Rates

Soil Type	Existing (ton/ac/yr)	Construction– Cut Area with No BMPs (ton/ac/yr)	Construction– Fill area with No BMPs (ton/ac/yr)	Construction– Average with No BMPs (ton/ac/yr)	Construction with BMPs (ton/ac/yr)	Operations with BMPs (ton/ac/yr)
Rositas Sand and Fine Sand, 0% to 9% Slopes	0.042	0.042	0.14	0.091	<0.042	<0.042
Rositas Loamy Fine Sand, 0% to 2% Slopes	0.082	0.081	0.25	0.17	<0.082	<0.082
Rositas Silt Loam 0% to 2% Slopes	0.42	0.42	1.3	0.86	<0.42	<0.42
Meloland Fine Sand	0.017	0.017	0.054	0.036	<0.017	<0.017
Vint Fine Sandy Loam	0.13	0.13	0.41	0.27	<0.13	<0.13
Indo Loam	0.25	0.25	0.76	0.51	<0.25	<0.25

Source: SES, 2008a

Notes:
< = less than
% = percent
BMP = Best Management Practice
ton/ac/yr = tons per acre per year
Soil erosion rates reflect sheet flow and rill erosion caused by storm water runoff and were calculated using the Revised Universal Soil Loss
Equation (Version 2), RUSLE2 computer program.
BMP = Erosion and Sediment Control Best Management Practice (Erosion Blanket, Mulch, Silt Fence, Fiber Roll, or Final Stabilization, etc.).

A Mitigated Negative Declaration (MND) has been prepared for the proposed improvements to the SWWTP (Dudek, 2009). This document is incorporated herein by reference. This document concluded that impacts related to soil loss and the erosion of topsoil associated with the improvements to the SWWTP were less than significant. This document states: “Construction of the proposed improvements could result in a temporary increase in erosion and sedimentation from soil disturbance at the project site. However (accordance with National Pollutant Discharge Elimination System (NPDES) regulations, a Storm Water Pollution Prevention Plan (SWPPP) and use of Best Management Practices (BMPs) would be implemented during construction (Mitigation Measure HYD-2). Erosion and sediment control BMPs may include, but are not limited to: installation of sediment barriers such as silt fence, straw wattles, and gravel/sand bags to prevent offsite sedimentation; dust abatement measures to minimize fugitive dust; removal of soil tracked onto paved surfaces; stabilizing or removing trench spoil and stockpiles; and avoiding construction and grading during periods of inclement weather. Project adherence with these standard construction measures would ensure potential soil erosion impacts would be less than significant.” MND Mitigation Measure HYD-2 is described below under Wastewater.

Project Water

The applicant estimates that construction water for dust control and ground preparation for concrete pours would average 45,000 gallons and not exceed 90,000 gallons per day, which is within the agreed-upon delivery of water from the Seeley Wastewater Treatment Plant. Condition of Certification **SOIL&WATER-2** would ensure viability of a water supply and ensure that water use be within the amount analyzed herein. With Condition of Certification **SOIL&WATER-2**, no adverse water supply impact is anticipated for project water during construction.

The on-site concrete-lined evaporation ponds will be used as storage reservoirs for construction water from SWWTP, which will be trucked in to the site prior to completion of the water pipeline. Water quality impacts could occur to groundwater through infiltration of this treated wastewater. The Colorado River RWQCB will be requiring monitoring of groundwater during this period. Compliance with **SOIL&WATER-3** will ensure no adverse impact to groundwater from storage of this water in the evaporation ponds.

Potable water for the construction workforce would be supplied from an offsite source yet to be determined. Condition of Certification **SOIL&WATER-4** would ensure that this water come from a water purveyor licensed to provide potable water in the state of California and that the supply provided to SES Solar Two be within the licensed capabilities of the purveyor, ensuring less than significant water supply impact for construction potable water.

Storm Water

Storm water runoff from the site during construction could include excess sediment, trash, oils, solvents, paints, cleaners, asphaltic emulsions, mortar mix, spilled fuel, vehicle fluids and other construction-related contaminants from the construction activity. The applicant proposes to collect and remove construction waste, including hazardous wastes, according to a regular schedule. The site construction would require a Stormwater Pollution Prevention Plan which would specify Best Management Practices (BMPs) that would prevent all construction pollutants including erosion products from contacting storm water, eliminate or reduce nonstorm water discharges to waters of the nation, and provide for inspection and monitoring of BMPs. Conditions of Certification **SOIL&WATER-1** and **SOIL&WATER-5** are intended to ensure adequate control of construction storm water pollutants.

Wastewater

Portable chemical toilets would be used for construction sanitary wastes. Sanitary wastewater from these toilets would be periodically pumped to a tanker truck by a licensed contractor and shipped to a sanitary water treatment plant. Condition of Certification **SOIL&WATER-5** will ensure proper handling of construction sanitary wastes.

The SWWTP MND states that the SWWTP upgrades would not violate water quality standards or waste discharge requirements and that related impacts would be mitigated to a less than significant level through two MND mitigation measures:

Mitigation Measure HYD-1: Prior to distribution of any treated water for public use, the (Seeley County Water) District shall submit an engineering report to the California Department of Public Health (CDPH) and the Colorado River RWQCB.

Mitigation Measure HYD-2: Seeley County Water District shall prepare a Notice of Intent to prepare a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP would address water quality impacts associated with construction and operation of the project. To mitigate impacts from short-term erosion and discharge of pollutants, all best management practices (BMPs) identified in the SWPPP would be implemented. The SWPPP shall be consistent with the requirements of the County, Clean Water Act and the BMPs of the Region 7 Regional Water Quality Control Board. Construction BMPs shall include, but may not be limited to the following:

- Limit construction access routes and stabilize access points;
- Stabilize denuded areas with seeding, mulching or other methods;
- Stake/mark construction limits;
- Designate specific areas of the site, away from storm drain inlets and drainage features for the storage, preparation and disposal of construction materials, chemical products and waste; for auto equipment parking; and for routine vehicle and equipment maintenance; store stockpiled materials and wastes under a roof or plastic sheeting; berm around stockpile/storage areas to prevent contact with runoff;
- Perform major maintenance, repair and vehicle and equipment washing off-site or in designated and controlled areas on-site;
- Sweep up spilled dry construction materials (cement, fertilizer, etc.) immediately; water would not be used to wash them away; and
- Clean up liquid spills on paved or impermeable surfaces using "dry" clean-up methods (e.g. absorbent materials, cat litter, rags) and dispose of clean-up materials properly.

Construction wastes are addressed in Section C.15 of this document. Conditions of Certification **WASTE-3** (Construction Waste Management Plan), **WASTE-6** (Reuse/ Recycling Plan) address construction wastes to further ensure minimal water quality impact from construction wastes.

<u>Proposed Project – Operation Impacts and Mitigation</u>

Soil Erosion Potential by Water and Wind

Wind erosion could occur on cleared and graded areas during project operation. This could result in loss of topsoil, nuisance deposition of wind-blown soil on other areas, and air quality problems for the El Centro and adjacent agricultural areas to the east, which is in the direction of the prevailing wind flow.

Under project operations disturbed and cleared areas, primarily within the SunCatcher field, would be subject to increased erosion potential due to the removal of vegetation, the removal of desert pavement, the disturbance of the surface crust, and the placement of SunCatcher foundation poles in the flow path. The result of surface disturbances and the presence of SunCatchers in the flow path could be long-term erosional degradation of the soil surface within the SunCatcher array and in the intervening undisturbed areas, as well as increased sediment discharge offsite across Dunaway Road and toward the east where the Westside Main Canal and New River flow.

The DESCP prepared by the applicant states that site soil stabilization would occur following construction and that several alternatives are being considered to determine which solution best achieves the desired effect to minimize wind erosion, prevent water erosion, minimize weed and undesired vegetation growth, as well as providing a suitable work surface. Soil binders would be used in high traffic areas. Some areas may be covered or stabilized. The laydown areas would be returned to "as found" condition as practical by removing all material placed there for the construction effort and then by restoring the soil to a native condition.

Conditions of Certification **SOIL&WATER-1** and **SOIL&WATER-5** would ensure surface erosion protection and protection against wind erosion and increased runoff-borne sediment load from the watershed surface. With the proposed BMPs in place as described in the DESCP, soil surface erosion due to wind and surface runoff would be minimized.

Localized summer monsoon storms can produce high-intensity rainfall spawning variable and unpredictable flash flooding on the project area. Flooding from these types of storms can be locally severe, with deep flows and high flow velocities. The aridity of the region results in sparse vegetative cover. Soils are generally sandy and subject to erosion during flood events. Consequently, the potential for channel bank erosion and transport of sediment downstream is high.

Soil and Water Resources Figures 4, 5 and 6 show typical channel patterns on the project site. **Soil and Water Resources Figure 4** shows a view of the G North watercourse in the southwest corner of Section 15. **Soil and Water Resources Figure 5** is an oblique aerial photograph of the same area. These images show a typical alluvial fan on Phase II with a braided but confined main channel upstream of the fan, a fan apex, and an alluvial fan with spreading, unconfined channels. At about right center in the **Soil and Water Resources Figure 5** photograph, the local hills diminish in size at the fan apex and the main channel splits into a series of smaller channels on the fan surface. Alluvial fans typically form where confined streams discharge onto relatively flat, unconfined plain areas. As sediment transported from upstream is deposited on the plain, local channels fill and flows can take new paths by avulsion. The alluvial fan surface is covered by radiating flow paths, any one of which, or all, can be taken by any flood. The flood pattern on alluvial fans for any given flood is unpredictable.

Soil and Water Resources Figure 6 shows typical braided channel conditions in the C North watercourse of the Phase I portion of the project. Braided channels can be formed by streams with steep slopes, high sediment load and easily erodible banks. They are characterized by multiple, shifting channels and alluvial islands. The response of braided streams to floods is difficult to predict because they are unstable, rapidly change their alignment, carry large quantities of sediment, and are wide and shallow even at flood flow (SLA, 1982). As floods occur local channels fill and shift across the braided surface in a local avulsion process contained by the adjacent hills. At the location of **Soil and Water Resources Figure 6**, a series of approximately 17 interconnected braided channels, across a width of approximately 320 feet, conveys the Drainageway C North flows. Most braids at this location are 10 feet or less in width.

Most of the medium to large size watercourses on the SES Solar Two site exhibit braiding or alluvial fan characteristics, or both. The site watercourses are typically unstable, with erodible banks, and are capable of rapidly shifting position where not constrained by high ground.

SunCatcher foundation poles in the flow path would create local areas of flow turbulence, resulting in local stream scour around the foundation poles. Scour such as this occurs on bridge piers, resulting in the need to bury bridge piers to a depth below the depth of scour to ensure stability. SunCatchers subject to scour could also become unstable if the scour is deep enough to undermine the structural foundation, resulting in collapse and potentially damaging and polluting the ground surface with mirror fragments and other SunCatcher debris.

The HEC-RAS model used as a basis for floodplain modeling by the applicant is widely accepted and very effective at modeling floodplains characterized by an incised channel with well-defined overbank areas. HEC-RAS is not as effective at delineating flood hazards in wide braided channels and alluvial fan areas subject to erosion and channel avulsions as occurs on most of the SES Solar Two site. HEC-RAS models flow from cross section to cross section using a one-dimensional energy equation. In the model, flow is assigned to the lowest area of a stream cross section first, and the water level is increased equally in the model until the energy equation is balanced with the previous modeled cross section. The result is a single, flat water surface across each cross section. In the case of braided or alluvial fan conditions, where flow direction can be two-dimensional with variable water surfaces across a cross section, HEC-RAS may give inaccurate results. To illustrate this, **Soil and Water Resources Figure 7** shows HEC-RAS Cross Section 9469.782 in the G North floodplain. This cross section is in the eastern portion of Construction Phase II approximately ½-mile downstream of the transmission line. The floodplain mapped by HEC-RAS is 646 feet wide. A geomorphic evaluation based on field observations, topographic maps and aerial photographs indicates the actual flood hazard area at this location is closer to 1,490 feet in width as indicated by the presence of visible wash beds. As floods occur on this cross section it is likely there would be variable water surface elevations across the cross section.

Numeric floodplain modeling on braided streams and alluvial fans can be accomplished by two-dimensional analysis for which a number of computer models exist. These models can be more accurate than HEC-RAS, but also have limitations. A simple and effective way to evaluate flood hazards is to use a qualitative geomorphic analysis based on observable factors such as topography, visible presence of past flow, vegetation patterns, soil characteristics, and visible presence of surface features not compatible with frequent flows (for instance desert pavement).

The floodplain mapping in **Soil and Water Resources Figure 3** attempts to account for HEC-RAS inaccuracies by including an interpreted 100-year floodplain to supplement the HEC-RAS output in areas where the HEC-RAS output is clearly inaccurate. Staff considers these floodplain limits and HEC-RAS modeling to be an approximate representation of the main flood-prone areas on the project site, but that the mapping is not complete. Additional geomorphic or two-dimensional analysis should be conducted prior to final design to more accurately map flood hazard areas. Actual flood-prone areas would be more extensive in areas where active or potentially active braided channels and alluvial fan characteristics extend beyond the HEC-RAS interpretive limits, and where smaller drainageways were not mapped.

Staff considers the HEC-RAS data provided by the applicant to be useful for determining probable hydraulic data, such as potential flow depths and flow velocities. Flow velocities and depths for the 100-year flood as estimated from the HEC-RAS modeling are fairly uniform across the site. Flow depths on the site average approximately 1.2 feet, with flow velocities approximately 3 feet per second. No flood depths in excess of 2 feet were modeled within the Phase I and Phase II boundaries. Maximum flow velocity for both areas is 4.7 feet per second.

The applicant proposes to bury SunCatcher foundations a sufficient depth to protect against 5 feet of scour. Staff estimates using hydraulic information from the HEC-RAS analysis, and the assumption of a 2-foot diameter foundation, that total 100-year scour at SunCatchers would be 5 feet or less in most, but not all, cases. Scour depth is estimated to be deeper than 5 feet in several areas, and if long-term stream degradation and debris accumulation on SunCatcher foundations is considered, the scour depth could be greater than 5 feet in many cases.

The site contains a large number of small drainageways not mapped in **Soil and Water Resources Figure 3**. Most originate on-site. **Soil and Water Resources Figure 8** shows a network of unmapped drainageways in the area of the Main Services Complex. **Soil and Water Figure 9** is a ground photograph of one of the drainageways shown in **Soil and Water Resources Figure 8.** These **Soil and Water Resources Figure 8** drainageways are approximately 80 to 300 feet wide in the area of the Main Services Complex, and converge to approximately 2,000 feet wide farther downstream. They exhibit the same braided pattern described above for the larger drainageways. Although these drainageways are relatively wide, the contributing watersheds for them are small. The beginning of the channel shown in **Soil and Water Resources Figure 9** is only 3,700 feet upstream. Small drainageways such as this exist throughout the site, but are more pronounced in the hillier Phase I area than Phase II area. In Phase I they run mostly north-south and are spaced roughly 300 feet apart through most of the area. Width ranges from 3 feet to about 400 feet or more including braids. Some drainageways in the Phase II area exhibit alluvial fan characteristics as they discharge onto the flatter Phase II slopes.

The flood hazard area of the small drainageways is approximately equivalent to the visible channel width. Although not modeled by the applicant, based on the hydrology and HEC-RAS results for the modeled watercourses, it is expected 100-year flood depths and velocities would be less than 1 foot and 3 feet per second, respectively.

Some SunCatchers could be placed in unmapped flood hazard areas without benefit of scour protection. Condition of Certification **SOIL&WATER-7** is proposed to prevent soil surface damage and contamination resulting from SunCatcher instability in all areas. Condition of Certification **SOIL&WATER-1** would also mitigate impacts associated with stream scour and SunCatcher instability.

Stream morphology in areas subject to direct impingement of flow could be altered by local diversions of flow by SunCatcher foundations. Local (pier) scour holes would form around the dish foundations during flooding. Each SunCatcher foundation in the flow path could have a scour hole roughly12 feet in diameter around it (including the foundation post), assuming an average pier scour depth of 3 feet, and an angle of repose of 30 degrees for sand, during a 100-year flood. The total land area subject to disturbance by scour around the 5,150 dish foundations in the floodplain could be 13 acres.

Scour holes would likely refill, at least partially, as the flood discharge subsides, but local scour during floods would be a continuing feature of the project. The turbulence created by local scour at dish foundations would result in the potential for increased local erosion and possibly new channel avulsions. The potential for adverse impact from induced local erosion and channel avulsions is expected to be more severe in the Phase II area because of the generally flatter terrain and higher flow discharges in Phase II. Phase II also has the presence of adjacent property not a part of the SES Solar Two Project, upon which these impacts could be manifested. The Phase I area would be subject to the same influences, but streams in this area are better confined by local topography.

Basic stream morphology and sediment transport characteristics could be affected by the project. Natural streams are typically in a state of dynamic equilibrium in terms of sediment transport. On average, the amount of sediment that a reach of a stream is capable of transporting is equal to the amount of sediment delivered to the reach from upstream. Should the amount of sediment delivered to a reach exceed the capacity of the stream to transport sediment the stream channel would tend to aggrade (accumulate sediment in the stream bed) as a result of the sediment delivery being in excess of the sediment transport capacity. A decrease in sediment delivery can result in stream degradation (lowering of the stream bed) as the sediment delivery is less than the sediment transport capacity and the stream takes sediment from the bed.

Stream channels are the most heavily vegetated areas on the property. **Soil and Water Figure 10**, from Drainage C in **Soil and Water Figure 3**, shows the relative density of vegetation within the stream channels as opposed to the watershed surface. The project proposes clearing vegetation along the parallel rows of SunCatchers. The width of clearing would be approximately 130 feet, with approximately 72 feet left undisturbed between rows. Clearing of vegetation and smoothing of surface irregularities, also proposed by the applicant, would result in a local decrease in channel or floodplain roughness, or resistance to flow, which could result in an increase in flow velocities along the cleared rows located in the floodplain. The capacity of a stream to transport sediment is heavily dependent on flow velocity. Staff anticipates the result would be an increased potential for sediment transport in the cleared areas.

In areas where the SunCatcher rows run parallel to and within the natural stream alignment, as is generally the case in Phase I and the western portion of Phase II, cleared areas running longitudinally along the stream alignment could be captured and used as efficient main conduits by flood flows. Localized erosion and scour could result, as well as increased sediment transport through these areas.

A sediment transport analysis to evaluate existing compared to with-project sediment transport conditions on the site is not available at this time. The RUSLE2 analysis described above addresses watershed sediment yield, not in-stream sediment transport. Staff has made a preliminary independent estimate that indicates sediment transport in areas cleared and graded for the project could be 10% to 60% higher than natural conditions. Increased sediment transport in the SunCatcher arrays could result in stream degradation within the arrays as well as sediment deposition in channels downstream of the SES Solar Two project where sediment transport capacity is reduced, for instance at highway culverts and bridges which tend to slow upstream flow velocities.

Project-induced sediment deposition could be most severe in the areas of the alluvial fans on Phase II, and upstream of the railroad and roadway culverts crossings on the Evan Hughes highway at drainageways designated with the letters I, J, A, K, C, and D (See **Soil and Water Resources Figure 3**). Deposition upstream of the culverts, if severe enough, could compromise the capacity of these culvert and bridge crossings.

Drainageways with the letter designation E, F, G and H in the western portion of the site run roughly perpendicular to the proposed solar dish row direction. After construction of the project these drainageways would include strips of unaltered vegetation between the solar dish rows and perpendicular to the flow direction which should reduce the effect of the vegetation removal within the solar dish rows. The extent of this reduction is unknown at this time due to the absence of a detailed numeric analysis. Drainageways F, G and H exit the solar dish array more than 1 mile upstream of the property line. This buffer distance, for which the sediment transport capacity should not be affected by the property, could also reduce or mitigate the effects of offsite sediment deposition induced by the project.

The sediment basins described in the DESCP and Section C.7.4.1 of this report are proposed as mitigation for potential excess sediment production which could result from increased sediment transport capacity in the SunCatcher arrays. These basins are designed by a regional equation rather than a site-specific sediment transport analysis. Because of the lack of precision in this form of analysis, the capacity of these basins to function as intended is not known. Since the basins are designed for two years of annual sediment production they may serve the intended purpose on small floods, but could be overwhelmed by the much larger sediment transport volume of larger floods, with the resulting effect of increased sediment deposition downstream if sediment transport from the SunCatcher fields has been increased through vegetation clearing and grading of surface irregularities.

On an average annual basis, with smaller floods occurring, the basins may function as intended to remove sediment. However, this too could have an adverse impact after a long series of small floods if the basins remove too much sediment from the system.

Artificial removal of sediment from a stream bed otherwise in equilibrium usually results in a lowering of the downstream bed. The result would be an alteration of downstream channel morphology from wide sandy washes with shallow banks to deeper channels with steeper banks. This could have an adverse effect on local riparian resources, increase the bank erosion potential, as well as affect in-stream man-made structures. Flow cascading into unprotected basins could create cuts that would migrate upstream along the channels.

Stream morphology on the site could be affected through: a) increased production of sediment from the watershed surface; b) placement of obstructions in the flow path resulting in local scour and potential diversions; c) clearing of vegetation within channels and increasing sediment transport capacity; and, d) installing sediment basins throughout the site to mitigate for increased sediment production. The result could be excess sediment deposition at culverts and bridges along the Evan Hewes Highway and parallel railroad, and toward the east in the direction of the Westside Main canal. Other effects could occur as described above. The level of analysis developed in the AFC and supporting documents is not sufficient to resolve uncertainties regarding the ability of the applicant-proposed measures to reduce sedimentation and stream morphology impacts to a level less than significant. Staff has determined by preliminary analysis that sediment transport capacity in on-site drainageways would likely be increased by the project, with possible adverse effects. In the absence of a detailed, site-specific sediment transport analysis specifically addressing these issues, these stream morphology impacts are considered a significant adverse impact of the project.

Staff has identified two drainage avoidance alternatives that would mitigate potential impacts from SunCatcher construction in drainageways. These alternatives are discussed in Section C.7.6 and C.7.7. Additionally, the drainage avoidance alternatives were developed to avoid or minimize impacts to waters of the U.S. The U.S. Army Corps of Engineers has determined the major watercourses on the project site are jurisdictional waters of the U.S. under Section 404 of the Clean Water act (See Section C.7.8.4 of this report). As described in the biology section of this report, the U.S. Army Corps of Engineers has not yet completed a 404(b)(1) analysis for the project. The 404(b)(1) analysis typically requires that to the extent practicable impacts to waters of the U.S. are: a) avoided; b) minimized; and, c) unavoidable impacts are mitigated. Many, if not all of the alternatives analyzed herein including the drainage avoidance alternatives will be used in the Corps of Engineers alternatives analysis compliant with the CWA 404(b)(1) Guidelines.

Storm Water

Operations surface water quality could be affected by the increase in sediment load, addressed under Soil Erosion Potential by Water and Wind above, and through the introduction of surface water pollutants such as operations-related trash, vehicle fuels, coolants and other fluids, contaminated runoff from developed areas such as the substation and main services complex, water treatment system wastes, sanitary wastes, SunCatcher mirror washing, and the accidental release of other materials, hazardous or non-hazardous, from the site.

SunCatcher mirror washing would be ongoing throughout the life of the project. Most washings would be with demineralized water. Once per year a dilute biodegradable soap solution would be used. The amounts of water used in the washes would not be sufficient to produce runoff, and the soap solution would be biodegradable. Condition of Certification **SOIL&WATER-1** would ensure no adverse water quality or soils impact from mirror washing.

Runoff from the Main Services Complex would be directed into a 1-acre storm water retention pond. Runoff-borne contaminants from the Main Services Complex would be discharged into the retention basin rather than being discharged into the natural channel system. The project would include an oil/water interceptor to collect oil and other contaminants from the Main Services Complex. Oil collected from this interceptor would be transported to a certified recycling facility.

Conditions of Certification **SOIL&WATER-1 and SOIL&WATER-5** would ensure minimization of operations-related storm water runoff contaminants and mitigate to a level less than significant in all areas except those associated with the sediment content of water related to stream morphological changes described above. Uncertainty regarding sediment content of runoff water results in a conclusion of potential significant adverse water quality (sediment) impact.

Surface water quality impacts from the SWWTP upgrade would be less than significant after implementation of SWWTP MND mitigation measures HYD-1 and HYD-2 (Dudek, 2009).

Wastewater

The reverse osmosis water treatment system would produce water with a high concentration of total dissolved solids, as well as other contaminants. These waste waters would be discharged into one of two concrete-lined evaporation ponds at the Main Services Complex for drying. After a pond is filled it would be allowed to dry while the other pond is filled. The dry cake from the evaporation process would be removed by truck to a waste disposal facility. Potential impacts include groundwater degradation from infiltration at the ponds, and surface water degradation from spills and mishandling of the dry cake.

This discharge of wastes to the evaporation ponds would be subject to waste discharge requirements from the Regional Water Quality Control Board. CWC §13260–13269; 23 CCR Chapter 9 requires the filing of a Report of Waste Discharge (ROWD) and provides for the issuance of Waste Discharge Requirements with respect to the discharge of any waste that can affect the quality of the waters of the state. An ROWD would be filed for the Reverse Osmosis (RO) Unit discharge waste. Subject to verification by the RWQCB, the RO Unit and evaporation ponds would be constructed and monitored in accordance with RWQCB requirements as outlined in Appendices B, C and D of this report. Conditions of Certification **SOIL&WATER-3** and **SOIL&WATER-7** would ensure no adverse water quality impact from the water treatment system.

The storage, handling and clean-up of hazardous wastes on the site would be subject to a Hazardous Materials Management Program (HMMP) developed by the applicant. The HMMP addresses handling and usage, emergency response, spill control and prevention, training, record keeping, and reporting. A fuel handling design plan has been prepared for proper storage and handling of fuels. Section C.15 (Waste Management) of this document also addresses wastes. Condition of Certification **WASTE-7** requires preparation of an Operation Waste Management Plan, **WASTE-8** requires documentation and clean-up of all spills of hazardous substances. Conditions of Certification **SOIL&WATER-3** and **SOIL&WATER-5** would address water quality issues related to hazardous wastes.

Sanitary wastes would be discharged into a septic tank system with a dual sanitary leach field alternated every two years to allow recovery from bacterial loading. Sewer sludge would be pumped and disposed of by trucks to an approved off-site disposal facility. Adverse surface water quality impacts could occur through overflow of the septic and leach field system. Condition of Certification **SOIL&WATER-8** would ensure the sanitary system is operated and maintained so potential impacts would be mitigated to a less than significant level.

Groundwater Quality

Groundwater would not be used for project construction or operation. Existing groundwater below the project site is poor in quality and located 50 feet or more below the ground surface. Potential groundwater quality impacts could occur from surface contaminants such as oil, grease and other fluids in surface water infiltrating through channel beds to the groundwater, infiltration of sanitary wastes through the septic leach fields, infiltration of contaminated brines through the evaporation ponds for the water demineralization process, and through infiltration of surface contaminants at the retention basin in the Main Services Complex.

Surface contaminants in runoff would be minimized as described under surface water quality above and mitigated through Conditions of Certification **SOIL&WATER-1**, **SOIL&WATER-5,** and **SOIL&WATER-7**. Surface contaminants would be minimized through these conditions. Contaminants that do reach surface water would be filtered through at least 50 feet of soil before reaching groundwater. No significant adverse impact to groundwater quality is expected from surface contaminants in runoff.

The leach fields would be designed according to the California Plumbing Code and County of Imperial regulations and as such would be more than 10 feet above groundwater. The leach fields may also be subject to a RWQCB waste discharge permit. Condition of Certification **SOIL&WATER-8** would ensure no significant adverse impact to groundwater quality from the sanitary leach field system.

The demineralized water evaporation ponds would be lined with concrete to prevent infiltration. Solids from the ponds would be removed and transported by truck to a disposal facility. Conditions of Certification **SOIL&WATER-3** and **SOIL&WATER-7** would ensure no adverse ground water quality impact from the water treatment system. No significant adverse impact to groundwater quality is expected from the evaporation ponds.

The retention basin in the Main Services Complex would include an oil/water interceptor and be subject to RWQCB waste discharge requirements. Oil collected from the interceptor would be transported to a certified recycling facility. Conditions of Certification **SOIL&WATER-1** and **SOIL&WATER-5** would ensure minimization of operations-related runoff contaminants. No significant adverse impact to groundwater quality is expected from the retention basin.

Upgrades to the SWWTP would have no impact on groundwater (Dudek, 2009).

Hydrology/Flooding

Flood discharges could be increased on the site through the creation of impervious areas and the channelization of runoff conveyance channels. Channelization of flows within the solar field array would be minimal, as grading would be conducted only locally to accommodate individual solar disks or to facilitate road construction. The basic hydrologic conveyance features of the site would remain unchanged. The amount of new impervious area within the solar field array is estimated to be approximately 3% of the total surface, most of which is within the Main Services Complex. Within the SunCatcher array, impervious areas would consist of the SunCatcher foundations (approximately 2 acres for the 30,000 SunCatchers) and 137 acres of paved access roads. These areas would experience an increase in surface runoff locally, but considering the size of the site, the overall increase in runoff due to new impervious areas would be small. Assuming 100% runoff from impervious areas, the overall runoff coefficient of the SunCatcher array site would be increased by about 3%. At Dunaway Road, the point where runoff exits the site, the increase would be approximately 1%, meaning the 100-year discharge at Dunaway Road could be increased from 4,223 cfs to 4,265 cfs. This increase is negligible and would be mitigated by the presence of the site roadway culverts and sediment basins which would have the effect of retarding and attenuating flood flows. Condition of Certification **SOIL&WATER-1** would ensure no significant increase in offsite flooding potential.

The Main Services Complex would be a source of additional runoff through the construction of impervious surfaces and efficient conveyance conduits. Increased runoff from the Main Services Complex would be mitigated through the construction of a 1-acre retention basin with capacity for 3 inches of runoff from the Main Services Complex, with no assumed reduction for infiltration or evaporation (compliance with County of Imperial Engineering Design Guidelines. No significant increase in runoff volume or discharge is expected from the Main Services Complex.

Site grading is intended to preserve the existing flow pattern. Localized channel grading would take place on a limited basis to improve channel hydraulics within the dry washes and to control flow direction where buildings and roadways are proposed. Staff has made an evaluation of a typical dish array pattern within a site floodplain and determined that it is unlikely the narrow dish foundations, spaced at intervals of 112 feet or more, would significantly increase flood depths. Flood depth increases are expected to be less than 1 inch in most cases. Flow depths could actually be lower than existing if stream roughness is reduced through vegetation clearing. Roadways would locally increase flooding at the location of culverts, but the basic flow pattern would not be disturbed. The Main Services Complex would be in an area that is subject to minor drainage flows. The Main Services complex design would include protection from flooding through fill, berms and local diversion channels that will direct flow around the perimeter of the building site. Conditions of Certification **SOIL&WATER-1** and **SOIL&WATER-7** would ensure hydrology and flooding impacts are kept to a level not significant.

Upgrades to the SWWTP would have less than significant hydrology or flooding impact (Dudek, 2009).

Project Water Supply

Operations water use, summarized in Table 3 and under Water Supply and Use – Operations Water Demand in Section C.7.4.1 of this report, would average 33,550 gallons per day, with total annual use of approximately 32.7 acre feet.

The Seeley Waste Water Treatment Facility (SWWTF), located at 1898 West Main Street in Seeley, California, approximately 13 miles east of the Project site, would supply treated wastewater for mirror washing and other project uses except potable water. SES would construct an approximate 12-mile pipeline from the SWWTF to the SES water treatment plant. The project owner would finance an upgrade to the SWWTF to allow it to meet Title 22 regulations and to treat up to 250,000 gpd, with up to 200,000 gpd made available to the SES Solar Two project. The SWWTF currently discharges about 150,000 gpd of reclaimed water into the New River. After construction of the SES Solar Two project, an average of 33,550 gpd, and a maximum of 200,000 gpd would be routed to the SES Solar Two project.

SWWTF discharges to the New River are currently used only for habitat along the New River and in the Salton Sea. Discharge impacts to the New River for this purpose would be minimal. A discharge of 33,550 gpd is approximately 0.05 cfs. The maximum water allotment to SES Solar Two of 200,000 gpd is approximately 0.31 cfs. USGS records (USGS, 2009) show New River average monthly discharges to be at least 198 cfs at the international boundary upstream of the SWWTF and 554 cubic feet per second at Westmorland downstream of the SWWTF. A reduction of 0.05 to 0.31 cfs to the New River discharge is 0.03% to 0.16% of the total and would not have a material effect on water quantity of the river. Condition of Certification **SOIL&WATER-9** would ensure that impacts related to the diversion of flow would be mitigated to a level not significant. Water quality impacts to the New River would be addressed by a revised waste discharge permit from the Regional Water Quality Control Board for the SWWTF upgrades proposed by SES Solar Two.

There is currently no backup water supply for the project.. The SWWTP is expected to reliably provide water to the project. The applicant has stated they would suspend mirror washing operations should the supply drop below their needs. Condition of Certification **SOIL&WATER-9** would ensure viability of a water supply and that water use is within the amount analyzed herein.

Potable water for the operations workforce, including water for hand washing and other uses requiring potable water, would be supplied from an offsite water supplier yet to be determined. Condition of Certification **SOIL&WATER-4** would ensure that this water come from a water purveyor licensed to provide potable water in the state of California and that the supply provided to SES Solar Two be within the licensed capabilities of the purveyor, ensuring less than significant water supply impact for potable water.

Decommissioning

The removal of the Project from service, or decommissioning, may range from “mothballing” to the removal of equipment and appurtenant facilities, depending on conditions at the time. The applicant proposes to prepare a decommissioning plan which will be submitted to the CEC and BLM for approval before decommissioning. In general, the decommissioning plan will attempt to maximize the recycling of project components including selling unused chemicals back to the suppliers or other purchasers or users, draining and shutting down of equipment containing chemicals, and collection and proper disposal of hazardous and nonhazardous wastes.

Decommissioning activities will produce impacts similar to the construction impacts described above, but likely to a lesser extent. Long-term impacts after decommissioning could be substantial, particularly those related to erosion by water and wind, unless the site is restored to a condition similar to the existing condition, or a post-decommissioning maintenance plan is provided to prevent these impacts. Condition of Certification **SOIL&WATER-10** would ensure that decommissioning impacts would be minimized to a level not significant.

C.7.4.3 CEQA LEVEL OF SIGNIFICANCE

With one exception as described below, staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant soil and water resources impacts would occur in most impact areas related to soil and water resources. This determination is based on the following:

- Whether the project would violate water quality standards or waste discharge requirements: Conditions of Certification **SOIL&WATER-1**, **SOIL&WATER-3**, **SOIL&WATER-5**, **SOIL&WATER-6**, **SOIL&WATER-7**, and **SOIL&WATER-8** would ensure no violation of water quality standards or waste discharge requirements.
- Whether the project substantially depletes groundwater supplies or interferes substantially with groundwater recharge such that there is a net deficit in aquifer volume: The project would not use groundwater. Impervious areas on the project would be negligible, and stream channels would remain in an essentially natural condition for groundwater recharge. No impact to groundwater supply or recharge would occur.
- Whether the project substantially alters existing site or area drainage patterns, including the alteration of stream or river courses, or substantially increases the rate or amount of surface runoff in a manner that results in on- or off-site flooding or substantial erosion or siltation: Conditions of Certification **SOIL&WATER-1**, **SOIL&WATER-5**, and **SOIL&WATER-7** would ensure no adverse alteration of drainage patterns related to flooding, and would reduce impacts related to sedimentation. Absent a detailed sediment transport analysis of the project drainageways, stream morphology impacts related to the alteration of hydraulic and sediment transport conditions through grading and removal of vegetation are considered significant and adverse.
- Whether the project would create or contribute runoff water that exceeds existing or planned storm water-drainage system capacity or provides substantial additional sources of polluted runoff: Conditions of Certification **SOIL&WATER-1**, **SOIL&WATER-3**, **SOIL&WATER-5**, **SOIL&WATER-6**, and **SOIL&WATER-7** would ensure that the project not create or contribute runoff water that exceeds existing or planned storm water-drainage system capacity or provides substantial additional sources of polluted runoff.

- Whether the project would place structures within a 100-year flood hazard area and impede or redirect flood flows: The project would place a substantial number of structures in the floodplain in the form of SunCatchers. The Main Services Complex and other project structures would locally impede and redirect flood flows. Aside from the Main Services Complex, drainage patterns on the site would remain basically unchanged from existing conditions. The Main Services Complex will be protected from 100-year flooding by fill or diversion structures. Conditions of Certification **SOIL&WATER-1**, and **SOIL&WATER-7** would ensure that structures within the floodplain are protected and that redirected flows are designed such that they not cause adverse impacts.
- Whether the project would lower groundwater levels such that protected species or habitats are affected: The project would not use groundwater. No adverse groundwater quantity impacts are expected.
- Whether the project would substantially degrade surface water or groundwater quality: Conditions of Certification **SOIL&WATER-1**, **SOIL&WATER-3**, **SOIL&WATER-5**, **SOIL&WATER-6**, **SOIL&WATER-7**, and **SOIL&WATER-8** would ensure no degradation of surface water or groundwater quality.

C.7.5 300 MW ALTERNATIVE

The 300 MW Alternative would essentially be Phase 1 of the proposed 750 MW project. The 300 MW Alternative would retain 40% of the SunCatchers and would affect 40% of the land of the proposed 750 MW project. The linear routes would remain the same, although the 750-MW substation would be reduced to 300-MW capacity.

C.7.5.1 SETTING AND EXISTING CONDITIONS

Except as otherwise described in this section and in Section C.7.5, the setting for this alternative is the same as for the proposed project.

The 300 MW Alternative site is on a north-sloping alluvial surface with ground elevations ranging from approximately 320 feet msl along the southern boundary to approximately 200 feet msl at the north eastern corner. Site topography is gently rolling with canyons generally not more than 20 to 40 feet deep with mildly sloping sides.

Soils

Soils on the entire 300 MW Alternative SunCatcher array are Rositas-Carrizo-Orita soils. Portions of the proposed water line are classified as Meloland-Vint-Indio or Imperial-Glenbar-Gilman soils, with a small segment of Badland-Beeline-Rillito soils along the proposed transmission line route. See the Soils section of Section C.7.4.1 for a description of soil conditions and characteristics.

Hydrology

Numerous ephemeral drainages traverse the site generally from the south to north. Headwaters for these drainages are gently sloping upland areas located to the south and west. Culverts under the I-8 Freeway allow flows from south of the freeway to flow across and into the site. Drainageways I, J, K, C and D in **Soil and Water Resources Figure 1** cross the site from south to north. Watershed areas and peak discharges for these drainageways are shown in **Soil and Water Resources Figure 1**. Drainageways C and D exit the site on the north within the SES Solar Two property approximately 1,200 feet and 5,200 feet south of the Evan Hewes Highway, respectively.

Stream Morphology

The 300 MW Alternative is characterized by relatively hilly terrain with braided stream channels as described in Section C.7.4.1 clearly confined by hills. There are no areas exhibiting unconfined alluvial fan characteristics.

Flooding

No watercourses within the 300 MW Alternative have been mapped by FEMA. Flooding would occur on this alternative in areas not mapped by FEMA as described for the proposed project. **Soil and Water Resources Figure 3 (**Phase 1 area) shows flood hazard areas mapped by the applicant for this alternative. Additional flood hazard areas exist on the 300 MW Alternative.

Groundwater

With the exception of portions of the water line and transmission line, the entire 300 MW Alternative is over the Coyote Wells Valley Groundwater Basin. Portions of the water line, transmission line and the laydown area are over the Imperial Valley Groundwater Basin.

Project Features

The 300 MW Alternative would contain 12,000 SunCatchers in the same basic formation as described in Section C.7.4.1. Approximately 2,209 SunCatchers would be placed in flood hazard areas, including active channels. **Soil and Water Resources Table 7** provides a summary of roadway surfaces that would be installed in flood hazard areas based on rough grading plans and flood hazard information provided by the applicant. In total, approximately 38 miles of roadways, comprising 69 acres of area, would be installed in flood hazard areas. Most, approximately 90% by area, would be unpaved roads.

Soil and Water Resources Table 7
300 MW Alternative Roadways in Flood Hazard Areas

Road Type	Road Length, in Feet	Road Length, in Miles	Road Width, in Feet	Road Area, in Acres
Paved Roads				
Arterial Main Access	12,408	2.4	24	6.8
Unpaved Roads				
Perimeter	1,670	0.3	12	0.5
SunCatcher Access	58,280	11.0	12	16.1
SunCatcher Maintenance	132,556	25.1	15	45.6
Total Unpaved Roads	192,506	36.5		62.2
All Roads				
Total	204,914	38.8		69.0

Site access roads from Dunaway Road and the 12-mile waterline would be similar to the proposed project. The Main Services Complex and substation would likely be smaller than for the proposed project.

Water Use

Average daily water use during construction would likely be similar to the proposed project, but with a shorter construction period resulting in lower overall use. Assuming a 16-month construction period, total water use during construction would be approximately 22 million gallons (68 acre feet). Operations water use after full construction would be approximately 13,420 gpd based on the reduced number of SunCatchers, with total annual use of approximately 13 acre feet.

C.7.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Except as otherwise described in this section, all impacts are the same as for the proposed project, but reduced in magnitude by about 60% due to the reduced area of this alternative. Conditions of certification are the same as for the proposed project and are applied in the same manner.

Construction Impacts and Mitigation

Soil Erosion Potential by Water and Wind

Construction of the 300 MW Alternative is expected to take less time than the proposed project. Based on the reduced number of SunCatchers, the construction period is expected to be approximately 16 months. Potential impacts to soils are similar to those of the proposed project, but reduced in magnitude by approximately 60%.

Project Water Supply

Construction water supply needs are expected to be similar to the proposed project on a daily average basis, but reduced in total amount by approximately 60% due to the reduced size of the alternative.

Wastewater

Wastewater impacts are similar to those of the proposed project, but reduced by roughly 60% due to the smaller size of the project.

Operation Impacts and Mitigation

Soil Erosion Potential by Water and Wind

Soil erosion impacts by water and wind are the same as for the proposed project, but substantially reduced due to the smaller construction area. The 300 MW Alternative would include SunCatchers within flood hazard areas, as described for the proposed project (Drainageways I, J, K, A and C (See **Soil and Water Resources Figure 3**). The resulting impact is expected to be increased sediment transport potential within these drainageways, manifested in sediment deposition upstream of the Evan Hewes Highway and south of Plaster City, potential erosion, and potential channel degradation as described for the proposed project. Although impacts to other drainageways within the project property boundary would be avoided, in the absence of a detailed sediment transport analysis this impact is considered significant and adverse for Drainageways I, J, K, A and C.

Surface Water Quality

Surface water quality impacts are similar to those of the proposed project. The potential for introduction of surface water pollutants such as operations-related trash, vehicle fuels, coolants and other fluids from the solar dish array would be reduced by about 60% due to the smaller size of the 300 MW Alternative. Impacts related to contaminated runoff from the substation, Main Services Complex would be similar to the proposed project.

Groundwater Quality

Groundwater impacts are the same as for the proposed project.

Hydrology/Flooding

Excluding stream morphology impacts described above, flood-related impacts are the same as for the proposed project, but reduced in magnitude due to the smaller size of the 300 MW Alternative.

Project Water Supply

Project water supply impacts are the same as for the proposed project, but reduced by about 60% due to the reduced size of the 300 MW Alternative.

C.7.5.3 CEQA LEVEL OF SIGNIFICANCE

The CEQA level of significance is the same as for the proposed project.

C.7.5.4 COMPARISON TO PROPOSED PROJECT

The 300 MW Alternative has the same impacts as the proposed project, but reduced by approximately 60% due to smaller project size. Soil erosion impacts by water would potentially be significant and adverse, but reduced in magnitude in comparison to the proposed project. All other impacts would be mitigated to a level less than significant.

C.7.6 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives developed to reduce impacts to the waters of the U.S. would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative would have the same outer project boundaries as the proposed project, but it would include prohibition of installing permanent structures within drainages, thereby reducing the available acreage for development from 6,500 to 4,690, and reducing the generation capacity from 750 MW under the proposed project to 632 MW (84% of the proposed generation capacity). Rather than the 30,000 SunCatchers included in the proposed project, there would be approximately 25,000 of them installed.

C.7.6.1 SETTING AND EXISTING CONDITIONS

Except as otherwise described in this section and in Section C.7.6, the setting for this alternative is the same as for the proposed project.

Roadways installed in flood hazard areas would be limited to those necessary for main access between SunCatcher array fields. Major drainageways would have one to three of these at-grade Arizona crossings, generally spaced hundreds to thousands of feet apart. Total length of road crossings in mapped flood hazard areas is approximately 5,500 feet. There would be no disturbance of mapped floodplains by SunCatchers.

Construction Water Demand

Daily water use during construction would be approximately the same as for the proposed project. Based on project size, it is expected construction would take approximately 33 months. Assuming this construction period, with 15 peak water use days, total construction water use would be approximately 46.5 million gallons (143 acre feet).

Operations Water Demand

Operations water use after full construction would be approximately 31,200 gpd. The largest use, approximately 12,480 gpd, would be solar mirror washing. Other water uses are expected to be similar as for the proposed project.

C.7.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Except as otherwise described in this section, all impacts and conditions of certification are the same as, and apply in the same manner as, for the proposed project.

Construction Impacts and Mitigation

Soil Erosion Potential by Water and Wind

Under Drainage Avoidance #1 Alternative, the disturbed areas presented in **Soil and Water Resources Table 5** would be reduced. Based on the reduced number of SunCatchers for this alternative, the total construction disturbance would be approximately 2,640 acres, of which 1,810 acres would be in the SunCatcher array. Other construction disturbance would be similar to the disturbance described in **Soil and Water Resources Table 5**. This amounts to a reduction in impact magnitude of approximately 12%. Impact description and the level of significance are the same as described for the proposed project.

Operation Impacts and Mitigation

Soil Erosion Potential by Water and Wind

Drainage Avoidance #1 Alternative avoids most SunCatcher foundation poles in the flow path. A small, undetermined number of SunCatchers would be placed in minor drainageways originating onsite. There would be local areas of scour around the foundation poles as described for the proposed project, with the same potential impacts of foundation instability and local erosion. Scour depths would likely be less than 5 feet in most cases for the Drainage Avoidance #1 Alternative due to lower discharges, flow velocities, and flow depths.

Drainage Avoidance #1 Alternative avoids most stream morphology and sediment transport impacts described for the proposed project. Specifically, significant impacts associated with altered sediment transport characteristics caused by vegetation removal and grading in the major drainageways would not occur. Sediment transport characteristics would be modified in the minor drainageways, but these impacts are not considered significant after implementation of conditions of approval due to small drainage areas and discharges affected, and the fact that the small tributaries drain into the major washes which would not be affected.

C.7.6.3 CEQA LEVEL OF SIGNIFICANCE

CEQA Level of Significance is the same as for the proposed project.

C.7.6.4 COMPARISON TO PROPOSED PROJECT

Drainage Avoidance #1Alternative avoids significant adverse soil erosion impacts related to stream morphology and sediment transport. All other impacts are the same as for the proposed project, but reduced slightly due to smaller project size. With compliance with LORS and compliance with Conditions of Certification, Drainage Avoidance #1 Alternative has no significant adverse impacts.

C.7.7 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative is the second of two alternatives intended to avoid impacts to waters of the U.S. Drainage Avoidance Alternative #2 would eliminate both the eastern and westernmost portions of the proposed project, where the largest drainage complexes are located. It would reduce the overall size of the project area by over 50% (from 6,500 acres to 3,153 acres). It would also reduce the generation capacity from 750 MW to 423 MW (retaining only about 32% of the proposed number of SunCatchers). In this alternative, permanent structures would be allowed within all drainages inside the revised, smaller project boundaries.

C.7.7.1 SETTING AND EXISTING CONDITIONS

Except as otherwise described in this section and in Section C.7.7, the setting for this alternative is the same as for the proposed project.

The Drainage Avoidance #2 Alternative site is on a north-sloping alluvial surface with ground elevations ranging from approximately 320 feet msl along the southern boundary to approximately 85 feet msl at the north eastern corner. Site topography is gently rolling with canyons generally not more than 20 to 40 feet deep with mildly sloping sides.

Soils

With the exception of portions of the transmission line and water line, the soils on the site are classified by the Natural Resource Conservation Service as Rositas-Carrizo-Orita soils. Soils in portions of the proposed water line are classified as Meloland-Vint-Indio or Imperial-Glenbar-Gilman soils, with a small segment of Badland-Beeline-Rillito soils along the proposed transmission line route. **Soil and Water Resources Table 1** provides a summary of selected characteristics of these soils.

Hydrology

Numerous ephemeral drainages traverse the site generally from the south to north. Headwaters for these drainages are gently sloping upland areas located to the south and west. Culverts under the I-8 Freeway allow flows from south of the freeway to flow across and into the site. Drainageways C and D in **Soil and Water Resources Figure 1** cross the site from south to north. The site also includes the westernmost portion of Drainageway E. Watershed areas and peak discharges for these drainageways are shown in **Soil and Water Resources Figure 1**. Drainageways C and D exit the site on the north across the Evan Hewes Highway. Drainageway E exits toward the east adjacent to Plaster City.

Stormwater

Stream Morphology

Stream morphology is dominated by the braided pattern described in Section C.7.4.1. There is one alluvial fan in the north western corner of this alternative, just south of Plaster City, between Plaster City and the Main Services Complex. This fan can be seen in **Soil and Water Resources Figure 3**.

Flooding

One watercourse, corresponding to C North on **Soil and Water Resources Figure 1** has been mapped by FEMA as Zone A. **Soil and Water Resources Figure 2** shows the location of the small FEMA-mapped floodplain on the alternative site.

Groundwater

The alternative site lies entirely over the Coyote Wells Valley Groundwater Basin. Portions of the water line, transmission line and the laydown area are over the Imperial Valley Groundwater Basin.

Project Features

Staff estimates, using a rough grading plan and flood hazard information provided by the applicant (**Soil and Water Resources Figure 3**), that approximately 1,570 SunCatchers would be placed in flood hazard areas, including active channels. The actual number of SunCatchers subject to flooding is expected to be higher considering the flood-prone areas not mapped in **Soil and Water Resources Figure 3**. **Soil and Water Resources Table 8** provides a summary of roadway surfaces that would be installed in flood hazard areas based on rough grading plans and flood hazard information provided by the applicant. In total, approximately 28 miles of roadways, comprising 49 acres of area, would be installed in flood hazard areas. Most, approximately 90% by area, would be unpaved roads.

Soil and Water Resources Table 8
Drainage Avoidance #2 Alternative Roadways in Flood Hazard Areas

Road Type	Road Length, in Feet	Road Length, in Miles	Road Width, in Feet	Road Area, in Acres
Paved Roads				
Arterial Main Access	8,937	1.7	24	4.9
Unpaved Roads				
Perimeter	2,951	0.6	12	0.8
SunCatcher Access	40,723	7.7	12	11.2
SunCatcher Maintenance	94,009	17.8	15	32.4
Total Unpaved Roads	137,683	26.1		44.4
All Roads				
Total	146,620	27.8		49.3

Note: These estimates are based on the floodplain mapping in **Soil and Water Resources Figure 3**. The final numbers for roadways in flood hazard areas is expected to be higher given the flood areas not mapped in **Soil and Water Resources Figure 3**.

Construction disturbance of land for the SunCatcher field would be approximately 3,160 square feet per SunCatcher including roadway construction, clearing and grading. Assuming a minimum of 1,570 SunCatchers in flood hazard areas, total construction disturbance for the 9,600 SunCatcher array would be at least 114 acres in the floodplain. Approximately 49 acres of this would be permanent disturbance in the form of roads and SunCatcher foundations.

<u>Water Supply and Use</u>

According to the applicant, contracts are already in place for SES-financed upgrades to the existing SWWTP to enable the plant to produce up to 250,000 gpd meeting California Code of Regulations Title 22 requirements regarding the quality of treated wastewater. It is expected the agreement entitling SES to acquire at least 150,000 gallons and up to 200,000 gallons of recycled water per day for project uses would remain in place. It is likely the proposed water treatment system at the Main Services Complex would be reduced in size from the proposed project.

Construction Water Demand

Construction water demand would likely be the same as for the proposed project on a per-day basis. It is expected the construction period would be shorter for the Drainage Avoidance #2 Alternative than for the proposed project. Based on the alternative size, the construction period is expected to be approximately 13 months. Assuming a 12-month construction period, with 15 peak days, total construction water use would be approximately 19 million gallons (58 acre feet).

Operations Water Demand

Based on project size, operations water use after full construction is expected to be approximately 10,770 gpd, with total annual use approximately 12.0 acre feet. The largest use, approximately 4,790 gpd, would be solar mirror washing. Other operations water uses, estimated by project size, include: 184 gpd for hydrogen production; 2,530 gpd of brine resulting from the water demineralization process for mirror washing; 1,790 gpd for on-site staff for drinking and sanitary purposes; and 1,600 gpd for dust control.

C.7.7.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Except as otherwise described in this section, all impacts are the same as for the proposed project, but reduced in magnitude by about 68% due to the reduced area of this alternative. Conditions of certification are the same as, and apply in the same manner as, for the proposed project.

Construction Impacts and Mitigation

Soil Erosion Potential by Water and Wind

Under Drainage Avoidance #2 Alternative, the disturbed areas presented in Table 5 would be reduced. Based on the reduced number of SunCatchers for this alternative, the total construction disturbance would be approximately 940 acres, of which 840 acres would be in the SunCatcher array. Other construction disturbance would be similar to the disturbance described in Table 5. This amounts to a reduction in impact magnitude of approximately 68%. Impact description and the level of significance are the same as described for the proposed project.

Operation Impacts and Mitigation

Soil Erosion Potential by Water and Wind

Soil erosion impacts by water and wind are the same as for the proposed project, but substantially reduced due to the smaller construction area. Drainage Avoidance #2 Alternative would include SunCatchers within flood hazard areas, as described for the proposed project, in Drainageways C, D and the upper alluvial fan portion of E (See **Soil and Water Resources Figure 3**). The resulting impact is expected to be increased sediment transport potential within these drainageways, manifested in sediment deposition upstream of the Evan Hewes Highway and south of Plaster City, potential erosion, and potential channel degradation as described for the proposed project. Although impacts to other drainageways within the project property boundary would be avoided, in the absence of additional sediment transport information, this impact is considered significant and adverse for Drainageways C, D, and E.

C.7.7.3 CEQA LEVEL OF SIGNIFICANCE

The CEQA Level of Significance is the same as for the proposed project.

C.7.7.4 COMPARISON TO PROPOSED PROJECT

Drainage Avoidance #2 Alternative has the same impacts as the proposed project, but reduced by approximately 68% due to smaller project size. Soil erosion impacts by water would be significant and adverse, but reduced in magnitude in comparison to the proposed project. All other impacts would be mitigated to a level less than significant.

C.7.8 NO PROJECT/NO ACTION ALTERNATIVES

NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on SES Solar Two project application and on CDCA land use plan amendment

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

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the impacts to soils and water from the construction and operation of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on SES Solar Two project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed SES Solar Two 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, impacts to soils and water would result from the construction and operation of the solar technology and resulting ground disturbance and would likely be similar to the impacts to soils and water from the proposed project, including erosion impacts and impacts to jurisdictional waters. Different solar technologies require different amounts of grading; however, it is expected that all solar technologies would require grading and maintenance. As such, this No Project/No Action Alternative could result in impacts to soils and water similar to the impacts under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3:

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

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

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no soil erosion impacts or impacts to jurisdictional waters. As a result, this No Project/No Action Alternative would not result in the impacts to soils and water under the proposed project. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.7.9 CUMULATIVE IMPACTS

Section B.3, Cumulative Scenario, provides detailed information on the potential cumulative solar and other development projects in the project area. Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis for the proposed project. In summary, these projects are:

1. Renewable energy projects on BLM, State, and private lands, as shown on **Cumulative Figures 1 and 2** and in **Cumulative Tables 1A and 1B.** Although not all of those projects are expected to complete the environmental review processes, or be funded and constructed, the list is indicative of the large number of renewable projects currently proposed in California.
2. Foreseeable future projects in the immediate Plaster City area, as shown on **Cumulative Impacts Figure 3, Plaster City Existing and Future/Foreseeable Projects, and Cumulative Tables 2 and 3**. Table 2 presents existing projects in this area and Table 3 presents future foreseeable projects in the Plaster City Area. Both tables indicate project name and project type, its location and its status.

These projects are defined within a geographic area that has been identified by the CEC and BLM as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all resource elements or environmental parameters. Most of these projects have, are, or will be required to undergo their own independent environmental review under CEQA and/or NEPA. Even if the cumulative projects described in Section B.3 have not yet completed the required environmental processes, they were considered in the cumulative impacts analyses in this SA/Draft EIS.

GEOGRAPHIC SCOPE OF ANALYSIS

The geographic area considered for cumulative impacts on Soil and Water Resources is defined as described below:

Soil Erosion Potential by Water and Wind. Soil erosion can be affected by any development or land alteration. The effects occur in terms of air quality as well as general deterioration of the land surface with potential regional effects. Cumulative impacts would be evaluated over all Southern California BLM land, including the CDCA.

Surface Water Quality. Project-related surface water quality impacts potentially extend from the project site to the Imperial County agricultural area and into the Salton Sea. The geographic extent of cumulative impacts would encompass those areas south of the Salton Sea that could potentially have similar extent. Imperial County is considered the geographical extent of Surface Water Quality impacts.

Ground Water Quality. Ground water quality impacts could affect the Coyote Wells Valley and Imperial Valley Groundwater Basins. These basins comprise the geographic area for cumulative ground water quality impacts.

Hydrology/Flooding. Hydrology and flooding impacts are generally managed on a county-wide or city-wide level. Imperial County is considered the geographic extent of hydrology and flooding impacts.

Water Supply. With the exception of a minimal amount of water for potable uses, the project would entirely use reclaimed water that is currently discharged into the New River.

EFFECTS OF PAST AND PRESENT PROJECTS

For this analysis, the following projects or developments are considered most relevant to effects on Soil and Water Resources:

A) All of the projects listed in Table 1A.

B) The following projects from Table 1B:

- Abengoa Mojave Solar Project (250 MW solar thermal)
- Rice Solar Energy Project (150 MW solar thermal)
- 3 MW solar PV energy generating facility
- Blythe Airport Solar 1 Project (100 MW solar PV)
- First Solar’s Blythe (21 MW solar PV)
- LADWP and OptiSolar Power Plant (68 MW solar PV)
- Bethel Solar Hybrid Power Plant (49.4 MW hybrid solar thermal and biomass)
- Mt. Signal Solar Power Station (49.4 MW hybrid solar thermal and biomass)
- Alta-Oak Creek Mojave Project (up to 800 MW)
- TelStar Energies, LLC (300 MW)
- Orni 18, LLC Geothermal Power Plant (49.9 MW)

C) All of the projects listed in Table 2.

Soil and Water Resources in the geographic area have been impacted by past and currently approved projects as follows: A) creating soil and vegetation disturbance resulting in an increased potential for water and wind erosion; B) placing structures within flood hazard and erosion hazard areas resulting flood or erosion hazards to the project or adjacent features; C) creating flow diversions or increasing runoff potential resulting in increased flood and erosion potential; D) depleting groundwater or other water resources; E) degrading water quality through construction-related impacts; and, F) degrading water quality through project operations. Existing and planned development projects within the California Desert have substantially increased the potential for water and wind erosion particularly during the construction phase and ongoing in the operations phase in projects such as the recreation and Naval Air Facility projects listed in Table 2. Groundwater use in some areas has been substantial, as has reliance on imported sources of water.

EFFECTS OF REASONABLY FORESEEABLE FUTURE PROJECTS

Soil and Water Resources are also expected to be affected by the all of the reasonably foreseeable future projects listed in Table 3.

CONTRIBUTION OF THE SES SOLAR TWO PROJECT TO CUMULATIVE IMPACTS

Construction. The construction of the SES Solar Two Project is expected to result in short term adverse impacts related to construction activities. It is expected that some of the cumulative projects described above which are not yet built may be under construction the same time as the SES Solar Two Project. As a result, there may be substantial short term impacts during construction of those cumulative projects related to Soil and Water Resources

The SES Solar Two Project could contribute substantially to these possible short term cumulative impacts related to Soil and Water Resources because of its size. The SES Solar Two Project is 6,500 acres, which amounts to roughly 25% of the total area of projects listed in Table 3 (not counting the general plan update and the West-wide Energy Corridor). Although applicant-proposed mitigation and conditions of certification will reduce the impact of SES Solar Two to a level not significant, it is reasonable to assume that similar restrictions and mitigation will be placed on other future projects such that the relative contribution of SES Solar Two to the total impact will be substantial.

Operation. The operation of the SES Solar Two Project is expected to result in long term adverse impacts during operation of the project related to Soil and Water Resources. It is expected that some of the cumulative projects described above may be operational at the same time as the SES Solar Two Project. As a result, there may be substantial long term impacts during operation of those cumulative projects related to Soil and Water Resources. With the exception of impacts related to changes in stream morphology, the SES Solar Two Project would be expected to contribute only a small amount to these possible long term operational cumulative impacts related to Soil and Water Resources because SES Solar Two impacts will be substantially mitigated. Specifically:

- SES Solar Two will use no groundwater. There will be no contribution to cumulative groundwater depletion.
- Non-sediment water quality impacts will be mitigated through strict conditions of certification such that the relative size of the SES Solar Two project will be less important than in the construction phase.
- Peak discharges and the potential for offsite flooding will not be increased by the SES Solar Two project. SES Solar Two project features will be protected.

- Water use by the SES Solar Two project will be minimal and derived primarily from treated wastewater that currently is discharged into the New River. It has been shown that this diversion of flow from the New River will have negligible impact on New River flows.

The SES Solar Two Project will contribute substantially to erosion and sediment-related operational cumulative impacts because of a significant adverse impact associated with altered sediment-transport characteristics of the area.

Decommissioning. The decommissioning of the SES Solar Two Project is expected to result in adverse impacts related to Soil and Water Resources similar to construction impacts. It is unlikely that the construction or decommissioning of any of the cumulative projects would occur concurrently with the decommissioning of this project, because the decommissioning of the SES Solar Two project is not expected to occur for approximately 40 years. As a result, the impacts of the decommissioning of the SES Solar Two Project would not be expected to contribute to cumulative impacts related to Soil and Water Resources.

C.7.10 COMPLIANCE WITH LORS

Clean Water Act

The U.S. Army Corps of Engineers has determined that 840 acres of the project site are jurisdictional waters of the U.S. under Clean Water Act (CWA) Section 404. Approximately 165 acres of these waters are proposed as permanent impacts, 5 acres as temporary impacts. The U.S. Environmental Protection Agency (USEPA) Section 404(b)(1) Guidelines (40 Code of Federal Regulations [CFR] 230 *et seq.*) are substantive environmental criteria used by the USACE to evaluate permit applications. Under these guidelines, an analysis of practicable alternatives is the primary tool used to determine whether a proposed discharge can be authorized. An alternative is considered practicable if it is available and capable of being implemented after considering cost, existing technology, and logistics in light of the overall project purpose (40 C.F.R. Part 230[a][2]). The guidelines suggest a sequential approach to project planning such that the Corps of Engineers must first consider avoidance and minimization of impacts to the extent practicable. Mitigation for unavoidable impacts to waters of the U.S. is addressed only after the analysis has determined the Least Environmentally Damaging Practicable Alternative (LEDPA). A formal 404(b)(1) analysis has not yet been completed; however, the analysis presented herein will aid the Corps in the preparation of a draft analysis to be included in the FEIR/EIS. Nonetheless, without a determination from the Corps of Engineers, Staff cannot determine at this time whether the project would comply with Section 404.

Porter-Cologne Water Quality Control Act/State Water Board Resolution No. 68-16

Conditions of Certification **SOIL&WATER-1** to **SOIL&WATER-9,** inclusive, would satisfy the requirements of the Porter-Cologne Water Quality Control Act and State Water Board Resolution No. 68-16, and other relevant regulations as administered by the RWQCB.

SWRCB Resolution 75-58 and Energy Commission's 2003 Integrated Energy Policy Report

SWRCB Resolution 75-58, Energy Commission's 2003 Integrated Energy Policy Report, and The Warren-Alquist Act relate to the use of fresh inland water for power plant cooling. The SES Project would not use water for power plant cooling, but is in compliance with the spirit of these regulations by using reclaimed water for mirror washing. No fresh inland water would be used except for potable water.

Public Resources Code, Sections 25300 Through 25302

Through compliance with Condition of Certification **SOIL&WATER-2**, information required by staff to conduct assessments and forecasts of potable and industrial water consumption by power plants is achieved.

California Code of Regulations Titles 17, 22, 23, 24 and 27

Staff has determined that the proposed project would satisfy the requirements of the California Code of Regulations Titles 17, 22, 23, 24 and 27 by upgrading the SWWTP to supply tertiary treated recycled water in accordance with Title 17 and 22 requirements as is proposed by the applicant and with the adoption of Conditions of Certification **SOIL&WATER-2, SOIL&WATER-3, SOIL&WATER-4**; **SOIL&WATER-7, SOIL&WATER-8** and **SOIL&WATER-9.**

Imperial County Land Use Ordinance, Title 9

Staff has determined that the proposed project would satisfy most requirements of Imperial County Land Use Ordinance, Title 9 by adoption of the following Conditions of Certification **SOIL&WATER-1, SOIL&WATER-5, SOIL&WATER-6,** and **SOIL&WATER-8.** The project may not satisfy the Imperial County Land Use Ordinance with regard to stream morphological changes that could result in excess sediment production from the site.

California Water Code Section 1211

Staff has determined that the proposed project would satisfy requirements of California Water Code Section 1211 adoption of Condition of Certification **SOIL&WATER-9**.

C.7.11 NOTEWORTHY PUBLIC BENEFITS

Staff has not identified any noteworthy public benefits associated with soil and water resources.

C.7.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

DRAINAGE EROSION AND SEDIMENTATION CONTROL PLAN

SOIL&WATER-1 Prior to site mobilization, the project owner shall obtain both BLM's Authorized Officer (AO) and the Compliance Project Manager's (CPM) approval for a site specific DESCP that ensures protection of water quality and soil resources of the project site and all linear facilities for both the construction and operation phases of the project. This plan shall address appropriate methods and actions, both temporary and permanent, for the protection of water quality and soil resources, demonstrate no increase in off-site flooding or sedimentation potential, and identify all monitoring and maintenance activities.

The project owner shall complete all necessary engineering plans, reports, and documents necessary for both the AO and CPM to conduct a review of the proposed project and provide a written evaluation as to whether the proposed grading, drainage improvements, sediment control measures, and flood management activities comply with all requirements presented herein. The plan shall contain the following elements:

Vicinity Map: A map shall be provided indicating the location of all project elements with depictions of all major geographic features to include watercourses, washes, irrigation and drainage canals, major utilities, and sensitive areas.

Site Delineation: The site and all project elements shall be delineated showing boundary lines of all construction areas and the location of all existing and proposed structures, underground utilities, roads, and drainage facilities. Adjacent property owners shall be identified on the plan maps. All maps shall be presented at a legible scale.

Drainage: The DESCP shall include the following elements:

a. Topography. Topography for offsite areas is required to define the existing upstream tributary areas to the site and downstream to provide enough definition to map the existing storm water flow and flood hazard. Spot elevations shall be required where relatively flat conditions exist.

b. Proposed Grade. Proposed grade contours shall be shown at a scale appropriate for delineation of onsite ephemeral washes, drainage ditches, and tie-ins to the existing topography.

c. Hydrology. Existing and proposed hydrologic calculations for onsite areas and offsite areas that drain to the site; include maps showing the drainage area boundaries and sizes in acres, topography and typical overland flow directions, and show all existing, interim, and proposed drainage infrastructure and their intended direction of flow.

d. Hydraulics. Provide hydraulic calculations to support the selection and sizing of the onsite drainage network, diversion facilities and BMPs.

Watercourses and Critical Areas: The DESCP shall show the location of all onsite and nearby watercourses including washes, irrigation and drainage canals, and drainage ditches, and shall indicate the proximity of those features to the construction site. Maps shall identify high hazard flood prone areas.

Clearing and Grading: The plan shall provide a delineation of all areas to be cleared of vegetation, areas to be preserved, and areas where vegetation would be cut to allow clear movement of the SunCatchers. The plan shall provide elevations, slopes, locations, and extent of all proposed grading as shown by contours, cross-sections, cut/fill depths or other means. The locations of any disposal areas, fills, or other special features shall also be shown. Existing and proposed topography tying in proposed contours with existing topography shall be illustrated. The DESCP shall include a statement of the quantities of material excavated at the site, whether such excavations or fill is temporary or permanent, and the amount of such material to be imported or exported or a statement explaining that there would be no clearing and/or grading conducted for each element of the project. Areas of no disturbance shall be properly identified and delineated on the plan maps.

Soil Wind and Water Erosion Control: The plan shall address exposed soil treatments to be used during construction and operation of the proposed project for both road and non-road surfaces including specifically identifying all chemical based dust palliatives, soil bonding, and weighting agents appropriate for use at the proposed project site that would not cause adverse effects to vegetation; BMPs shall include measures designed to prevent wind and water erosion including application of chemical dust palliatives after rough grading to limit water use. All dust palliatives, soil binders, and weighting agents shall be approved by both the AO and CPM prior to use.

Project Schedule: The DESCP shall identify on the topographic site map the location of the site-specific BMPs to be employed during each phase of construction (initial grading, project element construction, and final grading/ stabilization). Separate BMP implementation schedules shall be provided for each project element for each phase of construction.

Best Management Practices: The DESCP shall show the location, timing, and maintenance schedule of all erosion- and sediment-control BMPs to be used prior to initial grading, during project element excavation and construction, during final grading/stabilization, and after construction (during project operation). BMPs shall include measures designed to control dust and stabilize construction access roads and entrances. The maintenance schedule shall include post-construction maintenance of treatment-control BMPs applied to disturbed areas following construction.

Erosion Control Drawings: The erosion-control drawings and narrative shall be designed, stamped and sealed by a professional engineer or erosion control specialist.

Agency Comments: The DESCP shall include copies of recommendations, conditions, and provisions from the County of Imperial, California Department of Fish and Game (CDFG), and Colorado River Regional Water Quality Control Board (RWQCB).

Monitoring Plan: Monitoring activities shall include routine measurement of the volume of accumulated sediment in the onsite drainage ditches, and storm water diversions.

Verification: No later than ninety (90) days prior to start of site mobilization, the project owner shall submit a copy of the DESCP to the County of Imperial, the RWQCB, the AO, and CPM for review and comment. Both the AO and CPM shall consider comments received from Imperial County and RWQCB.

During construction, the project owner shall provide an analysis in the monthly compliance report on the effectiveness of the drainage-erosion- and sediment-control measures and the results of monitoring and maintenance activities. Once operational, the project owner shall provide in the annual compliance report information on the results of storm water BMP monitoring and maintenance activities. The property owner shall provide the AO and CPM with two (2) copies each of all reports, including monitoring reports.

MONITORING AND VERIFICATION OF WATER USE

SOIL&WATER-2 Prior to the use of recycled wastewater for operation of the SES Solar Two Project, the project owner shall install and maintain metering devices as part of the water supply and distribution system to monitor and record in gallons per day the volume of water supplied to the SES Solar Two Project. The metering devices shall be operational for the life of the project. An annual summary of daily water use by the SES Solar Two Project, differentiating between potable and recycled wastewater, shall be submitted to the AO and CPM in the annual compliance report.

Verification: At least 60 days prior to use of any water source for SES Solar Two Project operation, the project owner shall submit to the AO and CPM evidence that metering devices have been installed and are operational on all water pipelines serving the project. In the annual compliance report, the project owner shall provide a report on the servicing, testing, and calibration of the metering devices.

The project owner shall submit a water use summary report to the AO and CPM in the annual compliance report for the life of the project. The annual summary report shall be based on the volume of water used and shall distinguish recorded daily use of potable and recycled water. Included in the annual summary of water use, the project owner shall submit copies of meter and/or delivery records from the potable water and recycled water supplies documenting the volume of water supplied over the previous year. The report shall include calculated monthly range, monthly average, and annual use by the project in both gallons per day and acre-feet. After the first year and for subsequent years, this information shall also include the yearly range and yearly average potable and recycled water used by the project.

INDUSTRIAL FACILITY SWPPP

SOIL&WATER-3 The project owner shall comply with the requirements of the General NPDES Permit for Discharges of Storm Water Associated with Industrial Activity, including development of an Industrial Facility SWPPP. If the Regional or State Board finds the project does not require a General NPDES Permit for Discharges of Storm Water Associated with Industrial Activity, written confirmation from either board confirming this permit is not required would satisfy this condition.

Verification: The project owner shall submit a copy of the Industrial Facility SWPPP for operation of the project to the AO and CPM at least 60 days prior to the start of commercial operation and shall retain a copy of the approved SWPPP on site throughout the life of the project. The project owner shall submit copies of all correspondence between the project owner and the Colorado River RWQCB regarding the general NPDES permit for discharge of storm water associated with industrial activity to the AO and CPM within 10 days of its receipt or submittal. Copies of correspondence shall include the Notice of Intent sent by the project owner to the SWRCB, the confirmation letter indicating receipt and acceptance of the Notice of Intent, and any permit modifications or changes.

POTABLE WATER REQUIREMENTS

SOIL&WATER-4 Potable water shall be provided by a potable water purveyor licensed to provide potable water in the state of California. Potable water delivered by the purveyor to SES Solar Two shall be within the licensed capacity of the water purveyor. The SES Solar Two project shall not operate without an executed agreement for potable water on file with the AO and CPM.

Verification: No later than 30 days prior to the initiation of construction the project owner shall submit two copies of the executed agreement with a licensed water purveyor for the potable water supply. The agreement shall specify that the potable water purveyor can deliver potable water sufficient for the needs of the SES Solar Two Project construction and operation, specify the amount of water that shall be delivered on a monthly basis, document that the amount of water delivered is within the licensed capabilities of the water purveyor, and specify the contract time limit. The project owner shall ensure that this or an equivalent potable water agreement is in place and valid at all times the SES Solar Two project is in operation. New or revised agreements shall be delivered to the AO and CPM 30 days prior to the expiration of any agreement.

NPDES GENERAL PERMIT FOR CONSTRUCTION ACTIVITY

SOIL&WATER-5 The project owner shall comply with the requirements of the general National Pollutant Discharge Elimination System (NPDES) permit for discharge of storm water associated with construction activity. The project owner shall submit copies of all correspondence between the project owner and the State Water Resources Control Board (SWRCB) or the Colorado River RWQCB regarding this permit to the AO and CPM. The project owner shall also develop and implement a construction Storm Water Pollution Prevention Plan (SWPPP) for construction on the SES Solar Two main site, laydown areas, pipeline, and transmission line.

Verification: The project owner shall submit a copy of the construction SWPPP to the AO and CPM at least 10 days prior to site mobilization for review and approval, and retain a copy of the approved SWPPP on site throughout construction. The project owner shall submit copies of all correspondence between the project owner and the SWRCB or the Colorado River RWQCB regarding the NPDES permit for the discharge of storm water associated with construction activity to the AO and CPM within 10 days of its receipt or submittal. Copies of correspondence shall include the Notice of Intent sent to the SWRCB, the confirmation letter indicating receipt and acceptance of the Notice of Intent, any permit modifications or changes, and completion/permit Notice of Termination.

WASTE DISCHARGE REQUIREMENTS

SOIL&WATER-6 The project owner shall comply with the requirements of the Waste Discharge Requirements in Soil and Water Appendices B, C, and D for the proposed evaporation ponds. The project owner shall develop, obtain AO and CPM approval of, and implement a monitoring and reporting program for the operation of the project.

Verification: At least 60 days prior to commercial operation, the project owner shall submit to the AO and CPM, for review and approval, a copy of the plan for the monitoring and reporting program in compliance with the requirements outlined in Soil and Water Appendices B, C, and D. The project owner shall retain a copy of the plan onsite. The project owner shall submit copies to the AO and CPM of all correspondence between the project owner and the Colorado River RWQCB regarding the Requirements of Waste Discharge of water associated with industrial activity within 10 days of its receipt or submittal.

STORM WATER DAMAGE MONITORING AND RESPONSE PLAN

SOIL&WATER-7 The project owner shall prepare a detailed drainage map for existing conditions showing the location of all watercourses on the site, including those not mapped in **Soil and Water Resources Figure 3** of this report, recognizing that site areas with visible evidence of past flows are subject to future flows. The drainage map may be based on a geomorphic evaluation based on aerial photographs, topographic maps, site visits, and other relevant factors, and may be supplemented by a two-dimensional flow analysis at the discretion of the project owner.

The project owner shall ensure that all SunCatchers within flow areas as identified in the above-referenced drainage map are designed to withstand 100-year storm water scour as estimated by a SunCatcher Foundation Depth and Stability Report to be completed by the project owner. The report shall include estimates of hydraulic conditions at each location where SunCatchers are to be located in flood hazard areas and relevant scour calculations for each location. Scour calculations shall be developed by a registered civil engineer competent in scour calculation and include all relevant scour components including pier scour, general scour, antidune trough depth, bend scour, and long-term degradation. An assessment shall be made whether foundation widths should be increased for debris production.

The project owner shall also develop a Storm Water Damage Monitoring and Response Plan to evaluate potential impacts from storm water, including SunCatchers that fail due to storm water flow or otherwise break and scatter mirror debris on to the ground surface. The Storm Water Damage Monitoring and Response Plan shall include the following elements:

- Detailed maps showing the installed location of all SunCatchers.
- Each SunCatcher shall be identified by a unique ID number marked to show initial ground surface at its base and the depth of the pylon below ground.
- Minimum Depth Stability Threshold to be maintained of pylons to meet long-term stability for applicable wind, water, and debris loading effects.

- Above and below ground construction details of a typical installed SunCatcher.
- BMPs to be employed to minimize the potential impact of broken mirrors to soil resources.
- Methods and response time of mirror cleanup and measures that may be used to mitigate further impact to soil resources from broken mirror fragments.
- Monitoring, documenting, and restoring the soil surface when impacted by sedimentation or broken mirror shards.

Monitor and Inspect Periodically, Before First Seasonal and After Every Storm Event:

- SunCatchers within Drainages or subject to drainage overflow: Inspect for tilting, mirror damage, depth of scour compared to pylon depth below ground and the Minimum Depth Stability Threshold, collapse, and downstream transport.
- Drainage Channels: Inspect for substantial migration or changes in depth, and transport of broken glass.
- Constructed Diversion Channels: Inspect for scour and structural integrity issues caused by erosion, and for sediment and debris buildup.
- Ground Surface: Inspect for changes in the surface texture and quality from sediment buildup, erosion, or broken glass.

Short-Term Incident-Based Response:

- SunCatchers: Remove broken glass, damaged structure, and wiring from the ground, and for foundations no longer meeting the Minimum Depth Stability Threshold, either replace/reinforce or remove the mirrors to avoid exposure for broken glass.
- Drainage Channels: no short-term response necessary unless changes indicate risk to facility structures.

Long-Term Design-Based Response:

- Propose operation/BMP modifications to address ongoing issues. Include proposed changes to monitoring and response procedures, frequency, or standards.
- Replace/reinforce foundations no longer meeting the Minimum Depth Stability Threshold or remove the mirrors to avoid exposure for broken glass.
- Propose design modifications to address ongoing issues.

Inspection, short-term incident response, and long-term design-based response may include activities both inside and outside of the approved right of-way. For activities outside of the approved right-of-way, the project owner shall notify BLM and acquire environmental review and approval before field activities begin.

Verification: At least 90 days prior to the start of site mobilization, the project owner shall submit the final drainage map, the Foundation Depth and Stability Report, and the Storm Water Damage Monitoring and Response Plan, with supporting analysis, to the AO and CPM for review and approval. The project owner shall retain a copy of these documents onsite at the power plant at all times. The project owner shall prepare an annual summary of the number of SunCatchers failed, cause of the failure, and cleanup and mitigation performed for each failed SunCatcher.

SEPTIC SYSTEM AND LEACH FIELD REQUIREMENTS

SOIL&WATER-8 The project owner shall comply with the requirements of the County of Imperial Land Use Ordinance Title 9 and the California Plumbing Code (California Code of Regulations Title 24, Part 5) regarding sanitary waste disposal facilities such as septic systems and leach fields. The septic system and leach fields shall be designed, operated, and maintained in a manner that ensures no deleterious impact to groundwater or surface water. Compliance shall include an engineering report on the septic system and leach field design, operation, maintenance, and loading impact to groundwater.

Verification: The project owner shall submit all necessary information and the appropriate fee to the County of Imperial and the RWQCB to ensure that the project has complied with county and state sanitary waste disposal facilities requirements. Written assessments prepared by the County of Imperial and the RWQCB regarding the project's compliance with these requirements must be submitted to the AO and CPM for review and approval 30-days prior to the start of power plant operation.

ASSURED WATER SUPPLY

SOIL&WATER-9 The project owner shall provide the AO and CPM two copies of the executed Recycled Water Purchase Agreement (agreement) with the recycled waste water purveyor for the long-term supply (30-35 years) of disinfected tertiary recycled water to the SES Solar Two Project. The project shall not operate without a long term agreement for recycled water delivery and connection to a recycled water pipeline for project use. The agreement shall specify a delivery rate to meet SES Solar Two Project's maximum operation requirements and all terms and costs for the delivery and use of recycled water at the SES Solar Two Project. The SES Solar Two Project shall not connect to the new recycled water pipeline without the final agreement in place and submitted to the AO and CPM. The project owner shall comply with the requirements of Title 22 and Title 17 of the California Code of Regulations and section 13523 of the California Water Code.

The project owner shall work with the Seeley Waste Water Treatment Plant (SWWTP) to obtain approval from the RWQCB Division of Water Rights for the diversion of flows from the New River to the SES Solar Two project.

Verification: No later than 60 days prior to the connection to the recycled water pipeline, the project owner shall submit two copies of the executed agreement for the supply and on-site use of disinfected tertiary recycled water at the SES Solar Two Project. The agreement shall specify that the recycled wastewater purveyor can deliver recycled water at a maximum rate up to 250,000 gpd and would provide the SES Solar Two Project a minimum of 33 acre feet per year.

The project owner shall submit to the AO and CPM a copy of the Producer/User Water Recycling Requirements, the recycled wastewater criteria, the Engineering Report, the Cross Connection Inspection report, and RWQCB water rights approval under Section 1211 of the Water Code for the SWWTP diversion prior to the connection to the disinfected tertiary recycled wastewater pipeline.

DECOMMISSIONING PLAN

SOIL&WATER-10 The project owner shall identify likely decommissioning scenarios and develop specific decommissioning plans for each scenario that will identify actions to be taken to avoid or mitigate long-term impacts related to water and wind erosion after decommissioning. Actions may include such measures as a decommissioning SWPPP, revegetation and restoration of disturbed areas, post-decommissioning maintenance, collection and disposal of project materials and chemicals, and access restrictions.

Verification: At least 90 days prior to the start of site mobilization, the project owner shall submit decommissioning plans to the AO and CPM for review and approval prior to site mobilization. The project owner shall amend these documents as necessary, with approval from the AO and CPM, should the decommissioning scenario change in the future.

C.7.13 CONCLUSIONS

With the information provided to date, staff has determined that construction, operation, and decommissioning of the proposed project could potentially impact soils, surface water, flooding, surface water quality, ground water quality, and water supply. Where these potential impacts have been identified, staff has proposed mitigation measures to reduce identified impacts to levels that are less than significant. The mitigation measures, as well as specifications for laws, ordinances, regulations and standards (LORS) conformance, are included herein as conditions of certification. The conditions of certification referred to herein address the California Environmental Quality Act (CEQA) requirements for the Energy Commission’s analysis and BLM’s needs for a National Environmental Policy Act (NEPA) analysis. With the possible exception of Section 404 of the Clean Water Act, the project would conform with all applicable LORS. Staff’s conclusions based on analysis of the information submitted to-date are as follows:

1. The proposed project would be located in the Yuha Desert of Imperial County in an area characterized by braided, erosive stream channels, flash flooding, alluvial fan conditions, low rainfall, sparse vegetation, and the potential for wind erosion.
2. The project proposes to place more than 5,000 solar dishes, known as SunCatchers, within areas known to be subject to flash flooding and erosion. Project-related changes to the braided and alluvial fan stream hydraulic conditions could result in on-site erosion, stream bed degradation or aggradation, and erosion and sediment deposition impacts to adjacent land. SunCatchers within the floodplain could be subject to destabilization by stream scour. Impacts to soils related to wind erosion and runoff erosion are potentially significant, as are impacts to surface water quality

from sedimentation and the introduction of foreign materials, including potential contaminants, to the project area.

3. The applicant completed a hydrologic study and hydraulic modeling of the major stream channels on the project. Based on this work and subsequent analysis by staff, scour analyses have been performed to support development of a project design that can withstand flash flood flows with minimal damage to SunCatchers. Condition of Certification **SOIL&WATER-7** ensures no significant impact for SunCatchers placed in the floodplain.

4. A Drainage, Erosion, and Sedimentation Control Plan (DESCP) has been developed to mitigate the potential storm water and sediment project-related impacts. However, the calculations and assumptions used to evaluate potential storm water, geomorphic, and sedimentation impacts are imprecise and have limitations and uncertainties associated with them. Given the uncertainty associated with the calculations, the magnitude of potential impacts that could occur cannot be determined precisely without additional detailed numeric modeling of project effects. Based on an independent preliminary assessment by staff, staff has determined the proposed project could result in erosion and stream morphology impacts that would be significant with respect to CEQA significance criteria specified herein and NEPA significance criteria specified in 40 CFR 1508.27. Conditions of Certification **SOIL&WATER-1, SOIL&WATER-5,** and **SOIL&WATER-7** have been developed that require development of best management practices and monitoring and reporting procedures to mitigate impacts related to flooding, erosion, sedimentation, and stream morphological changes. These conditions of certification would minimize impacts, but due to the uncertainty associated with the existing analysis, impacts related to erosion, sedimentation and stream morphological changes are considered significant after mitigation.

5. Surface water and ground water quality could be affected by construction activities, ongoing activities on the project site including mirror washing, vehicle use and fueling, storage of oils and chemicals, the proposed septic and leach field system for sanitary wastes, and wastes from the water treatment system. These impacts are potentially significant. Compliance with LORS and Conditions of Certification **SOIL&WATER-1, SOIL&WATER-3, SOIL&WATER-5, SOIL&WATER-6, SOIL&WATER-7** and **SOIL&WATER-8** would mitigate to a level less than significant in all areas except those associated with the sediment content of water related to stream morphological changes described under Conclusion #4 above. Uncertainty regarding sediment content of runoff water results in a conclusion of potential significant adverse water quality impact.

6. The U.S. Army Corps of Engineers has determined that 840 acres of the project site are jurisdictional waters of the U.S. under Clean Water Act (CWA) Section 404.all of which would be permanent impacts. The U.S. Environmental Protection Agency (USEPA) Section 404(b)(1) Guidelines (40 Code of Federal Regulations [CFR] 230 *et seq.*) are substantive environmental criteria used by the USACE to evaluate permit applications. Under these guidelines, an analysis of practicable alternatives is the primary tool used to determine whether a proposed discharge can be authorized. An alternative is considered practicable if it is available and capable of being implemented after considering cost, existing technology, and logistics in light of the overall project purpose (40 C.F.R. Part 230[a][2]). The guidelines suggest a sequential

approach to project planning such that the Corps of Engineers must first consider avoidance and minimization of impacts to the extent practicable. Mitigation for unavoidable impacts to waters of the U.S. is addressed only after the analysis has determined the Least Environmentally Damaging Practicable Alternative (LEDPA). A formal 404(b)(1) analysis has not yet been completed; however, the analysis presented herein will aid the Corps in the preparation of a draft analysis to be included in the FEIR/EIS. Nonetheless, without a determination from the Corps of Engineers, Staff cannot determine at this time whether the project would comply with Section 404.

7. The proposed project would not require cooling water. However, SunCatcher mirrors would be washed on a regular basis. Mirror washing and dust control watering would comprise the primary water use for the project, which is estimated at 33,550 gallons per day (gpd), with total annual use approximately 32.7 acre feet. The applicant proposes to upgrade the Seeley Waste Water Treatment Plant (SWWTP), approximately 12 miles east of the site, to provide up to 200,000 gpd of treated wastewater for project use. Wastewater from SWWTP would be treated on the project site for use in mirror washing. By using SWWTP water, the project would comply with State policies regarding the use of recycled water for power plants where practicable. Potable water would be supplied by a local water supplier yet to be determined. Conditions of Certification **SOIL&WATER-2**, **SOIL&WATER-3**, **SOIL&WATER-7** and **SOIL&WATER-9** are proposed by staff to ensure and monitor an adequate water supply and to ensure and the water supply and treatment system comply with LORS and not create adverse water quality or supply impacts.

8. Impacts to groundwater supply and quality would be less than significant. No groundwater would be used by the project and the effect on groundwater infiltration would be negligible.

9. Three on-site alternatives have been evaluated in addition to the No Action alternative. Drainage Alternative #1, developed in an effort to avoid significant stream morphological and sediment transport impacts, and to avoid impacts to waters of the U.S. under Section 404 of the Clean Water Act, would successfully avoid significant impacts and is the least environmentally damaging alternative. least environmentally damaging alternative with respect to soil and water. This alternative avoids the major watercourses on the site. Other on-site alternatives evaluated have smaller project footprints, but do not avoid major watercourses and do not avoid significant impacts.

C.7.14 REFERENCES

Arizona Department of Water Resources 1985 – Design Manual for Engineering Analysis of Fluvial Systems.

California Department of Water Resources 2003 – California's Groundwater. Bulletin 118.

California Regional Water Quality Control Board 2006 – Water Quality Control Plan Colorado River Basin - Region 7.

CCR 2008 – California Environmental Quality Act (CEQA) Guidelines. Title 14, California Code of Regulations, section 15000 and the following (Cal. Code Regs., tit. 14, §15000 et seq,).

Dudek, 2009 – Draft Mitigated Negative Declaration for the Seeley Wastewater Reclamation Facility Improvements Imperial County, California. Prepared for the Seeley County Water District. Prepared by Dudek, 75151 Sheryl Avenue, Palm Desert, CA 92211.

Imperial County 2007 – Imperial County Flood Management Plan. February 2007.

NRCS (National Resource Conservation Service) 1961 – Soil Survey of Imperial County California Imperial Valley Area.

NRCS (National Resource Conservation Service) 2004 – RUSLE2 Instructions and User Guide.

RMT 2009 – Hydrologic Assessment Report SES Solar Two Project Site. RMT, Inc. Madison, Wisconsin.

SES (Stirling Energy Systems Solar Two, LLC) 2008a – Application for Certification for the Stirling Energy Systems (SES) Solar Two Project, Volumes 1 and 2. Submitted to the California Energy Commission, June 30, 2008.

SES (Stirling Energy Systems Solar Two, LLC) 2008xx – Response to CEC &BLM Data Requests 1-3, 5-10, 14, 24-26, 31-33, 36-38, 44 and 111-127. Submitted to the California Energy Commission, March 2008.

SES (Stirling Energy Systems Solar Two, LLC) 2008xx – Response to CEC &BLM Data Requests 1-52 Set 1, Part 1. Submitted to the California Energy Commission, December 2008.

SES (Stirling Energy Systems Solar Two, LLC) 2009a – Supplement to SES Solar Two Application for Certification. June, 2009.

SES (Stirling Energy Systems Solar Two, LLC) 2009b – Response to CEC & BLM Data Requests 31 and 32 DESCP/SWPPP – Volume 1. July, 2009.

SES (Stirling Energy Systems Solar Two, LLC) 2009c – Response to CEC & BLM Data Requests 31 and 32 DESCP/SWPPP – Volume 2. July, 2009.

SES (Stirling Energy Systems Solar Two, LLC) 2009c – Additional Supportive Materials – Biology and Water. October 30, 2009.

Simons, Li & Associates, Inc. 1982 – Engineering Analysis of Fluvial Systems. Fort Collins, Colorado.

USGS (United States Geological Survey) 2006 – Sediment Yield and Runoff Frequency of Small Drainage Basins in the Mojave Desert, California and Nevada. Fact Sheet 2006-3007.

USGS 2009 – Water Data for the Nation. http://waterdata.usgs.gov/.

Western Regional Climate Center 2009 – http://www.wrcc.dri.edu/index.html.

SOIL AND WATER RESOURCES – APPENDIX A

ACRONYMS USED IN THIS SECTION

AFC	Application for Certification	NEPA	National Environmental Policy Act
AO	BLM Authorized Office	ppm	Parts per Million
BLM	Bureau of Land Management	REC I	Water Contact Recreation
BMP	Best Management Practice	RECII	Non-Contact Water Recreation
CCR	California Code of Regulations	RO	Reverse Osmosis
CDFG	California Department of Fish and Game	ROW	Right of Way
CEQA	California Environmental Quality Act	ROWD	Report of Waste Discharge
CFR	Code of Federal Regulations	RUSLE2	Revised Universal Soil Loss Equation
cfs	Cubic Feet Per Second	RWQCB	Regional Water Quality Control Board
CPM	Compliance Project Manager	SAP	Sampling and Analysis Plan
CWA	Clean Water Act	SC	Sediment Control
DDT	Dichlorodiphenyltrichloroethane	SDG&E	San Diego Gas & Electric
DESCP	Drainage, Erosion, and Sedimentation Control Plan	SF	Square Feet
gpd	Gallons per Day	SS	Soil Stabilization
GWR	Groundwater Recharge	SWPPP	Stormwater Pollution Prevention Plan
HEC-RAS	Hydrologic Engineering Center River Analysis System	SWRCB	California State Water Resources Control Board
IND	Industrial Service Supply	SWWTP	Seeley Waste Water Treatment Plant
K	Erosion Factor	TC	Tracking Control
kV	Kilovolt	TDS	Total Dissolved Solids
LID	Low Impact Development	TMDL	Total Maximum Daily Load
LORS	Laws, Ordinances, Regulations and Standards	USC	United States Code
mg/l	Milligrams per Liter	USGS	United States Geological Survey
Ml	Milliliters	V	Volts
msl	Mean Sea Level	WDR	Waste Discharge Requirement
MUN	Municipal and Domestic Supply	WE	Wind Erosion
MW	Megawatt	WILD	Wildlife Habitat
N/A	Not Applicable	WRCC	Western Regional Climate Center

SOIL AND WATER RESOURCES – APPENDIX B

FACTS FOR WASTE DISCHARGE

1. Reason for Action and Regulatory Authority

   The applicant filed an Application for Certification (AFC) with the California Energy Commission (Energy Commission) on June 30, 2008. The AFC proposed the construction and operation of the SES Solar Two Solar Electric Generating System (SES) project in the Yuha Desert area of Imperial County, California. In conjunction with SES project construction, the applicant proposes to discharge wastes, dredged, and/or fill material to State waters as defined by California Water Code (Water Code) section 13050. These discharges are subject to State requirements in accordance with Water Code section 13260 and the Water Quality Control Plan for the Regional Water Quality Control Board (RWQCB) Colorado River Region (Basin Plan). All actions impacting or potentially impacting these drainages, including dredge and fill activities and construction and industrial activities, would be regulated through these requirements, which would be incorporated in the Energy Commission's certification process.

   Under the Warren-Alquist Act, and Governor's Executive Order S-14-08, the California Energy Commission (Energy Commission) has the authority to streamline permitting for renewable energy generation facilities. The Energy Commission implements an "in lieu of" permit process by incorporating the regulatory requirements and conditions of the various local and State agencies in its certification process. All necessary State and local permits for this Facility, including those permits typically issued by the Water Board are issued to the project owner through the Energy Commission's certification process. The Water Board has cooperated with the Energy Commission in evaluating the SES Solar Two Solar Energy Project (SES) and provided to the Energy Commission the Board's analysis and recommended waste discharge requirements, herein, which staff has independently evaluated and hereby adopts as its own.

2. Waste Discharge Requirements History

   The SES project would be a new facility. With the exception of the Seeley Waste Water Treatment Plant (SWWTP), for which there is an existing waste discharge requirement, there are no previous Colorado River RWQCB actions for the SES Solar Two project or location.

3. Climate

   The climate of the site vicinity is hot during summer, with temperatures commonly above 100 degrees, and moderate during winter when temperatures tend to be in the 40 to 70 degree range. Average maximum temperatures exceed 100 degrees for June, July, August and September. The coldest month of the year is December with an average minimum temperature of 40 degrees. Precipitation is very sparse. Annual average precipitation is approximately 2.65 Inches. Rainfall primarily occurs during the winter months (December to March) in the form of widespread winter storms. Summer monsoon storms generally occur from August to October.

4. Site Geology

   a. Setting

   The Project Site is located along the western margin of the Salton Trough near the west side of Imperial County. The Salton Trough is a sedimentary basin that was occupied by Ancient Lake Cahuilla as recently as about 300 years ago. One of the ancient shorelines of Lake Cahuilla is located near the eastern site boundary. The central and western portions of the site are characterized by low and moderate relief alluvial zones and washes. The surficial alluvial materials, created by erosion of the mountains to the west and northwest, are underlain by sandstone and claystone of the Palm Spring Formation.

   b. Faulting and Seismicity

   The site is in a highly seismic region of California within the broad limits of the San Andreas fault system.

   c. Soils

   The proposed SES project surface is covered by silt loam, sandy loam, and gravelly loam soils that are characterized by the Natural Resource Conservation Service as highly permeable with low to medium runoff potential.

5, Groundwater

   The project site lies primarily over the Coyote Wells Valley Groundwater Basin, with portions over the Imperial Valley Groundwater Basin. The Coyote Wells Valley Groundwater Basin lies primarily within Holocene alluvium 100 to 300 feet below the ground surface. This basin receives recharge from the percolation of precipitation on the valley and from ephemeral runoff from the surrounding mountains. Groundwater levels have been declining due to pumping and underflow to the Imperial Valley Groundwater Basin and to Mexico. Groundwater quality is characterized by sodium bicarbonate-chloride with high fluoride levels in some areas. Groundwater uses include municipal, irrigation and domestic uses. The Imperial Valley Groundwater Basin covers all of the agricultural area of Imperial County south of the Salton Sea. This basin has two major aquifers with the upper averaging 200 feet in thickness and the lower 380 feet. Recharge is primarily from irrigation return, underflow from adjacent groundwater basins and seepage from unlined irrigation canals. Groundwater quality is variable and generally the water is unsuitable for domestic and irrigation purposes without treatment. High fluoride levels occur in parts of the basin. Uses include municipal, domestic and irrigation. Groundwater at the SES site is known to be at least 45 feet below the ground surface, and in most places is likely more than 90 feet below.

6. Surface Water

   The project site lies within the Imperial Subregion of the Colorado River RWQCB. There are no perennial or intermittent drainages on the project site. The closest perennial drainage to the project site is the New River, approximately 7 miles east of the site. The highly polluted New River obtains its flow primarily from agricultural irrigation return.

   Numerous ephemeral drainages traverse the SES site from the south to north in the western portion of the site and toward the northeast in the eastern half of the site.

Headwaters for these drainages are gently sloping upland areas located to the south and west. The site drainages are normally dry and typically contain water only infrequently following precipitation events large enough to produce runoff. Rainfall is scant in this area so long periods of time may occur between runoff events. When it does occur, runoff is generally activated by intense summer monsoon rains that produce short-duration flash flooding possibly with high flow peaks. Winter storms, although producing more rain on average, than the summer monsoons, are widespread and low-intensity, producing little runoff except on watersheds much larger than those affecting the project site. Most of the medium to large size watercourses on the SES Solar Two site exhibit braiding or alluvial fan characteristics, or both. The site watercourses are typically unstable, with erodible banks, and are capable of shifting position where not constrained by high ground.

Discharges exiting the site do so toward the north on the western portion of the site, and toward the east on the eastern portion of the site. Flows exiting the site to the north are returned to the site further east. All site flows eventually travel east toward the Imperial County agricultural area.

7. Land Uses and Existing Site Conditions

The proposed SES project site and adjacent areas are federal lands managed by the BLM and are used for offroad vehicle recreation. Immediately adjacent to the northern boundary of the proposed project site is the USG Corporation Gypsum Wallboard Manufacturing Facility, known as Plaster City. The small communities of Edgar and Coyote Wells are located approximately 5 miles east and 4 miles west of the project site, respectively. A small water ski community known as Imperial Lakes is located about 2 miles northeast of the project site, and about 0.7 miles north of the project laydown area. The California State Centinela Prison is located approximately 1.5 miles north of Imperial Lakes.

Two private parcels of land, one owned by a recreational vehicle club and one by a private landowner, are surrounded by the proposed project and are not a part of the project. The northern boundary of the proposed project site is adjacent to Imperial County Route S80 and Plaster City, and the southern boundary is adjacent to Interstate Highway 8.

8. Description of Direct Impacts to State Waters

Placement of the SunCatchers and associated maintenance roads, debris basins, the electrical collection system, and culverts would result in a loss of approximately 840 acres of CDFG jurisdictional state waters and fill of approximately 840 acres of Waters of the U.S.

9. Mitigation Plan

As described in Section C.2 of this report, impacts to ephemeral desert washes resulting in permanent loss of 840 acres of state waters and 840 acres of Waters of the U. S., shall be mitigated as follows: a) For the plant site, replace functions and values of impacted desert wash with a 1:1 off-site acquisition; b) For the recycled water pipeline, staff is awaiting the conditions that would be included in the California Department of Fish and Game Lake and Streambed Alteration permit and requirements of the CWA Section 404(1)(b) Alternative Analysis. Once the conditions required by both agencies are known, the requirements will be incorporated into BIO-17; and, c)

For the recycled water pipeline, staff is awaiting the conditions that would be included in the CDFG Lake and Streambed Alteration permit and requirements of the CWA Section 404(1)(b) Alternative Analysis. Once the conditions required by both agencies are known, the requirements will be incorporated into BIO-17.

10. Wastewater Discharges

The project Main Services Complex would include a reverse osmosis water treatment plant to produce demineralized water for mirror washing. Wastewater produced by the reverse osmosis process will be approximately 7.5 acre feet per year (6,695 gpd) and be high in dissolved solids. The table below lists expected water quality characteristics for this wastewater based on a previous analysis assuming Imperial Irrigation District canal water as the water source. This water source is no longer being considered and the analysis below is subject to revision based on the current water source (SWWTP).

Water Quality Characteristics of Wastewater from the Reverse Osmosis Process

Characteristics	Units	Value
GENERAL		
Turbidity	NTU	0
Conductance	micromhos/cm	44
Total Dissolved Solids	Ppm	3,600
Total Hardness	Ppm	1,598
Total Alkalinity	mg/l CaCO3	710
CATIONS		
Calcium	mg/l	404
Magnesium	mg/l	147
Sodium	mg/l	533
Potassium	mg/l	21
ANIONS		
Bicarbonate	mg/l	844
Sulfate	Ppm	1,465
Chloride	Ppm	533
Fluoride	Ppm	1
TRACE ELEMENTS		
Arsenic	microg/l	11
Iron	microg/l	2,264
Manganese	microg/l	147

Table source: AFC Section 3 Table 3-5. Values adjusted based on AFC raw water analysis adjusted for AFC-stated concentration increases from the demineralization process.

11. Receiving Waters

The receiving waters immediately downstream of the project are minor surface waters of the Imperial Subregion of the Colorado River RWQCB. These flows ultimately discharge into the New River. Receiving waters for infiltrated waters from the septic leach field system and the reclaimed water evaporation ponds would be the Coyote Wells Valley Groundwater Basin

12. Colorado River Basin Plan

The Colorado River RWQCB adopted a Water Quality Control Plan (Basin Plan) in 1993, most-recently amended in June of 2006.

13. Beneficial Uses -Surface Waters

The Basin Plan designates beneficial uses for surface waters in each watershed of the Colorado River Region. The beneficial uses listed for washes in the west Colorado River basin which includes the project area include groundwater recharge (GWR), non-contact water recreation (RECII), and wildlife habitat (WILD).

14. Beneficial Uses -Groundwater

Groundwater beneficial uses include municipal and domestic supply (MUN) and industrial service supply (IND).

15. Non-Degradation

The State Water Board established California’s antidegradation policy in State Water Board Resolution No. 68-16 (Statement of Policy with Respect to Maintaining High Quality of Waters in California). Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings or facts. The Basin Plan implements and incorporates by reference State antidegradation policies.

16. Other Considerations and Requirements for Discharge

Pursuant to Water Code section13241, these requirements take into consideration:

a. *Past, present, and probable future beneficial uses of water*.

   These requirements identify past, present and probable future beneficial uses of water as described in Facts Nos. 16 and 17. The proposed discharge would not adversely affect present or probable future beneficial uses of water, including domestic water supply, agricultural supply, industrial supply, and freshwater replenishment.

b. *Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto*.

   Facts Nos. 6 through 13 describe the environmental characteristics and quality of water from this hydrographic unit.

c. *Water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect water quality in the area.*

   These requirements would not result in any significant changes to groundwater quality. Adverse effects to surface water quality would be minimized.

d. *Economic considerations*.

These requirements authorize the Discharger to implement closure and post-closure maintenance actions at the Facility as proposed by the Discharger. These requirements accept the Discharger's proposed actions as meeting the best practicable control method for protecting water quality from impacts from the Facility.

e. *The need for developing housing within the region*.

The Discharger is not responsible for developing housing within the region.

f. *The need to develop and use recycled water*.

The Energy Commission is currently evaluating the feasibility of using recycled water as the water source for Facility operations.

17. Description of Surface Impoundments (evaporation ponds)

Two 1-acre concrete-lined evaporation ponds are proposed. During the construction phase, raw water from the SWWTP will be stored in the ponds for construction use. Raw water from the SWWTP will have water quality concentrations approximately one-fourth to one-fifth of those listed in the Water Quality Characteristics of Wastewater from the Reverse Osmosis Process table above.

During project operation, wastewater from the demineralization process will be discharged to the evaporation ponds. Ponds will be sized for one year of discharge. After the first pond is full, discharge will be transferred to the second pond while the first pond evaporates. The ponds will alternate on an annual basis.

SOIL AND WATER RESOURCES – APPENDIX C

REQUIREMENTS FOR WASTE DISCHARGE

I. DISCHARGE SPECIFICATIONS

A. Receiving Water Limitations

Receiving water limitations are narrative and numerical water quality objectives contained in the Water Quality Control Plan for the Colorado River Region (Basin Plan). As such, the objectives are required to be met.

1. Surface Water Objectives

AESTHETIC QUALITIES: All waters shall be free from substances attributable to wastewater of domestic or industrial origin or other discharges which adversely affect beneficial uses not limited to: Settling to form objectionable deposits; floating as debris, scum, grease, oil, wax, or other matter that may cause nuisances; and, producing objectionable color, odor, taste, or turbidity.

TAINTING SUBSTANCES: Water shall be free of unnatural materials, which individually or in combination produce undesirable flavors in the edible portions of aquatic organisms.

TOXICITY: All waters shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in human, plant, animal, or indigenous aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, 96-hour bioassay or bioassays of appropriate duration or other appropriate methods as specified by the Regional Board. Effluent limits based upon bioassays of effluent will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged.

The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge, or other control water which is consistent with the requirements for "experimental water" as described in Standards Methods for the Examination of Water and Wastewater, 18th Edition. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour bioassay.

TEMPERATURE: The natural receiving water temperature of surface waters shall not be altered by discharges of waste unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses.

pH: Since the regional waters are somewhat alkaline, pH shall range from 6.0-9.0. Discharges shall not cause any changes in pH detrimental to beneficial water uses.

SUSPENDED SOLIDS AND SETTLEABLE SOLIDS: Discharges of wastes or wastewater shall not contain suspended or settleable solids in concentrations which increase the turbidity of receiving waters, unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in turbidity does not adversely affect beneficial uses.

TOTAL DISSOLVED SOLIDS: Discharges of wastes or wastewater shall not increase the total dissolved solids content of receiving waters, unless it can be demonstrated to the satisfaction of the Regional Board that such an increase in total dissolved solids does not adversely affect beneficial uses of receiving waters.

BACTERIA: In waters designated for water contact recreation (REC I) or noncontact water recreation (REC II), the following bacterial objectives apply. Although the objectives are expressed as fecal coliforms, E. coli, and enterococci bacteria, they address pathogenic microorganisms in general (e.g., bacteria, viruses, and fungi). Based on a statistically sufficient number of samples (generally not less than 5 samples equally spaced over a 30-day period), the geometric mean of the indicated bacterial densities should not exceed one or the other of the following for REC II waters: E. coli - 630 per 100 ml; enterococci - 165 per 100 ml. Nor shall any sample exceed the following maximum allowables: E. coli - 2000 per 100 ml; enterococci - 500 per 100 ml.

BIOSTIMULATORY SUBSTANCES: Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

SEDIMENT: The suspended sediment load and suspended sediment discharge rate to surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

TURBIDITY: Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.

RADIOACTIVITY; Radionuclides shall not be present in waters in concentrations which are deleterious to human, plant, animal or aquatic life or that result in the accumulation of radionuclides in the food web to an extent which presents a hazard to human, plant, animal or aquatic life.

CHEMICAL CONSTITUENTS: No individual chemical or combination of chemicals shall be present in concentrations that adversely affect beneficial uses. There shall be no increase in hazardous chemical concentrations found in bottom sediments or aquatic life.

PESTICIDE WASTES: The discharge of pesticidal wastes from pesticide manufacturing processing or cleaning operations to any surface water is prohibited.

2. Groundwater Objectives

TASTE AND ODORS: Ground waters for use as domestic or municipal supply shall not contain taste or odor-producing substances in concentrations that adversely affect beneficial uses as a result of human activity.

BACTERIOLOGICAL QUALITY: In ground waters designated for use as domestic or municipal supply (MUN), the concentration of coliform organisms shall not exceed the limits specified in California Code of Regulations, Title 22, Chapter 15, Article 3.

CHEMICAL AND PHYSICAL QUALITY: Ground waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the limits specified in California Code of Regulations, Title 22, Chapter 15, Article 4, Section 64435, Tables 2, 3, and 4 as a result of human activity.

BRINES: Discharges of water softener regeneration brines, other mineralized wastes, and toxic wastes to disposal facilities which ultimately discharge in areas where such wastes can percolate to ground waters usable for domestic and municipal purposes are prohibited.

RADIOACTIVITY: Ground waters designated for use as domestic or municipal supply (MUN) shall not contain radioactive material in excess of the limits specified in California Code of Regulations, Title 22, Chapter 15, Article 5, Sections 64441 and 64443.

II. PROHIBITIONS AND REQUIREMENTS

The discharge of wastes and fill associated with the Facility must not violate the following waste discharge prohibitions. The California Energy Commission expects that control measures would be implemented in an iterative manner as needed to meet applicable receiving water quality objectives.

A. Regionwide Prohibitions

1. The discharge of waste which causes violation of any narrative water quality objective contained in the Basin Plan, including the Nondegradation Objective, (State Water Board Resolution No. 68-16) is prohibited.
2. The discharge of waste which causes a violation of any numeric water quality objective contained in the Basin Plan is prohibited.
3. Where any numeric or narrative water quality objective contained in the Basin Plan is already being violated, the discharge of waste which causes further degradation or pollution is prohibited.
4. The discharge of untreated sewage, garbage, or other solid wastes into surface waters of the Region is prohibited. For the purposes of this prohibition, “untreated sewage” is that which exceeds secondary treatment standards of the Federal Water Pollution Control Act.
5. For municipal[ii] and industrial[iii] discharges:
   a. The discharge, bypass, or diversion of raw or partially treated sewage, sludge, grease, or oils to surface waters is prohibited.
   b. The discharge of wastewater except to the designated disposal site (as designated in waste discharge requirements) is prohibited.

[ii] “Municipal waste” is defined in Section 4.4 of the Basin Plan.

[iii] “Industry” is defined in Section 4.7 of the Basin Plan.

c. The discharge of industrial process wastes[iv] to surface waters designated for the Municipal and Domestic Supply (MUN) beneficial use is prohibited. The discharge of industrial process wastes to surface waters not designated for the MUN use may be permitted if such discharges comply with the limitations listed in the Basin Plan and if appropriate findings under state and federal anti-degradation regulations can be made.

B. Facility Discharge Prohibitions

1. Activities and waste discharges associated with the Facility must not cause or threaten to cause a nuisance or pollution as defined in Water Code section 13050.
2. The discharge of waste, as defined in the Water Code that causes violation of any narrative water quality objective contained in the Basin Plan is prohibited.
3. The discharge of waste that causes violation of any numeric water quality objective contained in the Basin Plan is prohibited.
4. Where any numeric or narrative water quality objective contained in the Basin Plan is already being violated, the discharge of waste that causes further degradation or pollution (as defined in Water Code Section 13050) is prohibited.
5. The discharge of septic tank pumpings (septage) or chemical toilet wastes to other than a sewage treatment plant or a waste hauler is prohibited.

C. Requirements

1. The project owner must, at all times, maintain appropriate types and sufficient quantities of material on site to contain any spill or inadvertent release of materials that may cause a condition of pollution or nuisance if the materials reach waters of the State.
2. Discharges of wastewater generated by the Facility's operations are not allowed to be released to the offsite environment.
3. The project owner must permit California Energy Commission staff or their authorized representative upon presentation of credentials:
   a. Entry onto Facility premises.
   b. Access to copy any record required to be kept under the terms and conditions of the Commission's Decision.
   c. Inspection of any treatment equipment, monitoring equipment, or monitoring method required by the Commission's Decision.
   d. Sampling of any discharge or surface water covered by the Commission's Decision.
4. The project owner must immediately notify the California Energy Commission and SWRCB by telephone whenever an adverse condition occurs as a result of this discharge. Such a condition includes, but is not limited to, a violation of

[iv] "Industrial process wastes" are wastes produced by industrial activities that result from one or more actions, operations, or treatments which modify raw material(s) and that may (1) add to or create within the effluent, waste, or receiving water a constituent or constituents not present prior to processing, or (2) alter water temperature and/or the concentration(s) of one or more naturally occurring constituents within the effluent, waste or receiving water. Certain non-storm water discharges may occur at industrial facilities that are not considered to be industrial process wastes for the purposes of Prohibition 5(c). Examples include: fire hydrant flushing, atmospheric condensates from refrigeration and air conditioning systems, and landscape watering.

the conditions of the Commission's Decision, a significant spill of petroleum products or toxic chemicals, or damage to control facilities that would cause noncompliance. A written notification of the adverse condition must be provided to the California Energy Commission within two weeks of occurrence. The written notification must identify the adverse condition, describe the actions necessary to remedy the condition, and specify a timetable, subject to any modifications by California Energy Commission staff, for the remedial actions.

5. The project owner must comply with the Monitoring and Report Program for Surface Water and Monitoring and Report Program Groundwater, included in these requirements.

III PROVISIONS

Special Provisions For The Evaporation Ponds And Water Treatment Unit

1. The evaporation ponds shall conform to the requirements for a Class II Surface Impoundment described in CCR, Title 27.
2. There shall be no discharge, bypass, or diversion of wastewater from the collection, conveyance, or disposal facilities, including backflush from the RO Unit, to adjacent land areas or surface waters.
3. All facilities used for the collection, conveyance, or disposal of waste shall be adequately protected against overflow, washout, inundation, structural damage, or a significant reduction in efficiency resulting from a storm or flood having a recurrence interval of once in 100 years. The surface impoundments (evaporation ponds) shall be designed and maintained with the capacity to capture the 1,000-year, 24-hour rainfall.
4. The release of wastewater shall not cause the presence of the groundwater monitoring parameters listed in the Monitoring and Reporting Programs (Appendix D) to be in excess of background levels.
5. The discharge, storage or evaporative accumulation of hazardous waste to the evaporation ponds at the Facility is prohibited.
6. Only wastewater from the demineralization process or storm water from rainfall shall be discharged to the evaporation ponds.
7. The flow of wastewater to the surface impoundments shall not exceed design levels.
8. The discharge of wastewater from the demineralization process except to the authorized evaporation ponds is prohibited.
9. All lined facilities shall be effectively sealed to prevent the exfiltration of liquids. For this project, "effectively sealed" facilities are the surface impoundments that are designed and constructed in accordance with the requirements of CCR, Title 27.
10. The vertical distance between the liquid surface elevation and the highest part of a surface impoundment dike (i.e. the freeboard), or the invert of an overflow structure, shall not be less than 2 feet.

SOIL AND WATER RESOURCES – APPENDIX D

MONITORING AND REPORTING PROGRAM FOR GROUNDWATER

I. WATER QUALITY PROTECTION STANDARD

Water Quality Protection Standard is required by Title 27 of the California Code of Regulations (CCR, Title 27) to assure the earliest possible detection of a release from the SES Solar Two Project (SES) to underlying soil and/or groundwater. The Water Quality Protection Standard shall consist of the list of constituents of concern, the concentration limits, the Point of Compliance and all Monitoring Points. This Water Quality Protection Standard shall apply during the operation, closure, post-closure maintenance period, and during any compliance period. SES would initially undergo construction and then would be under a Detection Monitoring Program.

II. MONITORING

The project owner shall comply with all detention monitoring requirements contained in CCR Title 27 and as described below. Any adaptive amendments to these requirements, procedures or monitoring parameters shall be first approved by the RWQCB and then provided to the AO and CPM for incorporation into the CEC permit prior to implementation of the amendments.

A. Flow Monitoring of Discharges to the Surface Impoundments (the two evaporation ponds)

The project owner shall monitor the following:

1. The volume, in gallons per day (gpd), of wastewater delivered to the surface impoundments;

2. The cumulative total of wastewater flow delivered to the surface impoundments (million gallons per month; and

3. The maximum daily flow rate, in ggd, delivered to the surface impoundments each month.

B. Monitoring of Wastewater Discharges to the Surface Impoundments

Semi-annually, the project owner shall record the following:

1. The sources of wastewater delivered to the surface impoundments; and,

2. The analytical results of a composite wastewater grab sample that shall be collected and analyzed for the parameters in Table II-1.

Table II-1
Wastewater Sampling Parameters

Parameter	U.S. EPA or Standard Method	Reporting Limit Goal	Units
Ammonia (as N)	350.1	100	µg/L
Aluminum	200.7	20	µg/L
Arsenic	6020	2	µg/L
Antimony	6020	10	µg/L

Parameter	U.S. EPA or Standard Method	Reporting Limit Goal	Units
Barium	6020	5	µg/L
Beryllium	6020	2	µg/L
Boron	200.7	140	µg/L
Cadmium	6020	5	µg/L
Calcium	200.7	40,000	µg/L
Chloride	300.0	14,000	µg/L
Chromium (total)	6020	5	µg/L
Cobalt	6020	5	µg/L
Copper	6020	5	µg/L
Cyanide (total)	SM 4500	10	µg/L
Fluoride	300.0	500	µg/L
Iron	200.7	20	µg/L
Lead	6020	3	µg/L
Magnesium	200.7	10,000	µg/L
Manganese	200.7	15	µg/L
Mercury	7470A	0.2	µg/L
Molybdenum	6020	10	µg/L
Nickel	6020	5	µg/L
Nitrate as nitrogen	300.0	1,000	µg/L
Nitrite as nitrogen	SM 4500	4	µg/L
Phosphate (total)	365.3	100	µg/L
Potassium	200.7	3,000	µg/L
Selenium	6020	10	µg/L
Silver	6020	5	µg/L
Sodium	200.7	10,000	µg/L
Strontium	200.7	500	µg/L
Sulfate	300.0	100.000	µg/L
Thallium	6020	10	µg/L
Total dissolved solids	SM 2540C	10,000	µg/L
Total alkalinity(as CaCO3)	SM 2320B	100,000	µg/L
Vanadium	6020	5	µg/L
Zinc	6020	10	µg/L
Biphenyl	8015M	500	µg/L
Diphenyl oxide	8015M	500	µg/L
Cyclohexamine (20-40%)	8015M	500	µg/L
Morpholine (1-10%)	8015M	500	µg/L
pH	Field	+/- 0.1	pH units
Temperature	Field	+/- 0.1	° F or °C

µg/L = micrograms per liter
Values in this table are subject to revision by the RWQCB

C. Surface Impoundment Monitoring

The project owner shall adhere to the following surface impoundment monitoring requirements.

1. Dikes and Liners

   a. Daily, the freeboard shall be measured from the top of the lowest part of the dike to the wastewater surface. If the surface impoundment is dry, indicate that it is empty of wastewater.

   b. Monthly, the integrity of the dikes and liners shall be inspected. Should the inspection indicate any damage to the dikes or liners or if an unauthorized discharge has occurred, or is likely to occur, the California Energy Commission shall be notified within 48 hours, followed by confirmation in writing.

2. Surface Impoundment Wastewater Monitoring

   Semi-annually, at each surface impoundment, liquid grab samples shall be collected at three (3) sample locations in the surface impoundments spaced approximately equidistant. The collected samples shall be composited into one sample by the laboratory and analyzed to determine the quantification of the parameters in Table II-1.

4. Surface Impoundment Sludge Monitoring

   Annually, in the last quarter of each year, three (3) representative grab samples of the bottom sludge in each surface impoundment, if present, shall be collected, composited and analyzed for the parameters in Table II-2.

Table II-2
Surface Impoundment Sludge Monitoring

Parameters	Unit
CCR title 22 metals (CAM 17)- Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, Silver, Thallium, Vanadium, Zinc	Milligrams per kilogram (mg/kg)
Biphenyl, diphenyl oxide (Therminol or similar)	mg/kg

D. Detection Monitoring

Using approved statistical or non-statistical data analysis methods approved in these requirements, and in compliance with CCR, title 27, the project owner shall, for each monitoring event, compare the concentration of each monitoring parameter with its respective concentration limit to determine if there has been a release from the surface impoundments. Monitoring shall be completed in compliance with this Section D as further described below.

1. Unsaturated Zone Monitoring - Neutron Probe

   a. Quarterly, the project owner shall check for moisture below the surface impoundment liners using a neutron moisture probe calibrated for use at the site. If moisture content is detected above 30% by volume, field verification testing shall be performed and the project owner shall notify the California Energy Commission and report physical evidence of a release (see notification procedures below). Field verification testing may include a combination of additional neutron analysis, laboratory analysis of liquids drawn from the neutron probe casing and visual observation to verify existence of a release.

   b. Annually, the project owner shall submit documentation of instrument calibration and performance checks. Performance checks shall be a comparison of quarterly results of neutron moisture. Pre testing with earlier tests made under comparable conditions to verify proper operation of equipment must be documented.

2. Groundwater Monitoring

   A Groundwater Monitoring Network (GMN) shall be developed for two scenarios: an on-site industrial water supply scenario, and, an off-site industrial water supply scenario. Both GMN layouts shall include three categories of monitoring wells: (1) background wells (located upgradient of the surface impoundments and land treatment unit); (2) detection wells (located adjacent to the surface impoundments and land treatment unit); and (3) compliance wells. For both onsite and offsite water supply scenarios, the detection wells shall be comprised of three proposed wells located immediately adjacent to the surface impoundments. The Point of Compliance as defined in CCR, title 27, section 20405 is "a vertical surface located at the hydraulically down gradient limit of the Unit that extends through the uppermost aquifer underlying the Unit."

   Semi-annually, samples shall be collected in the groundwater monitoring network and analyzed for the parameters listed in Table II-3.

   The results of the analysis shall be reported in the semi-annual report in tabular and graphical form. Each such graph shall be plotted with raw data at a scale appropriate to show trends or variations in water quality. For graphs showing the trends of similar constituents, the scale shall be the same. The data shall also be used to construct an Upper Tolerance Limit to determine evidence of a release and shall be used to evaluate data from the previous three quarters for evidence of a release.

Table II-3
Monitoring Well Sampling Parameters

Parameter	U.S. EPA or Standard Method	Reporting Limit Goal	Units
Ammonia (as N)	350.1	100	µg/L
Aluminum	200.7	20	µg/L
Arsenic	6020	2	µg/L

Antimony	6020	10	µg/L
Barium	6020	5	µg/L
Beryllium	6020	2	µg/L
Boron	200.7	140	µg/L
Cadmium	6020	5	µg/L
Calcium	200.7	40,000	µg/L
Chloride	300.0	14,000	µg/L
Chromium (total)	6020	5	µg/L
Cobalt	6020	5	µg/L
Copper	6020	5	µg/L
Cyanide (total)	SM 4500	10	µg/L
Fluoride	300.0	500	µg/L
Iron	200.7	20	µg/L
Lead	6020	3	µg/L
Magnesium	200.7	10,000	µg/L
Manganese	200.7	15	µg/L
Mercury	7470A	0.2	µg/L
Molybdenum	6020	10	µg/L
Nickel	6020	5	µg/L
Nitrate as nitrogen	300.0	1,000	µg/L
Nitrite as nitrogen	SM 4500	4	µg/L
Phosphate (total)	365.3	100	µg/L
Potassium	200.7	3,000	µg/L
Selenium	6020	10	µg/L
Silver	6020	5	µg/L
Sodium	200.7	10,000	µg/L
Strontium	200.7	500	µg/L
Sulfate	300.0	100.000	µg/L
Thallium	6020	10	µg/L
Total dissolved solids	SM 2540C	10,000	µg/L
Total alkalinity(as CaCO3)	SM 2320B	100,000	µg/L
Vanadium	6020	5	µg/L
Zinc	6020	10	µg/L
pH	Field	+/- 0.1	pH units
Temperature	Field	+/- 0.1	° F or °C

a. Semi-annually, the groundwater potentiometric surface shall be illustrated on a 8.5" x 11" copy of a site plan showing the static water level, in feet below ground surface; the monitoring well locations; the location of the surface impoundments; and the groundwater gradient under each surface impoundment.

c. Prior to sampling, each monitoring well shall be sufficiently purged in accordance with generally accepted sampling practices in order to obtain a representative ground water sample. If any monitoring well is dry for more than a year, a new or modified monitoring well shall be installed.

Groundwater samples must be collected after the wells have been purged in accordance with California Environmental Protection Agency guidance document, *Representative Sampling of Groundwater for Hazardous Substances*, revised February 2008 (see: http://www.dtsc.ca.gov/SiteCleanup/upload/SMP_ Representative_Sampling_GroundWater.pdf). The required stability parameters and criteria from this guidance are summarized in Table II-4.

Table II-4
Stabilization Parameters and Criteria

Parameter	Criteria
temperature	± 3% of reading (minimum of ± 0.2 C)
pH	+/- 0.1
specific electrical conductance	+/- 3%
Oxidation-reduction potential	+/- 10 millivolts
dissolved oxygen	+/- 0.3 milligrams per liter

III. DATA ANALYSIS

All data analyses methods (statistical or non-statistical) shall meet the requirements of CCR, title 27, section 20415, subdivision (e)(9).

A. General Non-statistical Methods

Evaluation of data would be conducted using non-statistical methods to determine if any new releases from the surface impoundments or land treatment unit have occurred. Non-statistical analysis shall be as follows.

1. Physical Evidence

Physical evidence can include dike or berm(s) damage or loss, unexplained volumetric changes in the surface impoundments, groundwater mounding, or soil discoloration. Each annual report shall comment on the absence or presence of physical evidence of a release.

2. Time Series Plots

Each annual report must include time series plot for groundwater monitoring parameters. Time series plots are not required for parameters that have never been detected above their method detection limit (as specified by the applicable USEPA Method) or if there are less than four quarters of data. Evidence of a release may include trends of increasing concentrations of one or more constituent over time.

B. General Statistical Analysis Methods

For Detection Monitoring, the project owner shall use statistical methods to analyze constituents of concern that exhibit concentrations that equal or exceed their respective method detection limit in at least 10% of applicable historical samples. The project owner may propose and use any statistical method that meets the requirements of CCR, title 27, section 20415, subdivision (e)(7). The report titled

"Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities" (USEPA, 1989) or subsequent versions may also be used to select the statistical test to use for comparing detection monitoring well data to background monitoring data. All statistical methods and programs proposed by the project owner are subject to AO and CPM approval and must be in compliance with CCR, title 27.

IV. RECORD KEEPING AND REPORTING REQUIREMENTS

A. Scheduled Reports to be filed with the California Energy Commission

A detection monitoring report shall be submitted to the AO and CPM of the California Energy Commission. The content of the detection monitoring report shall be as follows:

1. results of sampling analysis, including statistical limits or each monitoring point;
2. a description and graphical presentation of the velocity and direction of ground water flow under or around the evaporation ponds, based upon water level elevations taken during the collection of the water quality data submitted in the report;
3. a map or aerial photograph showing the locations of observation stations, monitoring points, and background monitoring points;
4. a letter transmitting the essential points in each report, including a discussion of any requirement violations found since the last report was submitted, and describing actions taken or planned for correcting those violations. If the project owner has previously submitted a detailed time schedule for correcting requirement violations, a reference to the correspondence transmitting this schedule would be satisfactory. If no violations have occurred since the last submittal, this shall be stated in the letter of transmittal.

B. Unscheduled Reports to be Filed

1. Release from the Surface Impoundments

   The project owner shall perform the procedures contained in this subsection whenever there is evidence of a release from the surface impoundments.

   The project owner shall immediately notify the AO and CPM verbally whenever a determination is made that there is physical or statistically significant evidence of a release (as determined in compliance with CCR, title 27, section 20164) from a surface impoundment. This verbal notification shall be followed by written notification via certified mail within 7 days of such determination. Upon such notification, the project owner may initiate verification procedures or demonstrate that another source other than the Impoundment caused evidence of a release (see below). The notification shall include the following information:

   a. the surface impoundment that may have released or be releasing wastewater;
   b. general information including the date, time, location, and cause of the release;
   c. an estimate of the flow rate and volume of waste involved;

d. a procedure for collecting samples and description of laboratory test to be conducted;

e. identification of any subsurface water bearing zone affected or threatened;

f. a summary of proposed corrective actions; and

For statistically significant evidence of a release (as determined in compliance with CCR, title 27, section 20164) - monitoring parameters and/or constituents of concern that have indicated statistically significant evidence of a release from the surface impoundments; or

For physical evidence of a release - physical factors that indicate physical evidence of a release.

2. Evaluation Monitoring

Pursuant to California Water Code section 13267, subdivision (b), the project owner shall, within 90 days of verifying a release, submit to the AO and CPM an amended Report of Waste Discharge proposing an evaluation monitoring program (CCR, title 27, sections 20420, subdivision (k)(5) and 20425). If project owner decides not to conduct verification procedures, or decides not to make a demonstration that a source other than the surface impoundments or land treatment unit are responsible for the release, the release would be considered verified.

4. Preliminary Engineering Feasibility Study Report

The project owner shall, within 180 days of verification of a release or detection, submit to the AO and CPM a Preliminary Engineering Feasibility Study pursuant to CCR, title 27, section 20420, subdivision (k)(6), that shall contain either corrective action measures that could be taken to achieve background concentration or demonstrate that the waste management units are not the cause of the detection.

V. REPORTING REQUIREMENTS

A. General Provisions

The project owner shall comply with the “General Provisions for Monitoring and Reporting” which is attached to and made part of this Monitoring and Reporting Program.

B. Semi-Annual Report

Beginning on June 30, 2010, a Semi-annual Monitoring Report, including the preceding monitoring information, shall be submitted to the AO and CPM. Subsequent semi-annual monitoring reports shall be submitted to the AO and CPM by January 30 and June 30 of each year.

C. Annual Report

Beginning on January 30, 2011, and by January 30 of each year, the project owner shall submit an Annual Report to the AO and CPM including the preceding information and with the following information:

a. Evidence that adequate financial assurance for closure, post-closure, and reasonably foreseeable releases is still in effect and may include a copy of the renewed financial instrument or a copy of the receipt for payment of the financial instrument;

b. Evidence that the amount is still adequate or increase the amount of financial assurance by the appropriate amount if necessary, due to inflation, a change in the approved closure plan, or other unforeseen events; and

c. A review of the closure plan and a statement that the closure activities described are still accurate or an updated closure plan.

D. Data Analysis Report

The project owner shall, by **January 30 of every year**, submit to the AO and CPM a Data Analysis Report as specified in Section III (Data Analysis) of this Monitoring and Reporting Program.

E. Electronic Submittal of Information

Pursuant to CCT title 23, section 3890, the project owner shall submit reports, including soil, vapor and water data, prepared for the purpose of subsurface investigation or remediation of a discharge of waste to land subject to Division 2 of Title 27 electronically over the internet to the State Water Resources Control Board's Geotracker system. This requirement is in addition to, and not superseded by, any other applicable reporting requirement.

GENERAL PROVISIONS
FOR MONITORING AND REPORTING

1. SAMPLING AND ANALYSIS

   b. All analyses shall be performed in accordance with the current edition(s) of the following documents:

      i. Standard Methods for the Examination of Water and Wastewater

      ii. Methods for Chemical Analysis of Water and Wastes, EPA

   c. All analyses shall be performed in a laboratory certified to perform such analyses by the California State Department of Health Services or a laboratory approved by the AO and CPM. Specific methods of analysis must be identified on each laboratory report.

   d. Any modifications to the above methods to eliminate known interferences shall be reported with the sample results. The methods used shall also be reported. If methods other than EPA-approved methods or Standard Methods are used, the exact methodology must be submitted for review and must be approved by the AO and CPM.

   e. The project owner shall establish chain-of-custody procedures to insure that specific individuals are responsible for sample integrity from commencement of sample collection through delivery to an approved laboratory. Sample collection, storage, and analysis shall be conducted in accordance with an approved Sampling and Analysis Plan (SAP). The most recent version of the approved SAP shall be kept at the facility.

   f. The project owner shall calibrate and perform maintenance procedures on all monitoring instruments and equipment to ensure accuracy of measurements, or shall insure that both activities would be conducted. The calibration of any wastewater flow measuring device shall be recorded and maintained in the permanent log book described in 2.b, below.

   g. A grab sample is defined as an individual sample collected in fewer than 15 minutes.

   h. A composite sample is defined as a combination of no fewer than 8 individual samples obtained over the specified sampling period at equal intervals. The volume of each individual sample shall be proportional to the discharge flow rate at the time of sampling. The sampling period shall equal the discharge period, or 24 hours, whichever period is shorter.

2. OPERATIONAL REQUIREMENTS

   i. Sample Results

      The project owner shall maintain all sampling and analytical results including: strip charts; date, exact place, and time of sampling; date analyses were performed; sample collector's name; analyst's name; analytical techniques used; and results of all analyses. Such records shall be retained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the AO and CPM.

j. Operational Log

An operation and maintenance log shall be maintained at the facility. All monitoring and reporting data shall be recorded in a permanent log book.

3. REPORTING

k. For every item where the requirements are not met, the project owner shall submit a statement of the actions undertaken or proposed which would bring the discharge into full compliance with requirements at the earliest time, and shall submit a timetable for correction.

l. All sampling and analytical results shall be made available to the AO and CPM upon request. Results shall be retained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the AO and CPM.

m. The project owner shall provide a brief summary of any operational problems and maintenance activities to the AO and CPM with each monitoring report. Any modifications or additions to, or any major maintenance conducted on, or any major problems occurring to the wastewater conveyance system, treatment facilities, or disposal facilities shall be included in this summary.

n. Monitoring reports shall be signed by:

   i. In the case of a corporation, by a principal executive officer at least of the level of vice-president or his duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge originates;

   ii. In the case of a partnership, by a general partner;

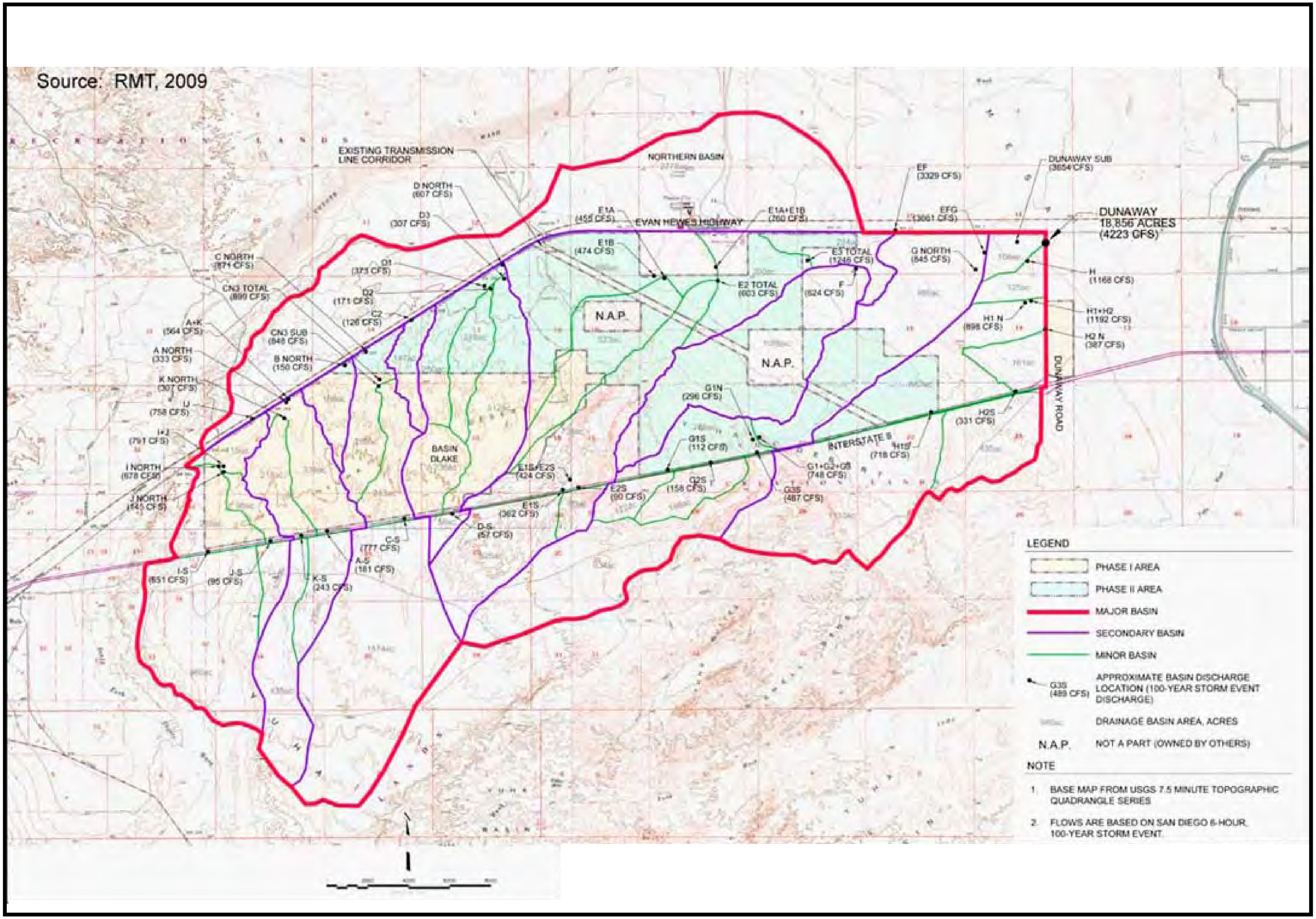
   iii. In the case of a sole proprietorship, by the proprietor; or

   iv. In the case of a municipal, state or other public facility, by either a principal executive officer, ranking elected official, or other duly authorized employee.

o. Monitoring reports are to include the name and telephone number of an individual who can answer questions about the report.

SOIL AND WATER RESOURCES - FIGURE 1

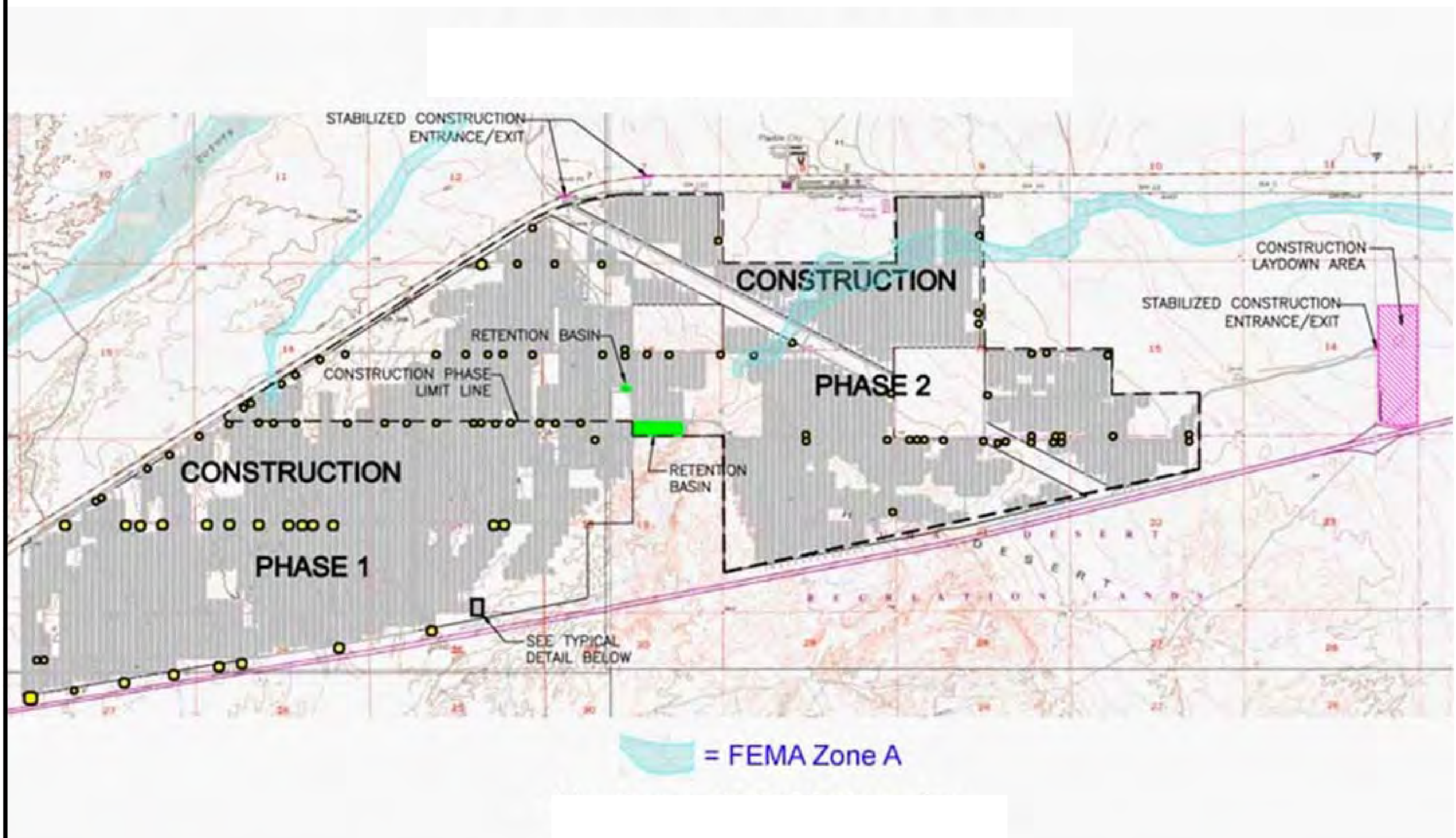
SES Solar Two - Drainage Basins and 100-Year Peak Discharges



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

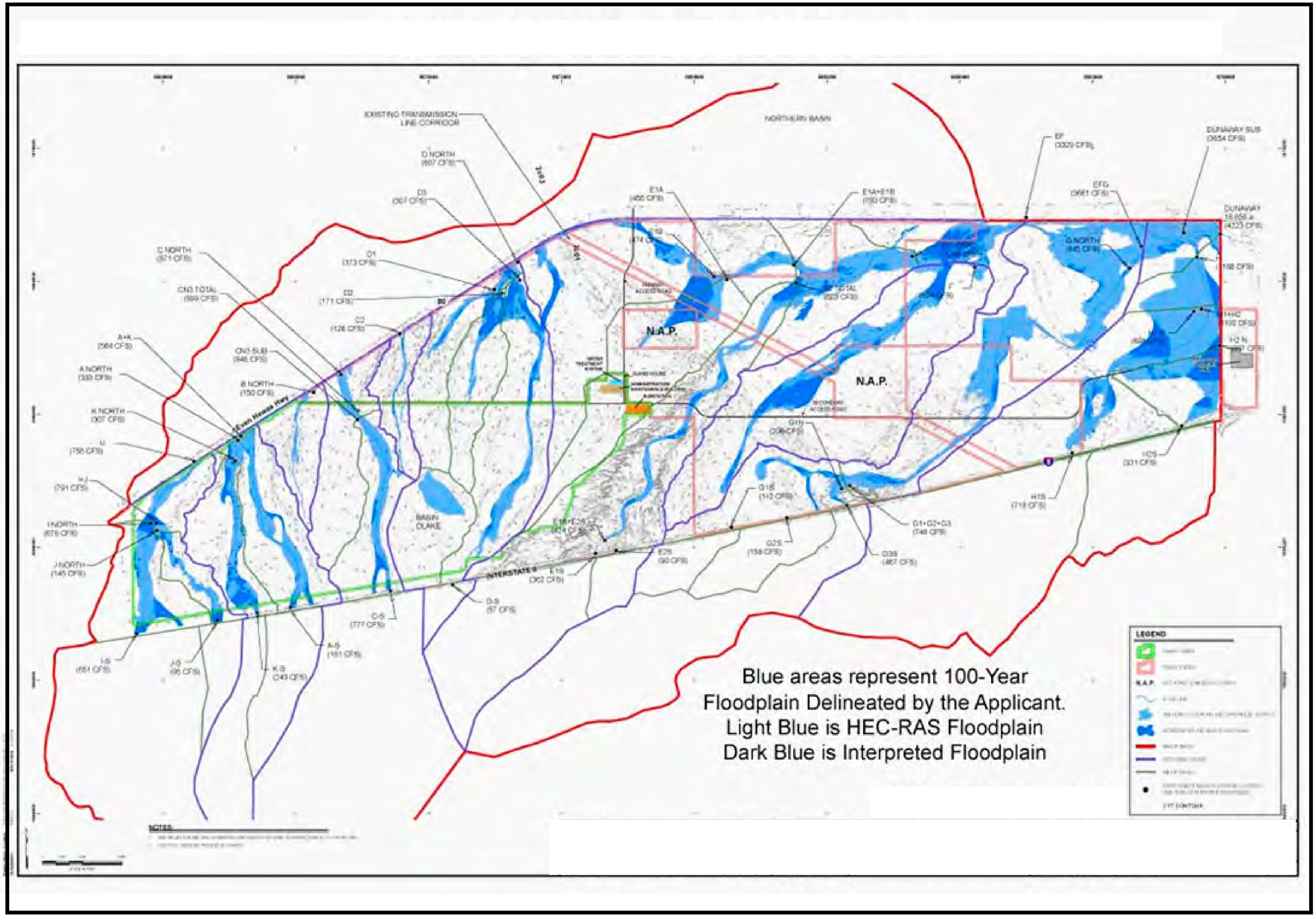
SOURCE: RMT, 2009

SOIL AND WATER RESOURCES - FIGURE 2
SES Solar Two - FEMA Floodplain



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, FEBRUARY 2010
SOURCE: AFC BMP Phase Map

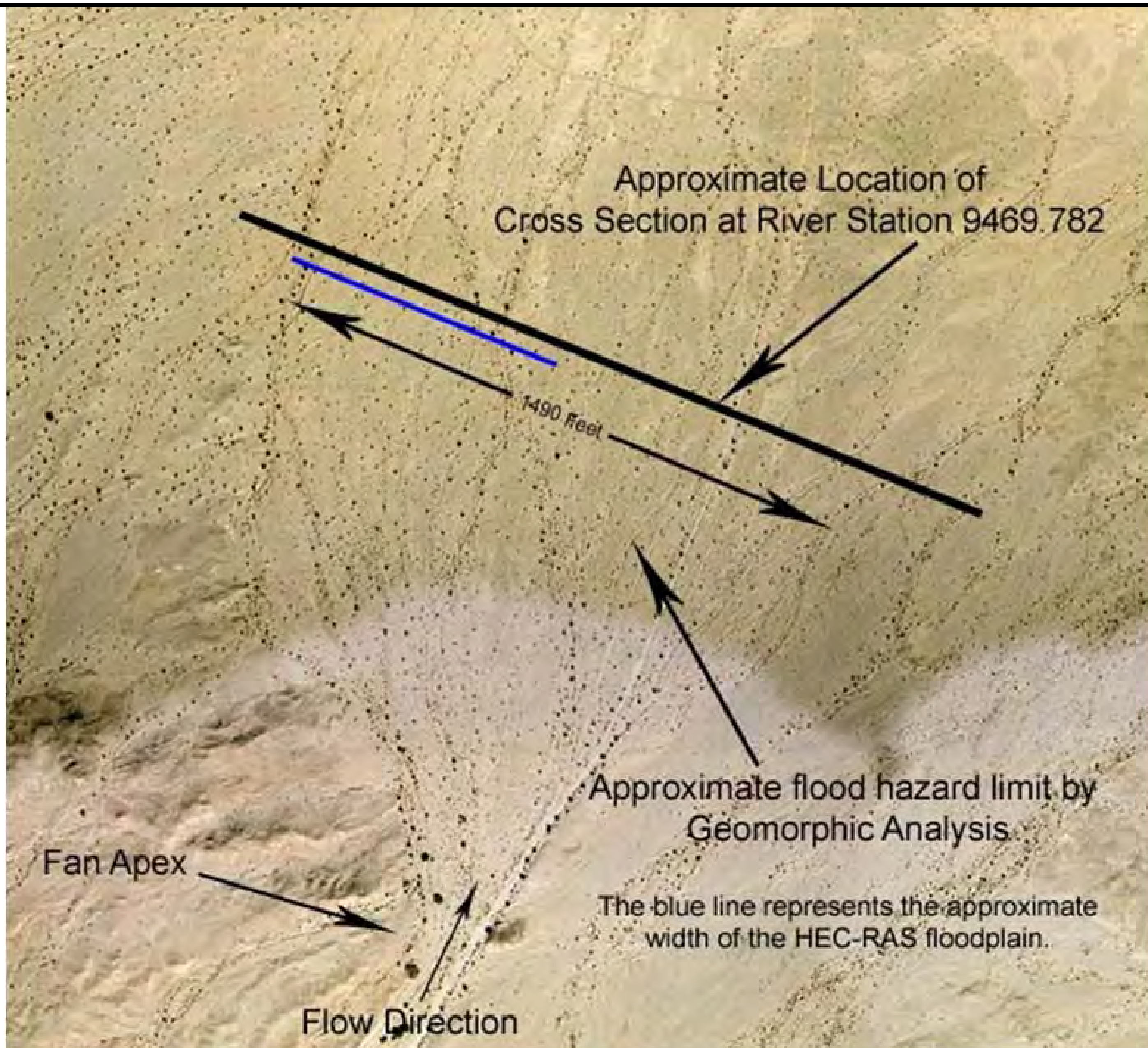
SOIL AND WATER RESOURCES - FIGURE 3
SES Solar Two - Applicant's Flood Zone Delineation



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, FEBRUARY 2010
SOURCE: RMT, 2009

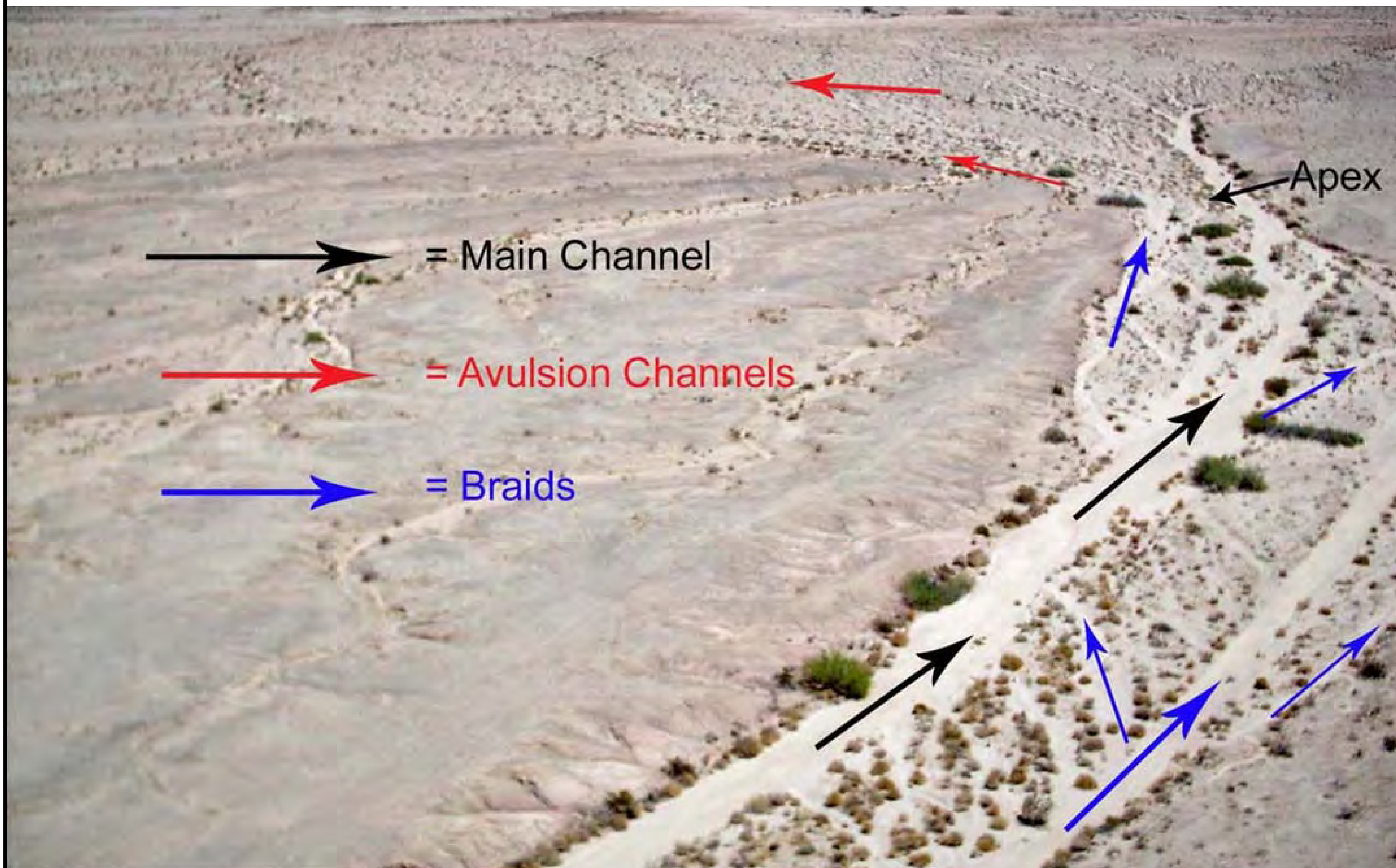
SOIL AND WATER RESOURCES - FIGURE 4

SES Solar Two - Watercourse G Showing Alluvial Fan Characteristics



SOURCE: Aspen Environmental Group

SOIL AND WATER RESOURCES - FIGURE 5
SES Solar Two - Watercourse G Alluvial Fan Oblique View



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, FEBRUARY 2010
SOURCE: Aspen Environmental Group

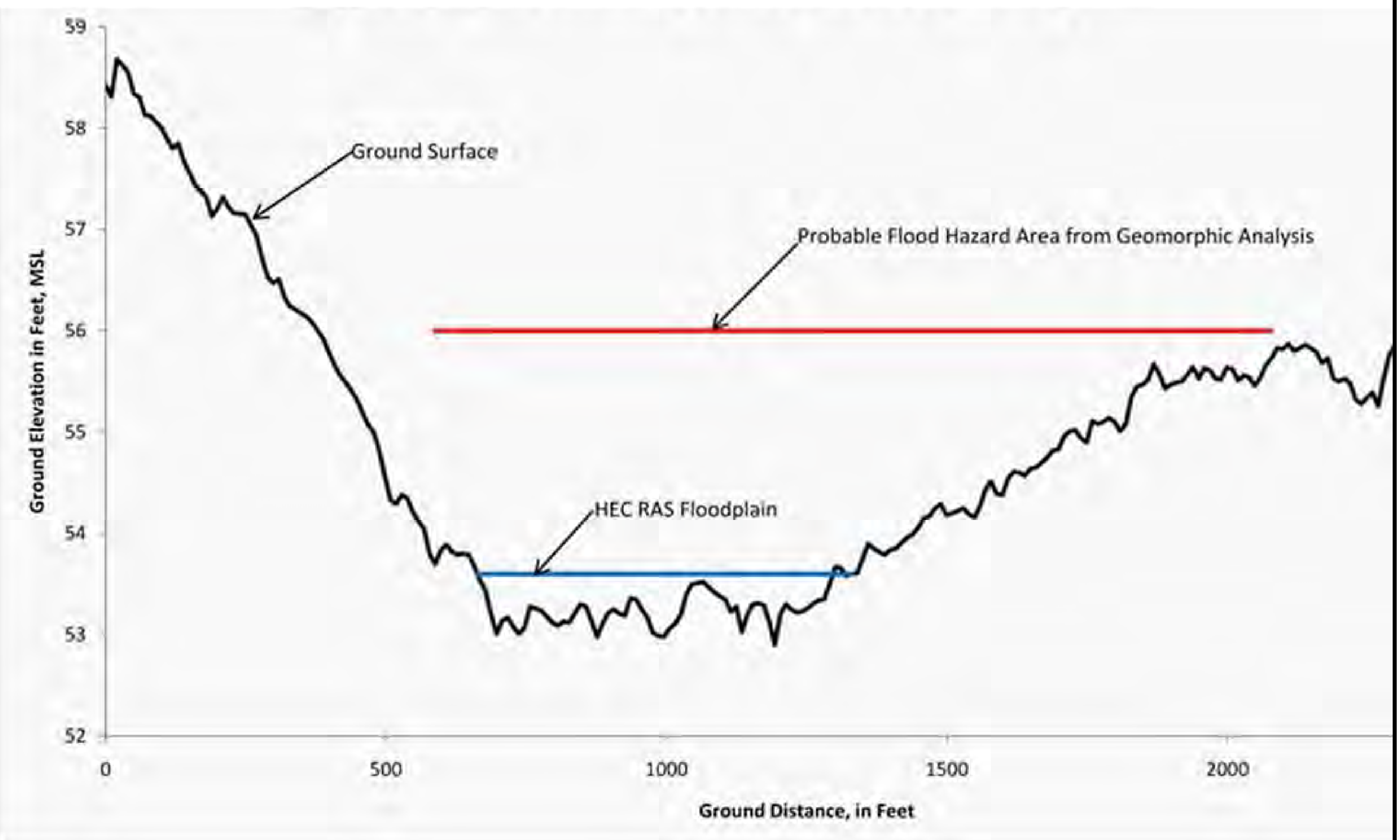
SOIL AND WATER RESOURCES - FIGURE 6

SES Solar Two - Braided Channels in Phase I

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

SOURCE: Aspen Environmental Group

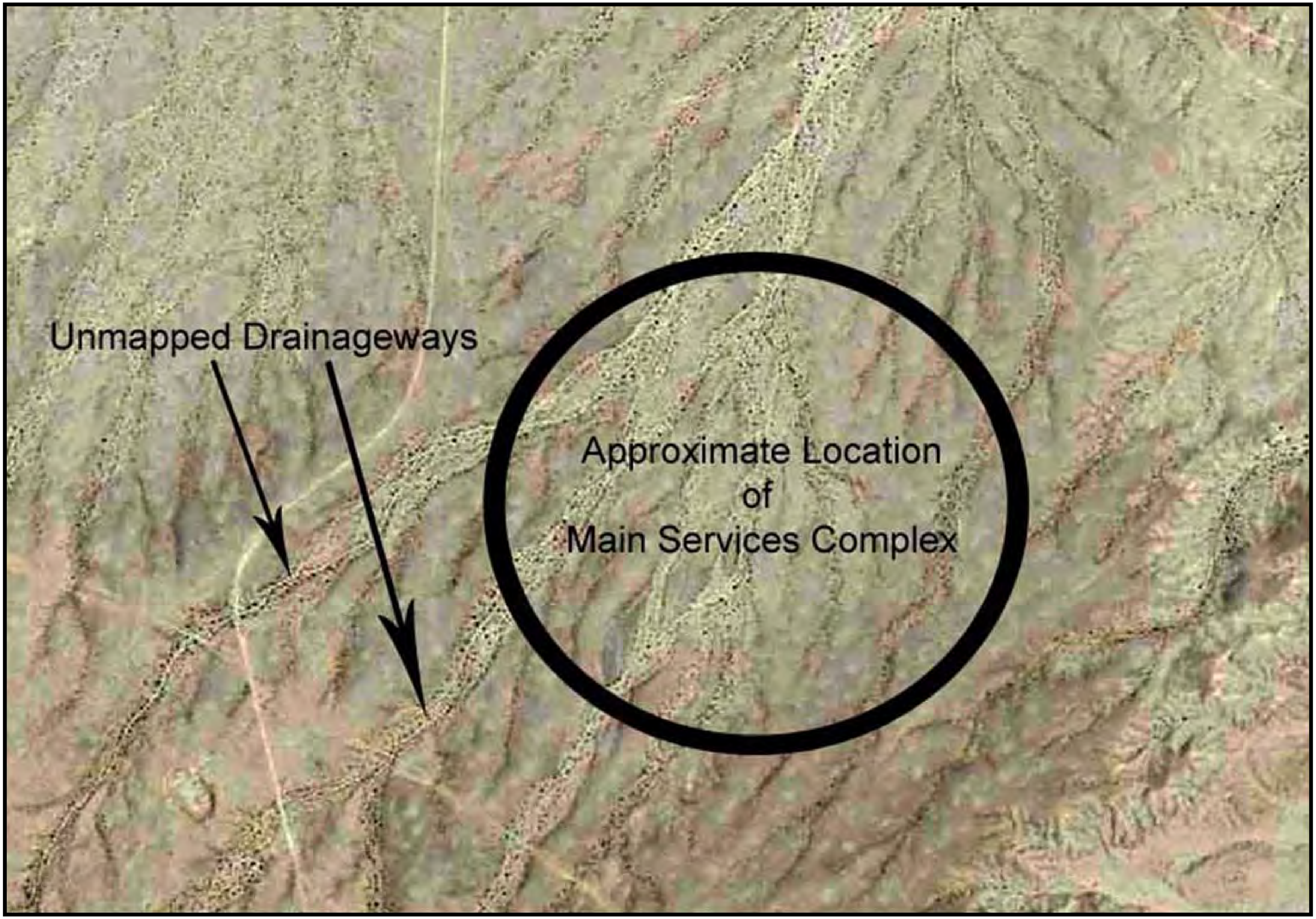
SOIL AND WATER RESOURCES - FIGURE 7
SES Solar Two - HEC-RAS Cross Section 9469 G



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, FEBRUARY 2010
SOURCE: Aspen Environmental Group

SOIL AND WATER RESOURCES - FIGURE 8

SES Solar Two - Unmapped Drainageways Example



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

SOURCE: Aspen Environmental Group

SOIL AND WATER RESOURCES - FIGURE 9

SES Solar Two - Unmapped Drainageway Near the Main Services Complex

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

SOURCE: Aspen Environmental Group

SOIL AND WATER RESOURCES - FIGURE 10

SES Solar Two - Floodplain Vegetation in Phase I

SOURCE: Aspen Environmental Group

C.8 - LAND USE, RECREATION, AND WILDERNESS

Testimony of Negar Vahidi and Susanne Huerta

C.8.1 SUMMARY OF CONCLUSIONS

The U.S. Bureau of Land Management (BLM) and Energy Commission staff (hereafter jointly referred to as "staff") have reviewed the proposed Stirling Energy Systems, Inc (SES) Solar Two Project in accordance with the requirements of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). This section addresses land use issues related to agriculture and rangeland resources, wilderness and recreation resources, wild horses and burros, and compatibility with existing land uses and applicable laws, ordinances, regulations, and standards (LORS). Implementation of the proposed SES Solar Two Project (SES Solar Two or "proposed project") would not result in any adverse impacts to the aforementioned resources and LORS, except for the following: 1) the conversion of approximately 6,500 acres of land to support the proposed project's components and activities would directly disrupt current recreational activities in established federal, state, and local recreation areas and would result in adverse effects on recreational users of these lands; 2) with implementation of staff's proposed Condition of Certification/Mitigation Measure **LAND-1**, the proposed project would be consistent with the applicable LORS pertaining to the Subdivision Map Act; and 3) the proposed project would not be consistent with Imperial County's S-2 zone as required by the Land Use Ordinance.

The applicant has submitted an application to the BLM requesting a right-of-way (ROW) grant 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. Because the proposed project is not currently identified in the CDCA Plan, the proposed project would require a BLM ROW grant and a project-specific CDCA Plan Amendment.

For purposes of CEQA compliance, the level of significance of each impact of the proposed project on land use resources has been determined and is discussed in detail in Section C.8.4.3 (CEQA Level of Significance). In summary, impacts on agricultural lands, rangelands, and wilderness lands would be less than significant, and there would be no impacts related to Williamson Act contracts. Impacts to horses and burros would be less than significant. LORS compliance impacts associated with the Subdivision Map Act would be less than significant with implementation of Condition of Certification/ Mitigation Measure **LAND-1**. However, the proposed project would result in two significant and unavoidable impacts associated with the disruption of recreation lands and non-compliance with the Imperial County Land Use Ordinance for portions of the site zoned S-2.

Alternative 1 to the proposed project would essentially be Phase 1 of the proposed 750 megawatt (MW) project, and would occupy approximately 2,600 acres of land. The conversion of 2,600 acres of land to support the components and activities associated with this alternative would directly disrupt current recreational activities in established federal recreation areas and would result in adverse effects on recreational users of these lands. However, this effect would be proportionally less than the 6,500 acres affected by the proposed project.

Also included is the analysis of two alternatives that were developed to reduce impacts to the U.S. Army Corps of Engineer's primary waters within the project site. As a result, Drainage Avoidance #1 Alternative would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries; and Drainage Avoidance #2 Alternative would eliminate both the eastern and westernmost portions of the proposed project, where the largest drainage complexes are located. In general, the impacts associated with these alternatives would be the same as the proposed project, and Condition of Certification/Mitigation Measure **LAND-1** would be required.

Approximately 1 million acres of land are proposed for solar and wind energy development in the southern California desert lands. Cumulative impacts to approximately 1 million acres of land would all combine to result in adverse effects on agricultural lands and recreational resources. The cumulative conversion of these lands would preclude numerous existing land uses including recreation, wilderness, rangeland, and open space, and therefore, result in a significant and unavoidable cumulative land use impact.

C.8.2 INTRODUCTION

The land use analysis focuses on the project's consistency with existing land use resources, land use plans, ordinances, regulations, policies, and the project's compatibility with existing or reasonably foreseeable land uses. In addition, an energy generating system and its related facilities generally have the potential to create impacts in the areas of air quality, biological resources, cultural resources, noise, dust, public health, traffic and transportation, and visual resources. These individual resource areas are discussed in detail in separate sections of this document.

C.8.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The analysis of proposed project effects must comply with both CEQA and NEPA requirements given the respective power plant licensing and land jurisdictions of the California Energy Commission and BLM. CEQA requires that the significance of individual effects be determined by the Lead Agency; however, the use of specific significance criteria is not required by NEPA.

Because this document is intended to meet the requirements of both NEPA and CEQA, the methodology used for determining environmental impacts of the proposed project includes a consideration of guidance provided by both laws.

CEQA requires a list of criteria that are used to determine the significance of identified impacts. A significant impact is defined by CEQA as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project" (State CEQA Guidelines Section 15382).

In comparison, NEPA states that "'Significantly' as used in NEPA requires considerations of both context and intensity…" (40 CFR 1508.27). Therefore, thresholds serve as a benchmark for determining if a project action will result in a significant adverse environmental impact when evaluated against the baseline. NEPA requires that an Environmental Impact Statement (EIS) is prepared when the proposed federal action (project) as a whole has the potential to "significantly affect the quality of the human environment." By preparing this EIS, the BLM (as the NEPA lead agency) has deemed that the project would generally have a significant impact on the environment.

Thresholds for determining significance in this section are based on Appendix G of the CEQA Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission staff. In addition, staff's evaluation of the environmental effects of the proposed project on land uses (i.e., those listed below) includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27.

Effects of the proposed project on the land use environment (and in compliance with both CEQA and NEPA) have been determined using the thresholds listed below.

Agricultural Lands and Rangelands

- Conversion of Farmland[1] or Rangeland
  - Conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.
  - Conflict with existing zoning for agricultural use, or a Williamson Act contract.
  - Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural uses.

Wilderness and Recreation

- Directly or indirectly disrupt activities in established federal, state, or local recreation areas and/or wilderness areas.
- Substantially reduce the scenic, biological, cultural, geologic, or other important factors that contribute to the value of federal, state, local, or private recreational facilities or wilderness areas.

[1] In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment (LESA) Model prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland (CCR 2006). The intent of the LESA Model is to provide: land use analysts with a quantitative means of determining agricultural land and Farmland disturbance acreages; and quantitative thresholds to determine the level of severity of those land disturbance impacts. The results of the LESA Model are then used to determine the occurrence of significant impacts on agricultural lands and Important Farmlands based on the CEQA Guidelines Appendix G thresholds of significance. Note that the California Energy Commission uses the LESA Model for assessment of impacts to agricultural lands for power generation facilities.

Horses and Burros

- Involve changes in the existing environment which, due to their nature or location, result in interference with BLM's management of Herd Management Areas (HMAs).

Land Use Compatibility and LORS Compliance

- Directly or indirectly divide an established community.
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction, or that would normally have jurisdiction, over the project adopted for the purpose of avoiding or mitigating environmental effects.

Cumulative Land Use Effects

- Individual environmental effects, which, when considered with other impacts from the same project or in conjunction with impacts from other closely related past, present, and reasonably foreseeable future projects, are considerable, compound, or increase other environmental impacts.

C.8.4 PROPOSED PROJECT

C.8.4.1 SETTING AND EXISTING CONDITIONS

Proposed Project

The proposed SES Solar Two site is approximately 6,500 acres and is located in the southwest region of Imperial County. The site consists of an estimated 6,140 acres of public land administered by the BLM, and approximately 360 acres of private land under the jurisdiction of Imperial County. The northern boundary of the proposed project site is adjacent to Imperial County Route S80 and Plaster City, and the southern boundary is adjacent to Interstate Highway 8 (I-8).

The SES Solar Two site currently consists of undeveloped desert land and recreation sites. Two private parcels of land, one owned by a recreational vehicle club and one by a private landowner, are surrounded by the proposed project. These parcels are not a part of the project. Access to these parcels of land would be provided via the arterial roadway system within the proposed project site (SES 2008a). The western boundary of the project site is within the Imperial County Ocotillo/Nomirage Planning Area.

The proposed project includes two laydown areas. One is a 100-acre laydown site located east of the project site on Dunaway Road and north of I-8. The second laydown site is 11.04 acres located within the project site boundaries just south of the Main Services Complex (see description below). Facilities associated with the proposed project (the majority of which are located on the proposed project site or construction laydown area), include:

- approximately 30,000, 38-foot solar dish Stirling systems (i.e., SunCatchers) and associated equipment and infrastructure within a fenced boundary;

- an off-site 12-mile, 6-inch water pipeline approximately 30 inches underground in the existing Evan Hewes Highway ROW, which would provide reclaimed water from the Seeley Waste Water Treatment Facility (SWWTF) located approximately 13 miles east of the proposed project site;
- an onsite, 24.27-acre Main Services Complex located generally in the center of the site for administration and maintenance activities, which would include buildings, parking and access roads;
- an onsite, 6-acre 750-megawatt (MW) Substation located generally in the center of the site, near the Main Services Complex;
- a 10.3-mile 730-MW/230-kilovolt (kV) transmission line intended to connect to the existing San Diego Gas & Electric (SDG&E) Imperial Valley Substation located southeast of the project site, which would parallel the existing Southwest Powerlink transmission line ROW; and
- approximately 27 miles of unpaved arterial roads, approximately 14 miles of unpaved perimeter roads, and approximately 234 miles of unpaved access roads.

Surrounding Area

The proposed project site is located in the southwestern corner of Imperial County. The surrounding area consists of undeveloped desert land with small rural communities in the vicinity. Immediately adjacent to the northern boundary of the proposed project site is the USG Corporation Gypsum Wallboard Manufacturing Facility, known as Plaster City. The Plaster City Off-Highway Vehicle (OHV) includes two staging areas, Plaster City East and Plaster City West which are popular primitive camping and day use areas (BLM 2010a). Immediately adjacent to the southern boundary of the project site is the Yuha Area of Critical Environmental Concern (ACEC) under BLM jurisdiction. Please refer to the **Biological Resources** and **Visual Resources** sections for detailed discussions regarding the setting and impacts associated with the Yuha ACEC.

The community of Edgar is located approximately 0.5 mile east of the project site and the Imperial Lakes Specific Plan area is the nearest residential development located approximately 0.7 mile northeast of the project (SES 2008a). The communities of Coyote Wells and Ocotillo are approximately 1.3 and 2.9 miles west of the nearest boundary of the project site, respectively.

Agricultural Lands and Rangelands

According to the Imperial County Land Use Map, the majority of the county's existing agricultural land is located in the central portion of the county, and is a continuous land use from south of the Salton Sea to the California-Mexico border. The county's major urban areas such as Brawley, Imperial, and El Centro are surrounded by these agricultural lands. The proposed project site is located west of the communities of Edgar and Seeley, and the proposed waterline would traverse approximately 7 miles of land designated as Agriculture by the county's General Plan. Construction of the waterline would occur in the existing Evan Hewes Highway ROW. In addition, the proposed 230-kV transmission line would connect to the existing SDG&E Imperial Valley Substation located southeast of the proposed project site. Approximately 0.75 mile of the proposed 10.3-mile transmission line would traverse agricultural land within a new

ROW in the Yuha Basin. According to the AFC, this portion of the proposed transmission line is within designated Utility Corridor “N;” however, staff calculated this distance (0.75 mile) based on AFC Figures 5.4-1 and 5.9-2, which depict the proposed transmission line within the jurisdiction of Imperial County.

The United States Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) provides information on designation of soils in areas with agricultural lands (NRCS 2009a). According to the NRCS’s Web Soil Survey (WSS), the entire project site has not been surveyed. However, approximately 30% of the total project site, or 1,931 acres of the eastern portion of the site, has been surveyed and is designated as “Prime Farmland if Irrigated” and “Farmland of Statewide Importance” (NRCS 2009b).

In addition, the Farmland Mapping and Monitoring Program (FMMP) of the California Department of Conservation (DOC) provides statistics on conversion of farmland to non-agricultural uses throughout the State. According to the farmland map of Imperial County, approximately 30% of the proposed project site is within the surveyed area and is considered “Other Land”, which is land not included in a farmland mapping category (DOC 2006). Adjacent to the eastern boundary of the construction laydown site is “Farmland of Local Importance,” and approximately 1.5 miles east of the laydown site is “Prime Farmland” and “Farmland of Statewide Importance.” The western portion of the proposed project site has not been surveyed.

Range allotments are designated BLM allotments or pastures for wildlife and livestock (BLM 2009a). No rangeland allotments are within Imperial County; and prior to the adoption of the Eastern San Diego Resource Management Plan (RMP) in 2008, BLM-administered rangelands were located in San Diego County throughout the areas between the Cleveland National Forest, Cuyamaca Rancho State Park, and Anza-Borrego Desert State Park. However, under Section 2.13.2 of the Eastern San Diego RMP, grazing within all allotments is eliminated with the exception of vegetation management prescriptions (BLM 2008). Therefore, there are no longer any range lands on BLM administered lands. Numerous United States Forest Service (USFS) range allotments are located within the Cleveland National Forest approximately 31 miles west of the project site.

Wilderness and Recreation

Wilderness land in Imperial County is administered by the BLM. According to the federal Wilderness Act, a designated Wilderness Area is defined as having four primary characteristics, including the following:

- a natural and undisturbed landscape;
- extensive opportunities for solitude and unconfined recreation;
- at least 5,000 contiguous acres; and
- feature(s) of scientific, educational, scenic, and/or historic value (US Code 2009).

The wilderness areas closest to the proposed project site are the Yuha ACEC which is adjacent to the southern boundary of the project site, the Jacumba Wilderness located approximately 4 miles southeast of the project site, and the Coyote Mountains

Wilderness located approximately 7 miles northeast of the project site. The Yuha ACEC contains several unique attractions including the Juan Bautista de Anza National Historic Trail (Anza Trail), which runs through the ACEC, the proposed project area, and north on to San Sebastian Marsh; geoglyphs created by Native Americans; an area of rare crucifixion thorns; oyster shell beds; and the Yuha Well (BLM 2009b). Please refer to the **Cultural Resources** and **Visual Resources** sections for detailed discussions regarding the setting and impacts associated with the Anza Trail. The Jacumba Mountains Wilderness is 31,237 acres and is generally bounded by I-8 to the north and the California-Mexico border to the south. This wilderness area is notable for private lands and recreational activities including camping and hunting. The Coyote Mountains Wilderness is 18,622 acres and offers recreational activities, such as hiking, camping, and sightseeing (BLM 2009c, BLM 2010b).

Approximately half of the proposed project is within the Yuha Desert Recreation Lands, and the proposed project site has been intensely used for OHV and camping. The CDCA plan designated this area as Limited, meaning that vehicle traffic is limited to designated routes. According to the Current Conditions report submitted by the applicant, there is evidence of human activity throughout the project site due to networks of BLM authorized roads as well as unauthorized trails and roads. Geographic Information System (GIS) data found that 1,038 acres within the project boundary have been disturbed by OHV vehicles (PBS&J 2009). In addition, a private parcel used for recreational activities is surrounded by the proposed project.

The majority of Imperial County land is designated as “Open Space/Recreation” according to the Land Use Map, and the open space and recreation areas under BLM management are designated as “open” or “limited use.” In “open” areas, all forms of cross-country travel are permitted within the posted boundaries, and in “limited use” areas vehicle travel is limited to approved/signed routes of travel and no cross-country vehicle travel is allowed. The Western Colorado Desert Routes of Travel Designations (WECO) is an amendment to the BLM’s CDCA Plan. There are ten (10) open routes designated by WECO within the project site and construction laydown site, and two (2) open routes are in the vicinity of the project site and construction laydown site that could be disturbed by operation or construction activities related to the proposed project. In addition, the California State Parks (CSP) administers recreation areas. **Land Use Table 1** describes recreation areas beginning with the area closest to the proposed project site.

Land Use Table 1
Open Space and Recreation Areas

Recreation Area	Jurisdiction/ Administration	Approximate Distance from the Proposed Project Site	Approximate Acreage	Allowed Uses
Recreational Vehicle Club	Open Space- Imperial County	Private parcel surrounded by the proposed project	640	OHV
Yuha Desert Recreation Lands	Limited Area – BLM; ACEC	Project site is within the boundaries of this designation[2]	+175,000	OHV, camping
Plaster City Open Area	Open Area – BLM	500 feet north	41,000	OHV, camping
Superstition Mountain	Open Area – BLM	10 miles north	13,000	OHV, camping
Anza-Borrego Desert State Park	California State Parks (CSP)	10 miles west	+600,000	Camping, hiking, natural exhibits
Lark Canyon OHV Area and Campground	Limited Use Area – BLM	20 miles west	N/A	OHV, camping
Ocotillo Wells State Vehicular Recreation Area	CSP	23 miles north	+80,000	OHV, camping
Heber Dunes State Recreation Area	CSP	24 miles east	343	OHV, camping
East Mesa	Limited Use Area – BLM	32 miles east	N/A	OHV, camping
Imperial Sand Dunes Recreation Area	Open Area – BLM	35 miles east	118,000	OHV, camping

Source: BLM 2009d; CSP 2009; IVEDC 2007

Horses and Burros

The BLM administers wild horses and burros as guided by the Wild Free-Roaming Horses and Burros Act of 1971. This includes the management of Herd Areas (HA) and Herd Management Areas (HMAs), which are geographic areas where wild horse or burro populations were found at the passage of the Act in 1971 (BLM 2009e). California contains 33 HAs and 22 HMAs. According to BLM maps, the Chocolate-Mule Mountains HMA and the Picacho HA are located approximately 58 miles east of the proposed project site in Imperial County near the California-Arizona border (BLM 2009f, BLM 2009g). As such, the proposed project site would not contain or traverse any established HMAs or HAs.

[2] According to the comments provided by the BLM on a draft of the SA/DEIS, the project site is within the Yuha Desert Recreation Lands.

Land Use and LORS Compliance

The majority of the proposed project site (6,150 acres) is located within the “Limited Use” category of the BLM’s CDCA Plan, and 360 acres of the private lands within the site are under Imperial County jurisdiction. **Land Use Table 2** provides a general description of the land use LORS applicable to the proposed project and surrounding lands. The project’s consistency with these LORS is discussed in **Land Use Table 3**.

Land Use Table 2
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	
Federal Land Policy and Management Act (FLPMA), 1976 – 43 CFR 1600	Establishes public land policy; guidelines for administration; and provides for the management, protection, development, and enhancement of public lands. In particular, the FLPMA’s relevance to the proposed project is that Title V, Section 501 establishes BLM’s authority to grant rights-of-way for generation, transmission, and distribution of electrical energy (FLPMA 2001).
Farmland Protection Policy Act, Subtitle I of Title XV, Section 1539-1549 of the Agriculture and Food Act of 1981(NRCS 2009)	The FPPA is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. It assures that—to the extent possible—federal programs are administered to be compatible with state, local units of government, and private programs and policies to protect farmland. Federal agencies are required to develop and review their policies and procedures to implement the FPPA every 2 years. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land.
Bureau of Land Management – California Desert Conservation Area (CDCA) Plan, 1980 as Amended (BLM 1980)	The 25 million-acre CDCA Plan Area contains over 12 million acres of public lands spread within the area known as the California Desert, which includes the following three deserts: the Mojave, the Sonoran, and a small portion of the Great Basin. The 12 million acres of public lands administered by the BLM are half of the CDCA. The CDCA Plan is a comprehensive, long-range plan with goals and specific actions for the management, use, development, and protection of the resources and public lands within the CDCA, and it is based on the concepts of multiple use, sustained yield, and maintenance of environmental quality. The plan’s goals and actions for each resource are established in its 12 elements. Each of the plan elements provides both a desert-wide perspective of the planning decisions for one major resource or issue of public concern as well as more specific interpretation of multiple-use class guidelines for a given resource and its associated activities.

Applicable LORS	Description
Yuha Desert Management Plan (1985) (YDMP 1985)	The BLM's Yuha Desert Management Plan establishes goals and planned actions that are designed to meet the goals of the CDCA Plan. They emphasize the protection of wildlife and cultural resource values while permitting a compatible level of competitive vehicle use and energy development.
Public Rangelands Improvement Act (1978) (PRIA 1978)	Establishes and reaffirms the national policy and commitment to inventory and identifies current public rangeland conditions and trends; manages, maintains and improves the condition of public rangelands so that they become as productive as feasible for all rangeland values in accordance with management objectives and the land use planning process; and continues the policy of protecting wild free-roaming horses and burros from capture, branding, harassment, or death, while at the same time facilitating the removal and disposal of excess wild free-roaming horses and burros which pose a threat to themselves, their habitat, and to other rangeland values.
Wild Free-Roaming Horses and Burros Act (1971) (BLM 2009h)	The BLM protects, manages, and controls wild horses and burros under the authority of the Wild Free-Roaming Horses and Burros Act of 1971 (Act) to ensure that healthy herds thrive on healthy rangelands. The BLM manages these animals as part of its multiple-use mission under the 1976 Federal Land Policy and Management Act. One of the BLM's key responsibilities under the Act is to determine the "appropriate management level" (AML) of wild horses and burros on the public rangelands.
State	
Subdivision Map Act (Public Resources Code Section 66410-66499.58)	This section of the California Public Resources Code provides procedures and requirements regulating land division (subdivisions) and parcel legality. Regulation and control of the design and improvement of subdivisions have been vested in the legislative bodies of local agencies.

Applicable LORS	Description
Local	
Imperial County General Plan, Land Use Element (Imperial County 2008a)	Imperial County covers an area of 4,597 square miles within the southeastern portion of the State of California. Approximately 50% of Imperial County lands are undeveloped and under federal ownership and jurisdiction. Currently, 20% of the nearly 3 million acres of Imperial County is irrigated for agricultural purposes, most notably the central area known as Imperial Valley. The Imperial County General Plan consists of 9 elements that serve as the primary policy statement by the Board of Supervisors for implementing development policies and land uses in Imperial County. The primary purpose of the Land Use Element is to identify the goals, policies and standards of the General Plan that will guide the physical growth of Imperial County, and serves as the primary policy statement by the Board of Supervisors for implementing development policies and land uses (Imperial County 2008a). The Land Use Element describes existing land uses within the county and the facilities and services which provide the public infrastructure to support these uses. Also stated are goals and objectives for future growth, expansion of public facilities, environmental resource protection, and policies and programs to guide such future growth. In particular, the goals and objectives are intended to serve as long-term principles and policy statements representing ideals which have been determined by the citizens as being desirable and deserving of community time and resources to achieve. These goals and objectives, therefore, are important guidelines for land use decision making. (Imperial County 2008a).
Imperial County General Plan, Conservation and Open Space Element (Imperial County 2006a)	The Conservation and Open Space Element identifies goals and policies to insure the managed use of environmental resources. The goals and policies are also designed to prevent limiting the range of resources available to future generations. The purpose of the Conservation and Open Space Element is to: • promote the protection, maintenance, and use the county's natural resources with particular emphasis on scarce resources and resources that require special control and management; • prevent the wasteful exploitation, destruction, and neglect of the State's natural resources; • recognize that natural resources must be maintained for their ecological value as well as for the direct benefit to the public; and • protect open space for the preservation of natural resources, the managed production of resources, outdoor recreation, and public health and safety.

Applicable LORS	Description
Imperial County General Plan, Geothermal/ Alternative Energy and Transmission Element (2006) (Imperial County 2006b)	Imperial County has expanded the Geothermal/Alternative Energy and Transmission Element of the General Plan to provide guidance and approaches for public input into the planning process with respect to the future siting of electrical transmission lines in the county. This addition to the element is intended to take into account the potential and probable growth of major transmission facilities anticipated to occur in Imperial County over the next decade. New transmission would accommodate increased demand for power delivery due to local growth, expected demand growth and system delivery requirements in Southern California's service area, overall system reliability and support the development of expanded renewable energy power production and exportation.
Imperial County Land Use Ordinance, Title 9 (2008) (Imperial County 2008b)	This title constitutes the comprehensive land use regulations for all unincorporated areas of Imperial County. These regulations are adopted to, promote and protect the public health, safety, and general welfare through the orderly regulation of land uses throughout the unincorporated areas of the county.
Ocotillo/Nomirage Community Area Plan (1994) (ONCAP 1994)	The Ocotillo/Nomirage Community Area Plan designates the proposed distribution and general location and extent of the uses of land for housing, business, industry, open space, including natural resources, recreation and enjoyment of scenic beauty, education, public buildings and grounds, solid waste disposal facilities and other categories of public and private uses of land.

C.8.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Construction and Operation

Agricultural Lands and Rangelands

According to the AFC, "…[t]he potential land use effects that relate to the Project are the loss of open space, and the removal of agricultural land for other purposes" (SES 2008a). However, the AFC then states, "[t]he Project Site is not within any specified agricultural areas and does not contain the preferred soils or water availability that facilitate intensive agricultural use. The Project Site therefore does not contain any farmland areas and will not contribute to loss of productive farmland" (SES 2008a). Staff conducted analysis of agricultural land and rangeland to verify the Applicant's assessment.

As described in detail above under the setting subsection entitled "Agricultural Lands and Rangelands," multiple governmental agencies at the federal, state, and local level have information regarding the agricultural lands relating to the proposed project and the surrounding area. To summarize, the following is a list of the various designations or categorizations these multiple governmental agencies have provided for the proposed project site and construction laydown area:

- **California DOC:** Under the standard FMMP mapping criteria, approximately 30% of the project site, which is within the survey boundaries, is considered "Other Land" (DOC 2006).
- **USDA NRCS:** As noted in the "Setting and Existing Conditions" section, 1,931 acres (approximately 30%) of the total proposed project site have been surveyed by the NRCS. According to the Web Soil Survey, the NRCS designates approximately 74% of the surveyed portion of the site as Farmland of Statewide Importance and 25% of the surveyed portion of the site as Prime Farmland if Irrigated (NRCS 2009b).
- **Imperial County:** The County of Imperial Land Use Ordinance designates the majority of the proposed site and construction laydown area within the S-2 (Open Space/Preservation) zone (Imperial County 2008b).
- **Williamson Act**: The project site is not located in an area that is under a Williamson Act contract (SES 2008a).

The DOC's FMMP mapping information is used in Staff Assessments to analyze impacts to important farmlands (i.e., Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) in the state. The FMMP designation for the proposed project site is "Other Land," which is a designation used for land that is not included in any other mapping category, such as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance (DOC 2006).

In addition, as provided for in the CEQA Guidelines Appendix G (Environmental Checklist Form, Item II, Agricultural Resources), "…[i]n determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment (LESA) Model prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland" (CCR 2006). Staff often uses the LESA Model for assessment of impacts to agricultural lands for power generation facilities. LESA is a term used to define an approach for rating the relative quality of land resources based upon specific measurable features. The formulation of a California Agricultural LESA Model is the result of Senate Bill 850 (Stats. 1993, ch. 812, section 3), which charged the Resources Agency, in consultation with the Governor's Office of Planning and Research, with developing an amendment to Appendix G of the California Environmental Quality Act (CEQA) Guidelines concerning agricultural lands. Such an amendment is intended "to provide lead agencies with an optional methodology to ensure that significant effects on the environment of agricultural land conversions are quantitatively and consistently considered in the environmental review process" (Public Resources Code Section 21095).

The California Agricultural LESA Model is composed of 6 different factors. Two "Land Evaluation" (LE) factors are based upon measures of soil resource quality. Four "Site Assessment" (SA) factors provide measures of a given project's size, water resource availability, surrounding agricultural lands, and surrounding protected resource lands. For a given project, each of these factors is separately rated on a 100-point scale. The factors are then weighted relative to one another and combined, resulting in a single numeric score for a given project, with a maximum attainable score of 100 points. It is this project score that becomes the basis for making a determination of a project's potential significance, based upon a range of established scoring thresholds (DOC 1997).

Staff conducted the LESA Model for the proposed project site in accordance with the detailed instructions provided in the LESA Model Instruction Manual. However, the entire site has not been surveyed by the NRCS; therefore, the LESA score is based only on the portions of the project site within the surveyed areas.

The LESA score is based on a scale of 0 to 100. The Final LESA score for the SES Solar Two site is 30.95. Based on the California Agricultural LESA Thresholds,[3] a score of 30.95 would not result in adverse effects due to the permanent conversion of 1,931 acres of Farmland. The completed LESA Model worksheets for the proposed project are included within **APPENDIX LU-1** at the end of this section.

In addition, the proposed project's linear components include a 12-mile waterline and a 10.3 mile transmission line. Portions of these linear facilities would traverse unincorporated areas of Imperial County within agricultural zoning designations, and construction of these facilities may result in impacts to surrounding agricultural land. The waterline and the majority of the transmission line would be constructed within existing linear ROWs; however, at the southeast end of the proposed transmission line, the proposed ROW would deviate from the existing SDG&E Southwest Powerlink Transmission Line corridor and head east in a new ROW for approximately 1 mile. The proposed transmission line would then terminate at the existing SDG&E Imperial Valley Substation. Approximately 0.75 mile of this portion of the transmission line would traverse land designated for agriculture by Imperial County. Construction impacts of the new ROW would be temporary, and the amount of agricultural land permanently converted by the transmission line tower footings would be minimal. In addition, construction of the transmission line would not preclude agricultural activities from occurring within the ROW and in the immediate areas surrounding the ROW. As such, no farmland conversion impacts or inconsistencies with lands within an agricultural zone are expected due to construction of linear facilities, and the project would not involve other changes to the existing environment which could result in the conversion of farmland to non-agricultural uses. Therefore, impacts agricultural land would not be adversely affected by construction of the proposed project's linear components.

In regard to rangelands, as noted in the "Setting and Existing Conditions," no allotments of rangeland are within the vicinity of the proposed project site. Therefore, no conversion of rangelands would occur, and they would not be adversely affected by construction or operation of the proposed project.

Finally, the project site is not located in an area that is under a Williamson Act contract. Therefore, the proposed project would not result in any conflict with Williamson Act contracts.

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[3] California LESA Model Scoring Thresholds (DOC 1997, Table 9):

- 0 to 39 Points Not Considered Significant
- 40 to 59 Points Considered Significant (only if LE and SA subscores are each greater than or equal to 20 points)
- 60 to 79 Points Considered Significant (unless either LE or SA subscore is less than 20 points)
- 80 to 100 Points Considered Significant.

Wilderness and Recreation

Approval of the proposed project would directly remove approximately 6,500 acres from potential use for recreational opportunities such as OHV use and camping. As noted in the "Setting and Existing Conditions" subsection, ten (10) "open" recreational routes designated by the WECO are within the project site and construction laydown site, two (2) "open" routes are in the vicinity of the proposed site and construction laydown site, and **Land Use Table 1** describes the numerous recreation areas with OHV and camping as permitted uses. In addition, the area adjacent to the southern boundary of the project site is the Yuha ACEC, while the eastern boundary of the project site borders agricultural land. As a result, these existing land uses either limit or prohibit OHV activity. However, the areas north and west of the project site are available for recreational activities, and construction of the proposed project would disrupt a highly active recreational area. This is supported by the applicant's Current Conditions report, which states that there is evidence of human activity throughout the project site due to networks of BLM authorized roads as well as unauthorized trails and roads, and GIS data that found 1,038 acres within the project boundary have been disturbed by OHV vehicles (PBS&J 2009). In addition, according to the Recreation Element of the CDCA Plan, "…lands managed by the Bureau are especially significant to recreationists (BLM 1980). The conversion of 6,500 acres of land to support the proposed project's components and activities would directly disrupt current recreational activities in established federal, state, and local recreation areas and would result in adverse effects on recreational users of these lands.

In addition, as noted in the "Setting and Existing Conditions" subsection, the proposed project surrounds a private parcel owned by a recreational vehicle club. The proposed project would impact the vehicles' routes to access this parcel. However, access to this parcel would be provided via the arterial roadway system within the proposed project site (SES 2008a). Therefore, this impact is not expected to hinder the recreational users' access to these areas that contain lands under private ownership.

In regard to potential wilderness impacts, the project would not be constructed on wilderness lands. However, the Yuha ACEC and Jacumba Mountains Wilderness near the project site attract visitors based on their scenic, biological, cultural, and recreational amenities. The proposed project would indirectly impact the recreational and wilderness values of these areas by changing the natural and undisturbed landscape at the proposed project site from open space to an intensive utility. The recreationists of the Yuha ACEC and Jacumba Wilderness may experience diminished quality of the surrounding wilderness mostly from areas where the proposed project would be visible. The **Visual Resources** section provides analysis of the proposed project's impacts on surrounding lands. Proposed project construction and operation activities would have the potential to degrade the qualities of solitude and unconfined wilderness and recreation in the remote southwestern portion of Imperial County. However, due to the abundance of wilderness and recreation sites throughout the county, the proposed project would impact a small fraction of these lands.

Please refer to the **Air Quality, Biological Resources, Noise, Cultural Resources**, and **Visual Resources** sections for detailed discussions of construction-related nuisance impacts to surrounding lands and proposed project effects on scenic, biologic, and cultural amenities.

Horses and Burros

The proposed project would not contain or traverse any established BLM HAs or HMAs. The nearest Chocolate-Mule Mountains HMA and the Picacho HA are located approximately 58 miles east side of the proposed project site in Imperial County near the California-Arizona border (BLM 2009f, BLM 2009g). In addition, following construction, fencing around the site would keep any burros outside of the proposed project location. Therefore, the proposed project would not result in any interference with BLM's management of an HMA or HA. For a discussion of the proposed project's consistency with Chapter 3 of the BLM's CDCA Plan, Wild Horses and Burros Element, please see **Land Use Table 3** (below).

Land Use Compatibility and LORS Compliance

Physical Division of an Existing Community

The project would not physically divide an established community,[4] because the proposed project and associated linear facilities would be located on undeveloped lands (and adjacent to existing utility ROWs) under the jurisdiction of the BLM or Imperial County. In addition, the proposed project would not be located within or near an established community. Neither the size nor the nature of the project would result in a physical division or disruption of an established community. In addition, no existing roadways or pathways within an established community would be blocked. Due to the temporary nature of construction activities, construction generated nuisances such as dust and noise are not expected to adversely affect land uses in the area. For a detailed analysis of construction-related nuisance impacts, please see the **Air Quality, Visual Resources,** and **Noise** sections.

Conflict with any Applicable Land Use Plan, Policy, or Regulation

As required by California Code of Regulations, Title 20, Section 1744, Energy Commission staff evaluates the information provided by the project owner in the AFC (and any amendments), project design, site location, and operational components to determine if elements of the proposed project would conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project, or that would normally have jurisdiction over the project except for the Energy Commission's exclusive authority. As part of the licensing process, the Energy Commission must determine whether a proposed facility complies with all applicable state, regional, and local LORS (Public Resources Code section 25523[d][1]). The Energy Commission must either find that a project conforms to all applicable LORS or make specific findings that a project's approval is justified even where the project is not in conformity with all applicable LORS (Public Resources Code section 25525).

In addition, the applicant has submitted an application to the BLM requesting a ROW to construct the proposed project and its related facilities. Pursuant to the

California Desert Conservation Area (CDCA) Plan (1980, as amended), sites associated with power generation or transmission not identified in the CDCA Plan are considered through the Plan Amendment process. Under Federal law, BLM is responsible for

[4] An established community usually refers to a residential community.

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 (FR 2008). 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 (please see the **Biological Resources** section).

If the ROW and proposed land use plan amendment are approved by BLM, the proposed solar thermal power plant facility on public lands would be authorized in accordance with Title V of the FLMPA of 1976 and the Federal Regulations at 43 CFR part 2800. This Environmental Impact Statement (EIS) acts as the mechanism for meeting NEPA requirements, and also provides the analysis required to support a Plan Amendment identifying the facility within the Plan.

The proposed project's consistency with applicable Imperial County Land Use LORS has been considered. The analysis of Imperial County's General Plan Land Use Element in **Land Use Table 3** primarily consists of the goals and objectives. Typically, a LORS analysis focuses on land use policies. However, the county's Land Use Element states the following regarding their goals and objectives:

> The Goals and Objectives, together with the Implementation Programs and Policies… are the statements that shall provide direction for private development as well as government actions and programs. Imperial County's Goals and Objectives are intended to serve as long-term principles and policy statements representing ideals which have been determined by the citizens as being desirable and deserving of community time and resources to achieve. These Goals and Objectives, therefore, are important guidelines for land use decisionmaking (Imperial County 2008a).

Staff's analysis of the proposed project's consistency with applicable federal, state, regional, and local land use LORS is presented in **Land Use Table 3.** Based on staff's independent review of applicable LORS documents, the proposed project would not be consistent with the intent of the S-2 zone within the county's Land Use Ordinance. Otherwise, the project would be consistent with all other applicable land use LORS.

Land Use Table 3
Project Compliance with Adopted Land Use LORS

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
FEDERAL			
Federal Land Policy and Management Act, 1976 – 43 CFR 1600, **Sec. 501. [43 U.S.C**. **1761]**	(a) The Secretary, with respect to the public lands … are authorized to grant, issue, or renew rights-of-way over, upon, under, or through such lands for: (4) systems for generation, transmission, and distribution of electric energy, except that the applicant shall also comply with all applicable requirements of the Federal Energy Regulatory Commission under the Federal Power Act, including part I thereof (41 Stat. 1063, 16 U.S.C. 791a-825r) [P.L. 102-486, 1992]	YES	The FLPMA authorizes the issuance of a right-of-way grant for electrical generation facilities and transmission lines. In addition, based on staff's review of the Federal Power Act, the requirements would not be applicable to the proposed project as they are not related to renewable resources, and are otherwise related to administrative procedures. Therefore, the proposed project would be in compliance with this policy.
Farmland Protection Policy Act, Section 658.1	As required by section 1541(b) of the [Farmland Protection Policy] Act, 7 U.S.C. 4202(b), Federal agencies are (a) to use the criteria to identify and take into account the adverse effects of their programs on the preservation of farmland, (b) to consider alternative actions, as appropriate, that could lessen adverse effects, and (c) to ensure that their programs, to the extent practicable, are compatible with State and units of local government and private programs and policies to protect farmland.	YES	As discussed above in detail in Section C.8.4.2 (under the subsection entitled "Agricultural Lands and Rangelands") and in **APPENDIX LU-1**, and based on the final score (30.95) of the LESA Model, the farmland conversion impacts of the proposed project would not be adverse. In addition, construction of the proposed project and its associated linear facilities would be temporary, and the project would not involve other changes in the existing environment which could result in conversion of farmland, to non-agricultural uses. Therefore, proposed project would be consistent with the FPPA.
Bureau of Land Management – California Desert Conservation Area (CDCA) Plan (BLM 1980)	**Chapter 2 – Multiple-Use Classes** **MULTIPLE-USE CLASS GUIDELINES** MULTIPLE-USE CLASS L Limited Use 6. Electrical Generation Facilities –Nuclear and Fossil Fuel –Wind/Solar –Geothermal Electric generation may be allowed. 7. Transmission Facilities New gas, electric, and water facilities and cables for interstate communication may be allowed only within designated corridors (see Energy Production and Utility Corridors Element). NEPA requirements will be met. [#5,85]	YES (with BLM's project-specific CDCA Plan Amendment)	Approximately 6,140 acres of the proposed project site is administered by the BLM and is managed under multiple use Class L (Limited Use) categories in conformance with the CDCA Plan (SES 2008a). The proposed project consists of an electrical generating facility, a transmission line, a waterline, and ancillary facilities. As such, development of the proposed project is an allowed use under the Multiple-Use Class Guidelines. In addition, the CDCA Plan, while recognizing the potential compatibility of solar generation facilities on public lands, requires that all sites associated with power generation or transmission not identified in the Plan be considered through the Plan Amendment process. Therefore, the BLM would undertake a project-specific CDCA Plan amendment along with the ROW grant for the proposed SES Solar Two Project. Upon BLM's amendment of the CDCA plan for the SES Solar Two Project, the proposed project would be fully compliant with the CDCA Plan. This Environmental Impact Statement (EIS) acts as the mechanism for meeting NEPA requirements, and also provides the analysis required to support a Plan Amendment identifying the facility within the Plan.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	Chapter 3 **Wild Horse and Burros Element** Goal 2. Protect wild horses and burros on public lands by conducting surveillance to prevent unauthorized removal or undue harassment of animals.	YES	As noted in the "Setting and Existing Conditions" subsection above, the proposed project site is not in the vicinity of an HMA or HA; therefore, the project site and surrounding area are not notable for the presence of wild horses or burros. Therefore, the proposed project would not result in any interference with BLM's management of an HMA, and would be consistent with this element of the CDCA Plan.
	Chapter 3 **Energy Production and Utility Element** Goal 1. Fully implement the network of joint-use planning corridors to meet projected utility needs to the year 2000. Specific electrical and natural gas right-of-way or power plant site applications made under the provisions of this element should be consistent with adopted California Energy Commission forecasts, which are reviewed biennially. Decision criteria are to: (1) Minimize the number of separate rights-of-way by utilizing existing rights-of-way as a basis for planning corridors; (2) Encourage joint use of corridors for transmission lines, canals, pipelines, and cables; (3) Provide alternative corridors to be considered during processing of applications; (4) Avoid sensitive resources wherever possible; (5) Conform to local plans whenever possible; (6) Consider wilderness values and be consistent with final wilderness recommendations; (7) Complete the delivery-systems network; (8) Consider ongoing projects for which decisions have been made, for example, the Intermountain Power Project; and (9) Consider corridor networks which take into account power needs and alternative fuel resources.	YES	The proposed project's linear facilities would either use, or be adjacent to, existing and established utility ROWs. The proposed project site is bisected by the existing 500-kV Southwest Powerlink transmission line. The proposed 230-kv transmission line would traverse approximately 7 miles of the Yuha Basin ACEC within the designated utility corridor (SES 2008a), and the proposed waterline would be constructed within an existing highway ROW (SES 2009). Therefore, the proposed project would utilize existing ROWs, and would be consistent with this element of the CDCA Plan.
	Addendum B: Interim Management Guidelines **Chapter III. Guidelines for Specific Activities** **Lands Actions – Disposal, Rights-of-Way, Access and Withdrawals** 2. Rights-of-Way: Existing rights-of-way may be renewed if they are still being used for their authorized purpose. New rights-of-way may be approved only for temporary uses that satisfy the non-impairment criteria. 3. Right-of-Way Corridors: Right-of-way corridors may be designated on lands under wilderness review.	YES	The non-impairment standard, directs that "until Congress has determined otherwise" the lands under review be managed so as not to impair their suitability as wilderness (CRS 2004). As the proposed project would not traverse an established Wilderness Area, the project would be in compliance with this guideline of the CDCA Plan.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
Federal Wilderness Act, 16 U.S.C. § 1131-1136	**(a) Establishment; Congressional declaration of policy; wilderness areas; administration for public use and enjoyment, protection, preservation… provisions for designation as wilderness areas** In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness.	YES	As the proposed project would not traverse an established Wilderness Area, the project would be consistent with this guideline.
Yuha Desert Management Plan IV. Goals, Planned Actions, and Implementation	**G. Energy Development** **I. Utilities** Goal: Reduce impacts from electrical transmission lines and access roads. 1. Action: Close most access roads to general public use (see Figures 11 and 14) and sign these closed.	YES	Approximately 7 miles of the proposed 10.3-mile transmission line would be constructed within the existing utility corridor of the Southwest Powerlink transmission line through the Yuha ACEC (SES 2008a). The remaining transmission line would be constructed within the boundaries of the proposed project site. Therefore, collocating the proposed transmission lines within, or adjacent to, existing utility corridors, would help minimize impacts. In addition, according to the applicant, all access to the proposed project site would be closed to the general public through controlled gates (SES 2008a). Therefore, the proposed project would be consistent with the Yuha Desert Management Plan.
Public Rangelands Improvement Act	Establishes and reaffirms the national policy and commitment to inventory and identify current public rangeland conditions and trends; manage, maintain and improve the condition of public rangelands so that they become as productive as feasible for all rangeland values in accordance with management objectives and the land use planning process; and continue the policy of protecting wild free-roaming horses and burros.	YES	As noted in the "Setting and Existing Conditions," no allotments of rangeland are within the vicinity of the proposed project site, and no conversion of rangelands would occur due to construction or operation of the proposed project. Therefore, the proposed project would be in compliance with this Act.
Wild and Free-Roaming Horse and Burro Act	Establishes BLM's authority to protect, manage, and control wild horses and burros to ensure that healthy herds thrive on healthy rangelands. BLM determines the "appropriate management level" (AML) of wild horses and burros on the public rangelands.	YES	As discussed above in detail in Section C.8.4.2, the proposed project would not contain or traverse an established HMA or rangeland allotment. As such, the proposed project would be consistent with this Act.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
State			
Subdivision Map Act (Public Resources Code Section 66410-66499.58)	Provides procedures and requirements regulating land division (subdivisions) and parcel legality. Regulation and control of the design and improvement of subdivisions have been vested in the legislative bodies of local agencies. Section 66412.1 of the Subdivision Map Act exempts a project from State subdivision requirements provided that the project demonstrates compliance with local ordinances regulating design and improvements.	YES (with Implementation of Condition of Certification **LAND-1**)	The SES Solar Two Project site is on public land that is administered by the BLM and private parcels under the jurisdiction of Imperial County. The amount of land to be fenced and developed within the BLM-administered public areas is estimated to be 6,140 acres. In addition to BLM-administered public lands, approximately 360 acres of private land would be permitted for the proposed project site (SES 2008a). The total fenced area to be developed would encompass approximately 6,140 acres of BLM-administered public lands, and private lands comprising portions of 52 contiguous parcels. In its AFC, the applicant states, "[t]he privately owned county administered lands within the Project Site are currently under option to purchase or leased by the Applicant prior to the start of construction. The Project Site would be owned and operated by Solar Two" (SES 2008a). In response to staff's data request regarding the private parcels that would be part of the proposed project, the applicant has provided the parcel information related to the 360 acres of private parcels that are under the jurisdiction of Imperial County. Assessor's Parcel Numbers (APNs) are as follows: 034-360-054, 034-360-055, 034-360-058, 034-360-079, 034-360-080, 034-360-081, 034-360-082, 034-360-083, 034-360-084, 034-360-085, and 034-360-086. The applicant would finalize the purchase or lease of these private properties prior to the issuance of the final decisions on the proposed project. If the purchase option is exercised, the applicant may merge or combine these private properties into one legal parcel after final decisions by the CEC/BLM have been issued. However, if the lease option is carried out, these private parcels would have to remain under separate ownership. (SES 2008b). In the event that property is purchased, the applicant would consider a number of factors including setback requirements and taxation in deciding whether to merge the parcels. In the event that the property owners elect to exercise the lease option, these private parcels would remain under separate ownerships and would not be merged into one parcel (SES 2008b). In order to ensure compliance with the Subdivision Map Act and site control, staff recommends Condition of Certification **LAND-1**.
Local			
Imperial County General Plan, Land Use Element	Objective 1.2 Discourage the location of incompatible development adjacent to or within productive agricultural lands.	YES	As discussed in Section C.8.4.2 (under the subsection entitled "Agricultural Lands and Rangelands") and in **APPENDIX LU-1**, according to the LESA model, there would not be any significant impacts under CEQA to agricultural land as result of the proposed project. In addition, the affected lands are not currently used for agricultural production. Therefore, the proposed project would not interfere with productive or potentially productive agricultural land, and would comply with this objective.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	Objective 3.6 Recognize and coordinate planning activities as applicable with the Bureau of Land Management (BLM), and the California Desert Conservation Plan.	YES	By preparing a joint document, this Staff Assessment (SA)/DEIS is intended to ensure that the proposed project is compatible with BLM and county regulations. As noted above, the proposed project is consistent with the CDCA Plan. Therefore, the proposed project is consistent with this county objective.
	<u>E. Implementation of Policies and Programs</u> <u>1. Agriculture</u> Policy The County of Imperial finds that farmland is one of its most vital resources. Continued preservation of this resource is paramount. The County is committed to the Williamson Act and its ideals of preserving Farmland. Program • The developer, property owner, or agency (applicant) of a "Development project" located on land designated by the General Plan Land Use Map (Land Use Element-Figure 1) as "Agricultural" that will result in the direct and total loss of Prime Farmland in excess of 40 acres, shall provide not-less-than 100% for un-contracted and 150% for contracted land, replacement land.	YES	As discussed above in detail in Section C.8.4.2 (under the subsection entitled "Agricultural Lands and Rangelands") and in **APPENDIX LU-1**, and based on the final score (30.95) of the LESA Model, the farmland conversion impacts of the proposed project would not be significant under CEQA. In addition, the project would not involve other changes in the existing environment which could result in conversion of farmland, to non-agricultural uses. The proposed project does not contain lands under Williamson Act contracts. However, as noted in the "Setting and Existing Conditions" subsection, the proposed project's linear components would traverse land designated for agriculture by the county's General Plan. None-theless, upon completion of its construction, the pipeline would be underground in the existing Evan Hewes Highway ROW. Therefore, construction of the pipeline would not result in the permanent loss of any agricultural land. The proposed project would be consistent with this policy and program.
Imperial County General Plan, Conservation and Open Space Element	Goal 6: The County shall seek to achieve maximum conservation practices and maximum development of renewable alternative sources of energy.	YES	The proposed project would be on county lands that are currently highly disturbed by human activity, and would coincide with the county's goal of developing alternative energy resources, as well as the State's Renewable Portfolio Standard (RPS) goals. Therefore, the proposed project would achieve this county goal.
	Objective 6.6 Encourage compatibility with National and State energy goals and city and community general plans.	YES	As a large-scale solar thermal power generation facility, the proposed project would coincide with the county's goal of developing alternative energy and is intended to comply with federal and state mandates, and local goals for renewable energy development. Therefore, the proposed project would be consistent with this county objective.
Imperial County General Plan, Geothermal/ Alternative Energy and Transmission Element	Objective 2.3 Utilize existing easements or rights-of-way and follow field boundaries for electric and liquid transmis-sion lines.	YES	Approximately 7 miles of the proposed 10.3-mile transmission line would be constructed within an existing utility corridor through the Yuha Basin ACEC (SES 2008a). Approximately 2.55 miles of the transmission line would be constructed within the boundaries of the proposed site, and approximately 0.75 mile of transmission line would be constructed within in a new utility ROW in an area desig-nated as Agricultural Land according to Imperial County. Therefore, the majority of the proposed transmission line would utilize an existing utility ROW and would be consistent with this objective.
	Objective 2.6 Encourage/require alternative resource production to be in energy zoned areas to minimize off-site impacts and lessen need for more transmission corridors.	YES	Although the proposed project would not be in an energy zoned area, the project site consists of undeveloped desert land, and the majority of the proposed linear facilities would be constructed in existing ROWs.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	Objective 5.1 Require all major transmission lines to be located in designated federal and IID corridors or other energy facility corridors such as those owned by investor owned utilities and merchant power companies.	YES	The Project would connect to the SDG&E Imperial Valley Substation via an approximate 10.3-mile, double-circuit, 230-kV transmission line. The 230-kV transmission line would parallel the Southwest Powerlink transmission line within the designated ROW.
	Objective 5.2 Design lines for minimum impacts on agriculture, wildlife, urban areas, and recreational activities.	YES	Approximately 7 miles of the proposed 10.3-mile transmission line would be constructed within an existing utility corridor through the Yuha Basin ACEC (SES 2008a). The remaining transmission line would be constructed within the boundaries of the proposed site, and approximately 0.75 mile of transmission line would be constructed within a new utility ROW in area designated as Agricultural Land according to Imperial County. As the majority of the proposed line would be within an existing utility corridor, and the portion that would traverse agricultural land would have minimal construction impacts and would not permanently preclude agricultural activities, the proposed project would be consistent with Objective 5.2.
	Objective 5.3 Construct transmission lines in accordance with this Element.	YES	The proposed project is consistent with this element's goals and objectives related to transmission line construction.
	Objective 5.4 Design transmission lines to be joint use with transportation and other infrastructure corridors within or external to the County.	YES	Approximately 7 miles of the proposed 10.3-mile transmission line would be constructed within the existing utility corridor of the Southwest Powerlink transmission line, approximately 2.55 miles would be constructed within the boundaries of the proposed project site, and approximately 0.75 mile of transmission line would be constructed within a new utility ROW and designated for agriculture by Imperial County. Locating the proposed transmission line within existing utility corridors would make the proposed project consistent with this county objective.
Imperial County Land Use Ordinance, Title 9, Division 2:	§ 90203.10 SIMILARITY IN USE(S) When an applicant proposes a use that is not specifically authorized or listed as a use or conditional use in the specific zone, he/she may apply for a determination of similar use to the Planning Commission through the following procedure. (The Planning Commission shall have final authority and no appeal to the Board on "similarity" shall be allowed). A. FILING: A request for a "similar use" determination shall be in writing to the Planning & Development Services Department and shall explain in detail the proposed use and its similarity to an existing approved use within that zone. C.SIMILAR USE CRITERIA: In order for the Planning Commission to allow a use to be a "similar use" it shall first make the following findings: 1. The proposed use resembles or is of the same basic	INCONSISTENT	The proposed Solar Two site is approximately 6,500 acres and consists of an estimated 6,140 acres of public land administered by the BLM and approximately 360 acres of private land under the jurisdiction of Imperial County. Approximately 5.5% of the project would impact Imperial County lands. These affected county lands show evidence of human disturbance and high activity due to recreational OHV use (PBS&J 2009). According to the Land Use Ordinance (LUO) and county zoning maps, the 360-acre portion of the project site within Imperial County jurisdiction is designated as S-2 Open Space/Preservation. The LUO does not specifically allow energy generation in this S-2 zone. As noted in this section of the LUO, when an applicant proposes a use that is not specifically authorized or listed as a use or conditional use in the specific zone, he/she may apply for a determination of similar use to the Planning Commission. A request for a "similar use" determination is possible in the case of a proposed use that is similar to an existing approved use within that zone. According to the applicant, per its discussions with the staff of the

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	nature as an identified use or a conditional use in that zone. 2. The proposed use includes activities, equipment, or materials typically employed in the identified use. 3. The proposed use has equal to or less impacts on traffic, noise, dust, odor, vibration and appearance than the identified listed use. 4. All impacts identified could and would be mitigated through conditions. 5. The "similar" use, if allowed in the proposed zone, will not affect the health, safety and welfare of the public or impact the property and residents in the vicinity.		Planning and Building Division of Imperial County, and based on the requirements of this LUO section, the county would be able to issue a Conditional Use Permit to the SES Solar Two Project (but for the Energy Commission's authority) in compliance with the LUO (SES 2009). In May 2009, staff contacted the county for further clarification on this issue and to obtain the county's interpretation of this section of the LUO as it would apply to the 360 acres of county lands affected by the proposed project. According to the county, the Planning Commission has ruled that proposed renewable energy projects would be allowed in the S-2 zone with a CUP, as they are in the S-1 zone, based on the "similarity of use" concept (CEC 2009). On February 25, 2009, Telstar Energy's 49.5 MW solar photovoltaic (PV) project was approved for the Similarity of Use designation in the S-2 zone (Imperial County 2009). According to the county this project approval is the action that the county is using as justification for application of the "similar use" concept to the proposed project (CEC 2010). On February 2, 2010, staff contacted the county to obtain the approval document for the solar PV project, and the associated conditions the county used to conditionally approve the project in an effort to use the same or similar conditions to apply to the proposed project. The county indicated to staff that the Planning Commission Meeting Minutes from February 25, 2009 are the official record for Telstar Energy's approval of the Similarity of Use designation for development of a 49.5 megawatt PV solar generation facility in the S-2 zone (CEC 2010). After review of the February 25, 2009 Imperial County Planning Commission Meeting Minutes, staff was not able to find any specific conditions for the Telstar solar PV project that could be applied to the proposed project (Imperial County 2009). Specifically, although the February 25, 2009 Meeting Minutes discuss and approve the Telstar "Similarity of Use Determination" in the S-2 zone, no conditions are listed and there is no information regarding the five findings required by the LOU Title 9, Division 2 provisions (listed to the left). As such, in lieu of specific conditions or specific findings related to the provisions of Title 9, Division 2 of the LUO, staff has made its own following findings recognizing that the county has expressed support for the proposed project and has indicated that they view the proposed project to be a "similar use:" 1. Because the county has not provided environmental documentation, conditions of approval, or specific findings related to t heir "Similarity of Use" determination associated with the Telstar solar PV Project or its applicability to the proposed project, staff cannot find that a 6,500-acre, 740-MW solar thermal power generating facility is a similar use to a 49.5 MW solar PV project located on approximately 540 acres of land.. 2. Staff does not believe that the proposed use (i.e., the proposed project) includes activities, equipment, or materials typically employed

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
			in the identified use (i.e., development of solar PV), because the proposed project solar power generation technology is different (i.e., SunCatchers vs. low-profile solar PV panels). Please refer to the **Visual Resources** section for a discussion of visual and scenic impacts of the proposed project. 3. The proposed use (i.e., the proposed project) has greater environmental impacts on traffic, noise, dust, odor, vibration and appearance than the identified listed use (i.e., the solar PV project referred to as the similar use), because the proposed project would have greater construction related nuisance impacts (i.e., noise, traffic, air quality, etc.) and operation related visual and cumulative land use impacts than the "similar use." Please refer to the **Air Quality, Noise, Public Health**, and **Visual Resources** sections for a detailed discussion of these impacts. 4. All project impacts cannot be mitigated through Conditions of Certification. Please refer to the significant, unavoidable cumulative land use and recreation impacts of the proposed project discussed in detail below, and the **Visual Resources** section. 5. The "similar" use (i.e., the proposed project), in the proposed zone, will affect the public and impact lands in the vicinity given the significant/unavoidable impacts to recreation and significant/unavoidable cumulative land use impacts. Based on the findings enumerated above, staff concludes that the proposed project would not be consistent with this section of the county's LUO.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
Imperial County Land Use Ordinance, Title 9, Division 5: Zoning Areas Established	Chapter 18: S-2 (Open Space/Preservation) § 90519.00 PURPOSE & APPLICATION The S-2 Zone is considered to be the Open Space Preservation Zone. The primary intent is to preserve the cultural, biological, and open space areas that are rich and natural as well as cultural resources. The S-2 Zone is dominated by native desert habitat and stark topographic features. While certain uses are allowed within the S-2 Zone, such uses must be compatible with the intent of the Open Space and Conservation Element of the General Plan. §90519.03 PROHIBITED USES All other uses not permitted by Section 90519.01 or 90519.02 shall be prohibited in the S-2 Zone.	INCONSISTENT	Please see the detailed discussion above (under LUO Title 9, Division 2, § 90203.10 SIMILARITY IN USE(S)) regarding the "similar use" finding by the county and staff. According to the county, the proposed project would qualify as a "similar use" and would be allowed in the county's S-2 zone. Pursuant to Title 20, Section 1714.5 (California Energy Commission Siting Regulations), "...comments and recommendations submitted to the commission pursuant to this section regarding the project's conformance with applicable laws, ordinances, and standards under the agency's jurisdiction shall be given due deference by the commission staff." It should be noted that Imperial County did not specifically make findings related to the Similarity in Use concept provisions of the LUO, and did not provide staff with any specific conditions to be applied to the proposed project. Base on staff's independent evaluation (see discussion above), staff disagrees that the proposed project qualifies as a "similar use" that can be conditionally permitted in the S-2 zone. Therefore, although the county views the proposed project to be compatible with the S-2 zone, from a land use LORS consistency perspective, staff believes that given the amount and level of significance of cultural, visual, and biological resources impacts, the intent of S-2 zone likely would not be met, and that the proposed project would be inconsistent with this section of the county's LUO. For a detailed discussion of proposed project impacts with regard to these issues, please see the **Biological Resources, Cultural Resources,** and **Visual Resources** sections of this Staff Assessment.
Ocotillo/Nomirage Community Area Plan	IV. Implementation Program and Policies B. Land Use Designations and Standards 9. Open Space The Open Space designation will be applied to all land future and present that are under the administration of the U.S. Department of the Interior, Bureau of Land Management. Except for limited mining activities and utility corridors, most private enterprises or land uses are not allowed in this classification.	YES	A portion of the west end of the project site would be within the boundaries of this area plan. Although the proposed project would not be allowed under this area plan's open space classification, the land is under BLM jurisdiction, which supersedes Imperial County's area plans, and as noted above, the proposed project would be consistent with BLM's CDCA Plan, once the plan is amended.

Project Closure and Decommissioning

According to Section 3.12 of the applicant's project description, the solar generating facility is expected to have a lifespan of 40 years. At any point during this time, temporary or permanent closure of the solar facility could occur. Temporary closure would be a result of necessary maintenance, hazardous weather conditions, or damage due to a natural disaster. Permanent closure would be a result of damage that is beyond repair, adverse economic conditions, or other significant reasons.

Both temporary and permanent closures would require the applicant to submit to the CEC a contingency plan or a decommissioning plan, respectively. A contingency plan would be implemented to ensure compliance with applicable LORS, and appropriate shutdown procedures depending on the length of the cessation. A decommissioning plan would be implemented to ensure compliance with applicable LORS, removal of equipment and shutdown procedures, site restoration, potential decommissioning alternatives, and the costs and source of funds associated with decommissioning activities.

Upon closure of the facility or decommissioning, it is likely that the applicant would be required to restore lands affected by the project to their pre-project state. Given the fact that the proposed project site is located on undeveloped land with current evidence of high levels of disturbance (due to OHV use), staff anticipates that project decommissioning would have impacts similar in nature to proposed project construction activities. Therefore, given the temporary nature of decommissioning activities and the eventual return of the lands to their current state, the effects of decommissioning on land use is not expected to be adverse.

C.8.4.3 CEQA LEVEL OF SIGNIFICANCE

For the purposes of CEQA compliance, the significance of each identified impact of the proposed project has been determined. The CEQA Lead Agency is responsible for determining whether an impact is significant and is required to adopt feasible mitigation measures to minimize or avoid each significant impact. Conclusions in this section are presented to identify the level of significance of each identified impact (as required by CEQA) as follows: less than significant (i.e., adverse, but not significant); less than significant with mitigation (i.e., can be mitigated to a level that is not significant); or significant and unavoidable (i.e., cannot be mitigated to a level that is not significant).

Agricultural Lands and Rangelands

As discussed above in detail in Section C.8.4.2 (under the subsection entitled "Agricultural Lands and Rangelands") and in **APPENDIX LU-1**, and based on the final score (30.95) of the LESA Model, the farmland conversion impacts of the proposed project are "Not Considered Significant." In addition, construction of the proposed project and its associated linear facilities would be temporary, and the project would not be inconsistent with agricultural zoning nor involve other changes in the existing environment which could result in conversion of Farmland, to non-agricultural uses. Therefore, proposed project impacts on agricultural lands would be less than significant.

In regard to rangelands, as noted in the “Setting and Existing Conditions,” no allotments of rangeland are within the vicinity of the proposed project site. Therefore, no conversion of rangelands would occur. Therefore, impacts to rangelands due to construction or operation of the proposed project would be less than significant.

Finally, the project site is not located in an area that is under a Williamson Act Contract. Therefore, proposed project impacts due to conflicts with Williamson Act contracts would be less than significant.

Wilderness and Recreation

As discussed above in detail in Section C.8.4.2 (under the subsection entitled “Wilderness and Recreation”), the conversion of 6,500 acres of land to support the proposed project’s components and activities would directly disrupt current recreational activities in established federal, state, and local recreation areas and would result in adverse effects on recreational users of these lands.

In addition, access to the private parcel owned by the recreational vehicle club would be provided via the arterial roadway system within the proposed project site (SES 2008a). Therefore, the recreational users’ access to these areas would not be hindered and impacts would be less than significant to recreational use of the lands under private ownership.

In regard to potential wilderness impacts, given the abundance of wilderness and recreation sites throughout the county, the proposed project would not impact the area’s wilderness areas.

Horses and Burros

As discussed above in detail in Section C.8.4.2 (under the subsection entitled “Horses and Burros”), the proposed project would not contain or traverse any established BLM HMAs. Therefore, the proposed project would not result in any interference with BLM’s management of an HMA. Impacts would be less than significant.

Land Use Compatibility and LORS Compliance

As discussed above in detail in Section C.8.4.2 (under the subsection entitled “Land Use Compatibility”), the project would not physically divide or disrupt an established community. Impacts would be less than significant.

Staff’s analysis of the proposed project’s consistency with applicable federal, state, regional, and local land use LORS is presented in **Land Use Table 3.** The proposed project would be consistent with applicable federal land use LORS. With BLM’s issuance of a project-specific CDCA Plan Amendment, the proposed project would fully comply with the plan. Therefore, impacts associated with compliance with federal land use LORS would be less than significant. In addition, the proposed project would comply with the Subdivision Map Act, and would be less-than significant, with implementation of Condition of Certification **LAND-1.**

Based on staff’s independent review of applicable LORS documents, the proposed project would not be consistent with applicable Imperial County land use LORS (i.e., the S-2

Zone designation) adopted for the purpose of avoiding or mitigating environmental effects. Thus, impacts would be significant and unavoidable.

Cumulative Land Use Effects

Section C.8.8 (below) provides a detailed analysis of cumulative impacts. As discussed below, the potential combined development of approximately 1 million acres of land in the southern California desert, would all combine to result in adverse effects on agricultural lands (one of the state's most important resources), and recreational resources. Although the development of renewable resources in compliance with federal and state mandates is important and required, the conversion of thousands of acres of open space (including areas with high soil quality and agricultural resources) would result in a significant and unavoidable impact under CEQA. In general, the land conversion impacts to these lands would preclude numerous existing land uses including recreation, wilderness, rangeland, and open space, and would result in a significant and unavoidable cumulative impact under CEQA.

C.8.5 ALTERNATIVE 1

The 300 MW alternative would essentially be Phase 1 of the proposed 750 MW project (see Alternatives Figure 1), and would consist of 12,000 SunCatchers with a net generating capacity of approximately 300 MW occupying approximately 2,600 acres of land. This alternative would transmit power to the grid through the SDG&E Imperial Valley Substation and would require infrastructure similar to the proposed 750 MW project, including a water supply pipeline, transmission line, road access, operations facilities, substation, and hydrogen system (SES 2008a). Infrastructure associated with this alternative would require approximately 40 acres. This alternative would retain 40% of the SunCatchers and would affect 40% of the land of the proposed 750 MW project.

C.8.5.1 SETTING AND EXISTING CONDITIONS

The setting for this alternative would be approximately 2,600 acres or 40% of the lands affected by the proposed project. Lands affected by this alternative would be located on the western portion of the proposed project site, and would all be under the jurisdiction of the BLM. Please see the discussion of existing conditions within affected BLM lands under Section C.8.4.1

C.8.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Agricultural Lands and Rangelands

With a 60% reduction in the site, any land conversion impact would also be proportionately less. As discussed above in detail in Section C.8.4.2 (under the subsection entitled "Agricultural Lands and Rangelands") the farmland conversion impacts of the proposed project are "Not Considered Significant" under CEQA. In addition, construction of the proposed project and its associated linear facilities would be temporary, and the project would not involve other changes in the existing environment that could result in conversion of farmland to non-agricultural uses.

In regard to rangelands, as noted in the “Setting and Existing Conditions,” no allotments of rangeland are within the vicinity of the proposed project site. Therefore, no conversion of rangelands would occur with this alternative.

Finally, given that this alternative would be located wholly on federal lands, state land preservation contracts (i.e., Williamson Act Contract), and county zoning for agricultural use would not be affected.

Therefore, the types of effects on agricultural lands and rangelands resulting from this alternative would be similar to the proposed project but less intense.

Wilderness and Recreation

The conversion of 2,600 acres of land to support the components and activities associated with this alternative would directly disrupt current recreational activities in established federal recreation areas and would result in adverse effects on recreational users of these lands. However, this effect would be proportionally less than the 6,500 acres affected by the proposed project.

This alternative would have no effect on wilderness resources, but these effects would be less intense due to the reduction in the size of the project by 60%.

Horses and Burros

Similar to proposed project, this alternative would not contain or traverse any established BLM HMAs or HAs. Therefore, the 300 MW alternative would not result in any interference with BLM’s management of an HMA or HA.

Land Use Compatibility and LORS Compliance

Similar to the proposed project, this alternative would not physically divide or disrupt an established community.

Staff’s analysis of the proposed project’s consistency with applicable federal land use LORS is presented in **Land Use Table 3.** These federal LORS would apply to this alternative. Similar to the proposed project, this alternative would be consistent with applicable federal land use LORS. With BLM’s issuance of a project-specific CDCA Plan Amendment, the proposed project would fully comply with the Plan. With this alternative, the State Subdivision Map Act and local Imperial County land use LORS requirements would not apply.

Cumulative Land Use Effects

This alternative would result in the conversion of 2,600 acres of undeveloped open space with an industrial utility use (i.e., a 300 MW power plant and associated infrastructure). When compared to the proposed project, this alternative would result in 60% less land conversion to industrial uses, and the cumulative effects of this amount of land conversion along with all other existing, planned, and proposed projects would result in adverse cumulative land conversion. Section C.8.8 (below) provides a detailed analysis of cumulative impacts. The potential combined development of approximately 1 million acres of land in the southern California desert, would all combine to result in adverse effects on agricultural lands (one of the state's most important resources), and recreational resources. In general, the conversion of vast amounts of open space lands would preclude numerous existing land uses including recreation, wilderness, rangeland, and open space, and therefore, result in a significant cumulative impact.

C.8.5.3 CEQA LEVEL OF SIGNIFICANCE

Agricultural Lands and Rangelands

As discussed above in subsection C.8.5.2, and similar to the proposed project, impacts resulting from this alternative on agricultural and rangelands would be less than significant.

Wilderness and Recreation

As discussed above in subsection C.8.5.2, and similar to the proposed project, impacts resulting from this alternative to recreation would be significant and unavoidable, and impacts to wilderness would be less than significant.

Horses and Burros

As discussed above in subsection C.8.5.2, and similar to the proposed project, impacts resulting from this alternative on horses and burros would be less than significant.

Land Use Compatibility and LORS Compliance

As discussed above in subsection C.8.5.2, and similar to the proposed project, this alternative would comply with federal LORS. Therefore, impacts would be less than significant. State and local LORS would not be applicable.

Cumulative Land Use Effects

As discussed above in subsection C.8.5.2, and similar to the proposed project, the cumulative impacts of this alternative would be significant and unavoidable.

C.8.6 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives developed to reduce impacts to the waters of the U.S. would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative is illustrated in **Alternatives Figure 1B**. This alternative would have the same outer project boundaries as the proposed project, but it would include prohibition of installing permanent structures within drainages, thereby reducing the available acreage for development to 4,690 acres.

C.8.6.1 SETTING AND EXISTING CONDITIONS

This alternative would exclude primary drainages located throughout the proposed project site, which would decrease the amount of land converted to an industrial use. Nonetheless, as this alternative would have the same outer project boundaries as the proposed project, the environmental setting would be the same as the proposed project. Please see the discussion of existing conditions within affected BLM lands under Section C.8.4.1.

C.8.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Agricultural Lands

As discussed above in Section C.8.4.2 (under the subsection entitled "Agricultural Lands and Rangelands") the farmland conversion impacts of the proposed project are "Not Considered Significant" under CEQA. Construction of the proposed project and its associated linear facilities would be temporary, and the project would not involve other changes in the existing environment that could result in conversion of farmland to non-agricultural uses. In addition, with reduced acreage, the Final LESA score for this alternative would be lower than that of the proposed project site. Therefore, the types of effects on agricultural lands resulting from this alternative would be similar to the proposed project but less intense.

In regard to rangelands, as noted in the "Setting and Existing Conditions," no allotments of rangeland are within the vicinity of the proposed project site. Therefore, no conversion of rangelands would occur with this alternative.

Finally, given that this alternative would be located wholly on federal lands, state land preservation contracts (i.e., Williamson Act Contract) and county zoning for agricultural use would not be affected.

Wilderness and Recreation

The conversion of 4,690 acres of land to support the components and activities associated with this alternative would directly disrupt current recreational activities in established federal recreation areas and would result in adverse effects on recreational users of these lands. This effect would be to the proposed project because the site boundaries would not change (i.e., 6,500 acres would be fenced and OHV access to these lands would be restricted).

This alternative would have similar effects to the proposed project on wilderness and recreation resources.

Horses and Burros

Similar to proposed project, this alternative would not contain or traverse any established BLM HMAs or HAs. Therefore, this alternative would not result in an interference with BLM's management of an HMA or HA.

Land Use Compatibility

Similar to the proposed project, this alternative would not physically divide or disrupt an established community.

Staff's analysis of the proposed project's consistency with applicable federal, state, and local land use LORS is presented in **Land Use Table 3**, which would also apply to this alternative. Similar to the proposed project, with BLM's issuance of a project-specific CDCA Plan Amendment, and implementation of Condition of Certification/Mitigation

Measure **LAND-1** (which would be required for compliance with the State Subdivision Map Act), this alternative would be consistent with applicable land use LORS.

Cumulative Land Use Effects

This alternative would result in the conversion of 4,690 acres of undeveloped open space with an industrial utility use. When compared to the proposed project, this alternative would result in approximately 28% less land conversion to industrial uses. However, the cumulative effects of this amount of land conversion along with all other existing, planned, and proposed projects would result in adverse cumulative land conversion. Section C.8.8 (below) provides a detailed analysis of cumulative impacts. The potential combined development of approximately 1 million acres of land in the southern California desert, would all combine to result in adverse effects on agricultural lands (one of the state's most important resources), and recreational resources. In general, the conversion of vast amounts of open space lands would preclude numerous existing land uses including recreation, wilderness, rangeland, and open space, and therefore, result in a significant cumulative impact under CEQA.

C.8.6.3 CEQA LEVEL OF SIGNIFICANCE

Agricultural Lands and Rangelands

As discussed above in subsection C.8.5.2, and similar to the proposed project, impacts resulting from this alternative on agricultural and rangelands would be less than significant.

Wilderness and Recreation

As discussed above in subsection C.8.5.2, and similar to the proposed project, impacts resulting from this alternative to recreation resources would be significant and unavoidable, and wilderness impacts would be less than significant.

Horses and Burros

As discussed above in subsection C.8.5.2, and similar to the proposed project, impacts resulting from this alternative on horses and burros would be less than significant.

Land Use Compatibility and LORS Compliance

As discussed above in subsection C.8.5.2, and similar to the proposed project, this alternative would comply with federal LORS, and with implementation of Condition of Certification **LAND-1** (which would be required for compliance with the State Subdivision Map Act), this alternative would be consistent with applicable land use LORS. Similar to the proposed project, for the lands under county jurisdiction, implementation of this alternative would not be consistent with county LORS regarding zoning (i.e., siting of a power generating facility in the S-2 zone). The inconsistency with the S-2 zoning designation is a significant and unavoidable impact under CEQA. Please refer to **Land Use Table 3.**

Cumulative Land Use Effects

As discussed above in subsection C.8.5.2, and similar to the proposed project, the cumulative impacts of this alternative would be significant and unavoidable.

C.8.7 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative would eliminate both the eastern and western-most portions of the proposed project, where the largest drainage complexes are located. This alternative is shown in **Alternatives Figure 1C**. It would reduce the overall size of the project site by 3,347 acres (from 6,500 acres to 3,153 acres). In this alternative, permanent structures would be allowed within all drainages inside the revised project boundaries.

C.8.7.1 SETTING AND EXISTING CONDITIONS

This alternative would exclude segments of land located throughout the proposed project site, which would decrease the amount of land converted to an industrial use. Nonetheless, as this alternative would have the same outer project boundaries as the proposed project, the environmental setting would be the same as the proposed project. Please see the discussion of existing conditions within affected BLM lands under Section C.8.4.1.

C.8.7.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Agricultural Lands

As discussed above in Section C.8.4.2 (under the subsection entitled "Agricultural Lands and Rangelands") the farmland conversion impacts of the proposed project are "Not Considered Significant" under CEQA. Construction of the proposed project and its associated linear facilities would be temporary, and the project would not involve other changes in the existing environment that could result in conversion of farmland to non-agricultural uses. In addition, with reduced acreage, the Final LESA score for this alternative would be lower than that of the proposed project site. Therefore, the types of effects on agricultural lands resulting from this alternative would be similar to the proposed project but less intense.

In regard to rangelands, as noted in the "Setting and Existing Conditions," no allotments of rangeland are within the vicinity of the proposed project site. Therefore, no conversion of rangelands would occur with this alternative.

Finally, given that this alternative would be located wholly on federal lands, state land preservation contracts (i.e., Williamson Act Contract), and county zoning for agricultural use would not be affected.

Wilderness and Recreation

The conversion of 3,153 acres of land to support the components and activities associated with this alternative would directly disrupt current recreational activities in established federal recreation areas and would result in adverse effects on recreational users of these lands. However, this effect would be similar to the proposed project, because the outer boundary of the site would not change and OHV access to the 6,500 acres that would be fenced would be restricted.

This alternative would have similar effects on wilderness and recreation resources, but these effects would be less intense due to the reduction in the size of the project by approximately 51%.

Horses and Burros

Similar to proposed project, this alternative would not contain or traverse any established BLM HMAs or HAs. Therefore, this alternative would not result in any interference with BLM's management of an HMA or HA.

Land Use Compatibility

Similar to the proposed project, this alternative would not physically divide or disrupt an established community.

Staff's analysis of the proposed project's consistency with applicable federal, state, and local land use LORS is presented in **Land Use Table 3**, which would also apply to this alternative. Similar to the proposed project, with BLM's issuance of a project-specific CDCA Plan Amendment, this alternative would be consistent with applicable federal land use LORS. Implementation of Condition of Certification/Mitigation Measure **LAND-1** is required for compliance with the State Subdivision Map Act. Similar to the proposed project, for the lands under county jurisdiction, implementation of this alternative on county lands zoned S-2 would not be consistent with county LORS regarding zoning (i.e., siting of a power generating facility in the S-2 zone).

Cumulative Land Use Effects

This alternative would result in the conversion of 3,153 acres of undeveloped open space with an industrial utility use. When compared to the proposed project, this alternative would result in approximately 51% less land conversion to industrial uses, and the cumulative effects of this amount of land conversion along with all other existing, planned, and proposed projects would result in adverse cumulative land conversion. Section C.8.8 (below) provides a detailed analysis of cumulative impacts. The potential combined development of approximately 1 million acres of land in the southern California desert, would all combine to result in adverse effects on agricultural lands (one of the state's most important resources), and recreational resources. In general, the conversion of vast amounts of open space lands would preclude numerous existing land uses including recreation, wilderness, rangeland, and open space, and therefore, result in a significant cumulative impact under CEQA.

C.8.7.3 CEQA LEVEL OF SIGNIFICANCE

Agricultural Lands and Rangelands

As discussed above in subsection C.8.5.2, and similar to the proposed project, impacts resulting from this alternative on agricultural and rangelands would be less than significant.

Wilderness and Recreation

As discussed above in subsection C.8.5.2, and similar to the proposed project, impacts resulting from this alternative to recreation resources would be significant and unavoidable, and impacts to wilderness resources would be less than significant.

Horses and Burros

As discussed above in subsection C.8.5.2, and similar to the proposed project, impacts resulting from this alternative on horses and burros would be less than significant.

Land Use Compatibility and LORS Compliance

As discussed above in subsection C.8.5.2, and similar to the proposed project, this alternative would comply with federal LORS, and with implementation of Condition of Certification **LAND-1** the proposed project would comply with the State Subdivision Map Act). The inconsistency with the S-2 zoning designation is a significant and unavoidable impact under CEQA.

Cumulative Land Use Effects

As discussed above in subsection C.8.5.2, and similar to the proposed project, under CEQA the cumulative impacts of this alternative would be significant and unavoidable.

C.8.8 NO ACTION ALTERNATIVES

NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on SES Solar Two Project Application and on CDCA Land Use Plan Amendment

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

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no land disturbance. As a result, the land use-related impacts of the SES Solar Two project would not occur at the proposed site, including the conversion of 6,500 acres of land and any resulting impacts to existing uses, including recreational uses. Additionally, a project-specific land use plan amendment would not be required. However, the land on which the project is proposed would become available to other uses that are consistent with BLM’s land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.8.8.1 SETTING AND EXISTING CONDITIONS

The land use setting for the No Project/No Action Alternative would include lands that would contain the proposed project site and the associated linear facilities, which would become available for other uses that are consistent with BLM's land use plan, including another renewable energy project. In addition, renewable projects could be developed on other sites in Imperial County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/ Federal mandates. Subsection C.8.4.1 (above) describes in detail the lands that would be affected, as well as a general description of Imperial County.

C.8.8.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

With the No Project /No Action Alternative, the construction- and operation-related impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, potentially including other renewable energy projects, recreational activities, etc. Currently, there are 7 large solar projects proposed on BLM land within the area served by the BLM El Centro Field Office, and 70 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District.

Under the No Project/No Action alternative, the land use-related impacts of the SES Solar Two project would not occur at the proposed site. The conversion of 6,500 acres of land that would be converted as a result of the proposed project would not occur, and a project-specific CDCA Plan amendment would not be necessary. In addition, OHV users and recreationists would continue to be able to use the lands affected by the proposed project occurring under existing conditions. Although, it is possible that the proposed project site could be developed with power generation and/or utility uses in the future given the existing and planned energy-related infrastructure and industrial uses in the area (i.e., high voltage Southwest Power link transmission line and Imperial Valley Substation, the approved Sunrise Powerlink transmission line, and Plaster City), the specific size, type, and timing of such use would be unknown. Land use effects under the No Project/No Action Alternative would be similar to the current setting of the proposed project area.

C.8.8.3 CEQA LEVEL OF SIGNIFICANCE

Under the No Project/No Action alternative land use impacts to the proposed project site and area would be similar as those currently occurring under the existing conditions in the area. Given that there would be no significant change over the existing conditions, the land use impacts of the No Project/No Action alternative would be less than significant.

NO PROJECT/NO ACTION ALTERNATIVE #2:

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

Under this alternative, the proposed SES Solar Two 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. Different solar technologies require the use of different amounts of land; however, it is expected that all utility solar technologies would require the use of large amount of the site. As a result, construction and operation of the solar technology would likely result in the conversion of 6,500 acres of land and would create impacts to existing uses of the land, including recreational users. As such, this No Project/No Action Alternative could result in the conversion of 6,500 acres of land similar to under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on SES Solar Two Project Application and Amend the CDCA Land Use Plan to Make the Area Unavailable for Future Solar development

Under this alternative, the proposed SES Solar Two 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, and the conversion of 6,500 acres of land as a result of the proposed project would not occur. OHV users and recreationists would continue to be able to use the lands affected by the proposed project as is occurring under existing conditions. As a result, the use of the site is not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in impacts from the conversion of 6,500 acres of land at the project site. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.8.9 CUMULATIVE IMPACT ANALYSIS

C.8.9.1 AGRICULTURAL LANDS AND RANGELANDS

Geographic Extent

The geographic scope for the analysis of cumulative impacts related to agricultural lands and rangelands includes agricultural land within Imperial County and rangeland under BLM jurisdiction throughout the Imperial Valley region. Cumulative impacts include the conversion of agricultural land and/or rangelands that would conflict with existing land uses. Projects related to agriculture and rangelands consist of all construction activities, and residential, and industrial developments within the region. For the purpose of this analysis, in addition to the projects listed in **Cumulative Impacts Tables 2 and 3,** data obtained from the NRCS, the U.S. Census, and the BLM's online GIS maps were considered when identifying activities that could contribute to cumulative impacts.

Existing Cumulative Conditions

A wide variety of past and present development projects contribute to the cumulative conditions for agricultural lands. As noted above in the "Setting and Existing Conditions" subsection for agricultural lands, the majority of the county's agricultural land is surrounded by the county's largest urban areas. According to the U.S. Census, from 1990 to 2000 the population of El Centro increased by 20.5%, and from 2000 to 2007 the population increased by 4.8% (U.S. Census 2009). This is an example of the steady growth rate that has occurred throughout this portion of Imperial County. As a result, past and present residential, commercial, and industrial development has contributed to the conversion of existing rural and open space land uses, including agriculture, to other land uses.

In regard to rangeland, no allotments are located within Imperial County. The BLM rangeland allotments closest to the project site are in San Diego County throughout the areas between the Cleveland National Forest, Cuyamaca Rancho State Park, and Anza-Borrego Desert State Park. Otherwise, a number of rangeland allotments are located in Riverside County near the California-Arizona border. Past and present projects contribute to the cumulative conditions for rangelands, including industrial and military developments.

Future Foreseeable Projects

Foreseeable Projects in the Plaster City Area

According to **Cumulative Impacts Figure 3** and **Cumulative Impacts Table 3**, about 12 multiple mixed-used developments have been proposed for approximately 1,200 acres of undeveloped and agricultural land in El Centro east of the proposed project site.

Foreseeable Renewable Projects in the California Desert

As shown in **Cumulative Impacts Tables 1 and 2** renewable energy projects are proposed throughout the California desert lands. According to **Cumulative Analysis Table 1**, a total of 72 projects and 649,440 acres of solar energy and 61 projects and 433,721 acres of wind energy are currently proposed for development in the California desert lands. This represents a worst-case scenario and not all of these projects would be ultimately developed. In addition, according to the BLM's online GIS data, one proposed solar energy project in Riverside County may traverse the Ford Dry Lake allotment, and one solar energy project would be in the vicinity of Keoughs allotment (BLM 2009g).

Contribution of the SES Solar Two Project to Cumulative Impacts

Construction. The construction of the SES Solar Two Project is expected to result in short term adverse impacts related to construction activities. It is expected that some of the cumulative projects described above which are not yet built may be under construction the same time as the proposed project. As a result, there may be substantial short term impacts during construction of those cumulative projects related to agricultural lands and rangelands.

The SES Solar Two Project would be expected to contribute only a small amount to the possible short term cumulative impacts related to agricultural lands due to portions of the proposed project's linear facilities that would traverse unincorporated areas of Imperial County that are designated as agricultural land. Construction of these facilities may result in impacts to surrounding agricultural land. However, the waterline and transmission line would be constructed within existing linear ROWs, and therefore, construction impacts would be temporary. In addition, the proposed project would be expected to contribute only a small amount to the possible short term cumulative impacts related to rangelands since few solar or wind energy applications have been proposed in or near designated allotments.

Operation. The operation of the SES Solar Two Project is expected to result in long term adverse impacts during operation of the project related to agricultural lands and rangelands. It is expected that some of the cumulative projects described above may be operational at the same time as the proposed project. As a result, there may be substantial long term impacts during operation of those cumulative projects related to agricultural lands and rangelands.

The proposed project could contribute substantially to these possible long term operational cumulative impacts related to agricultural lands and rangelands since the proposed project would convert approximately 1,391 acres of agricultural land to a nonagricultural use. The cumulative impacts of additional development projects that would convert the county's agricultural land to non-agricultural uses and conflict with agricultural operations could be cumulatively considerable over time. However, all development projects must go through environmental review and be in compliance with all applicable LORS. In particular, the Imperial County Agricultural Element states that agricultural production has been the county's major economic industry throughout the 1900s and in recognition of the importance of agricultural production and the potential threats to continued success, the County Board of Supervisors directed that an Agricultural Element be developed (Imperial County 1996). Although, the proposed project by itself would not convert a significant amount of agricultural land to nonagricultural uses, the conversion of lands due to past and present projects, and the potential development of the approximately 1 million acres of land in the southern California desert, would all combine to result in adverse effects on agricultural lands (one of the state's most important resources). Therefore, although the development of renewable resources in compliance with federal and state mandates is important and required, the conversion of thousands of acres of open space (including areas with high soil quality and agricultural resources) would result in a significant and unavoidable cumulative impact under CEQA.

Decommissioning. The decommissioning of the SES Solar Two Project is expected to result in adverse impacts related to agricultural lands and rangelands similar to construction impacts. It is unlikely that the construction or decommissioning of any of the cumulative projects would occur concurrently with the decommissioning of this project, because the decommissioning is not expected to occur for approximately 40 years. As a result, there may not be impacts related to agricultural lands and rangelands during decommissioning of the SES Solar Two Project generated by the cumulative projects. However, due to the temporary nature of decommissioning activities and the eventual return of the lands to their current state, the effects of decommissioning on agricultural lands and rangelands is not expected to be adverse. Therefore, impacts of the decommissioning of the SES Solar Two Project would not be expected to contribute to cumulative impacts related to agricultural lands and rangelands**.**

C.8.9.2 WILDERNESS AND RECREATION

Geographic Extent

The geographic scope for the analysis of cumulative impacts related to wilderness and recreation includes the local and regional wilderness areas and recreation facilities in the Imperial Valley. Recreational facilities primarily include OHV and camping sites located throughout the county. Likewise, wilderness areas are located throughout Imperial County and in San Diego County, a number of which are also designated as ACECs.

Existing Cumulative Conditions

Existing recreation and wilderness areas throughout the county are abundant and maintained by the BLM and California State Parks. However, past and present developments, in particular Department of Defense sites, occupy significant portions of open space areas throughout the county which preclude recreation activities.

Future Foreseeable Projects

Foreseeable Projects in the Plaster City Area

Proposed projects in the vicinity of the SES Solar Two site and Plaster City include the West-Wide Energy Corridor, which generally follows State Highway 8 eastward from the San Diego–Imperial County border to the edge of the Yuha Basin. As a result, in addition to the proposed project, a wind energy development project is proposed immediately east of SES Solar Two, the Mount Signal Solar Power Station is proposed northeast of the project site, and the Sunrise Powerlink Project follows the entire length of the proposed energy corridor and westward into San Diego County and eastward through southern Arizona. Additional projects include a 225-mile pedestrian fence along the U.S.-Mexico border, and mixed-use developments.

Foreseeable Renewable Projects in the California and Arizona Desert

As shown in **Cumulative Impacts Tables 1 and 2** renewable energy projects are proposed throughout the BLM's California Desert District. According to **Cumulative Analysis Table 1**, a total of 72 projects and 649,440 acres of solar energy and 61 projects and 433,721 acres of wind energy are proposed for development.

Contribution of the SES Solar Two Project to Cumulative Impacts

Construction. The construction of the SES Solar Two Project is expected to result in short term adverse impacts related to construction activities. It is expected that some of the cumulative projects described above which are not yet built may be under construction the same time as the SES Solar Two Project. As a result, there may be substantial short term impacts during construction of those cumulative projects related to wilderness and recreation resources.

The SES Solar Two Project could contribute substantially to these possible short term cumulative impacts related to wilderness and recreation resources since there are many past, present, or reasonably foreseeable future actions that contribute to impacts to recreation and wilderness areas. Regionally, there have been both positive and negative impacts to recreational and wilderness resources as a result of development projects within Imperial Valley. Development of highway access to the region has provided direct vehicular access to open desert scenery for residents throughout Southern California. This increased access improved the recreational experience for some users by making the area more accessible and detracted from the recreational experience for other users who preferred remote camping, hiking, and hunting away from populated areas. Presently, as noted above, numerous energy-related development projects, including the proposed project, would remove large acreages of land from potential recreational use, and would have adverse effects on the viewscape that would result in some users seeking out other areas of the desert for their activities (see the cumulative analysis in the **Visual Resources** section). Similarly, within wilderness areas, the attraction of hiking, camping, and other outdoor activities is likely to decrease due to the increased large-scale construction of industrial uses in the region, and its consequent impact of development on the viewscape. The combined effect of construction of past, present, and proposed and reasonably foreseeable projects in the Imperial Valley would adversely affect recreation and wilderness resources. Therefore, the cumulative effect of would be significant and unavoidable under CEQA.

Operation. The operation of the SES Solar Two Project is expected to result in long term adverse impacts during operation of the project related to wilderness and recreation resources. It is expected that some of the cumulative projects described above may be operational at the same time as the SES Solar Two Project. As a result, there may be substantial long term impacts during operation of those cumulative projects related to wilderness and recreation resources.

The SES Solar Two Project could contribute substantially to these possible long term operational cumulative impacts related to wilderness and recreation resources because the proposed project would permanently change the nature of land use at the proposed project site from Government Special Public Limited Use interspersed with private parcels that are zoned for Open Space, to an intensive utility for the generation of power. The combined effect of the overall cumulative past, present, and proposed and reasonably foreseeable projects in the Imperial Valley would adversely affect wilderness and recreation resources. Therefore, the cumulative effect of would be significant and unavoidable under CEQA.

Decommissioning. The decommissioning of the SES Solar Two Project is expected to result in adverse impacts related to wilderness and recreation resources similar to construction impacts. It is unlikely that the construction or decommissioning of any of the cumulative projects would occur concurrently with the decommissioning of this project, because the decommissioning is not expected to occur for approximately 40 years. As a result, there may not be impacts related to wilderness and recreation resources during decommissioning of the SES Solar Two Project generated by the cumulative projects. However, due to the temporary nature of decommissioning activities and the eventual return of the lands to their current state, the impacts of the decommissioning of the SES Solar Two Project would not be expected to contribute to cumulative impacts related to wilderness and recreation resources. Therefore, the effects of decommissioning on wilderness and recreation resources is not expected to be adverse.

C.8.9.3 HORSES AND BURROS

Geographic Extent

As there are no HMAs or HAs in the immediate vicinity of the proposed project site, the geographic scope for the analysis of cumulative impacts related to horses and burros includes the Imperial Valley region. Cumulative impacts would result in changes in the existing environment which, due to their nature or location, would result in interference with BLM's management of HMAs. The cumulative analysis of wild horses and burros was conducted using BLM maps of HMAs and HAs.

Existing Cumulative Conditions

The Chocolate-Mule Mountains HMA is the closest management area, which is located approximately 58 miles northeast of the project site near the California-Arizona border. This area is not notable for significant past or present development.

Future Foreseeable Projects

Foreseeable Projects in the Plaster City Area

As no HMAs or HAs are in the vicinity of the proposed project, it is unlikely that future projects in the Plaster City area would impact horses or burros.

Foreseeable Renewable Projects in the California and Arizona Desert

As shown in **Cumulative Impacts Figures 1 and 2,** two energy applications are proposed in areas surrounding the Chocolate-Mule Mountains HMA.

Contribution of the SES Solar Two Project to Cumulative Impacts

Construction. The construction of the SES Solar Two Project is expected to result in short term adverse impacts related to construction activities. It is expected that some of the cumulative projects described above which are not yet built may be under construction the same time as the SES Solar Two Project. As a result, there may be substantial short term impacts during construction of those cumulative projects related to horses and burros.

The SES Solar Two Project would be expected to contribute only a small amount to the possible short term cumulative impacts related to horses and burros because authorized and unauthorized vehicle use, and construction of utility rights-of-way could impact horses and burros by removal of vegetation utilized for forage and the danger of vehicles colliding with burros. However, in areas of close proximity to HMAs or HAs, development projects would be required to consider impacts related to wild horses and burros. Therefore, cumulative constructions impacts would not be adverse.

Operation. The operation of the SES Solar Two Project is expected to result in long term adverse impacts during operation of the project related to horses and burros. It is expected that some of the cumulative projects described above may be operational at the same time as the SES Solar Two Project. As a result, there may be substantial long term impacts during operation of those cumulative projects related to horses and burros. The proposed project would be expected to contribute only a small amount to these possible long term operational cumulative impacts related to horses and burros because the impact of the proposed and probable development projects would cumulatively remove and isolate potential grazing sites for burros. In addition, maintenance activities could impact horses due to the danger of vehicles colliding with burros. However, in areas of close proximity to HMAs or HAs, development projects would be required to consider impacts related to wild horses and burros. Therefore, cumulative impacts would not be adverse.

Decommissioning. The decommissioning of the SES Solar Two Project is expected to result in adverse impacts related to horses and burros similar to construction impacts. It is unlikely that the construction or decommissioning of any of the cumulative projects would occur concurrently with the decommissioning of this project, because the decommissioning is not expected to occur for approximately 40 years. As a result, there may not be impacts related to horses and burros during decommissioning of the SES Solar Two Project generated by the cumulative projects. However, given the temporary nature of decommissioning activities and the eventual return of the lands to their current state, the impacts of the decommissioning of the proposed project would not be expected to contribute to cumulative impacts related to horses and burros**.** Therefore, the effects of decommissioning on horses and burros is not expected to be adverse.

C.8.9.4 LAND USE COMPATIBILITY AND LORS COMPLIANCE

Geographic Extent

The geographic scope for the analysis of cumulative impacts related to land use compatibility and LORS compliance are the local and regional communities and sensitive receptors. Cumulative impacts could result from the physical division of an established community or from conflict with any applicable land use plan, policies, or regulation adopted for the purposed of avoiding or mitigating environmental impacts.

Existing Cumulative Conditions

Past and present projects occurring in the vicinity of the proposed project site include recreational activities proposed by the BLM, quarry activities in Plaster City, and development of the existing state prison.

Future Foreseeable Projects

Foreseeable Projects in the Plaster City Area

Proposed projects in the vicinity of the SES Solar Two site and Plaster City include the West-Wide Energy Corridor, which generally follows the State Highway 8 eastward from the San Diego-Imperial County border to the edge of the Yuha Basin. As a result, in addition to the proposed project, a wind energy development project immediately east of

SES Solar Two and the Mount Signal Solar Power Station, northeast of the project site, are proposed for development. The Sunrise Powerlink Project follows the entire length of the proposed energy corridor and westward into San Diego County and eastward through southern Arizona. Additional projects include a 225-mile pedestrian fence along the U.S.-Mexico border, and mixed-use developments.

Foreseeable Renewable Projects in the California and Arizona Desert

As shown in **Cumulative Impacts Tables 1 and 2** renewable energy projects are proposed throughout the BLM's California Desert District. According to **Cumulative Analysis Table 1**, a total of 72 projects and 649,440 acres solar energy and 61 projects and 433,721 acres of wind energy are proposed for development.

Contribution of the SES Solar Two Project to Cumulative Impacts

Construction. The construction of the SES Solar Two Project is expected to result in short term adverse impacts related to construction activities. It is expected that some of the cumulative projects described above which are not yet built may be under construction the same time as the SES Solar Two Project. As a result, there may be substantial short term impacts during construction of those cumulative projects related to land use compatibility and LORS compliance.

The proposed developments near the project site that would have the potential to induce cumulative impacts include a wind energy generation project, a solar energy generation project, the Sunrise Powerlink Project, and numerous mixed-use developments. However, in consideration of cumulative land use compatibility impacts, the implementation of renewable projects in Southern California would occur mostly in undeveloped desert lands or areas of rural development, and would not create physical divisions of established residential communities. Therefore, SES Solar Two Project would be expected to contribute only a small amount to the possible short term cumulative impacts related to land use compatibility and LORS compliance

Operation. The operation of the SES Solar Two Project is expected to result in long term adverse impacts during operation of the project related to land use compatibility and LORS compliance. It is expected that some of the cumulative projects described above may be operational at the same time as the SES Solar Two Project. As a result, there may be substantial long term impacts during operation of those cumulative projects related to land use compatibility and LORS compliance.

The SES Solar Two Project could contribute substantially to these possible long term operational cumulative impacts related to land use compatibility and LORS compliance because as noted above, over 1 million acres of land are proposed for solar and wind energy development in the southern California desert lands. The conversion of these lands would permanently preclude numerous existing land uses including recreation, wilderness, rangeland, and open space, and therefore, result in a significant cumulative impact.

Decommissioning. The decommissioning of the SES Solar Two Project is expected to result in adverse impacts related to land use compatibility and LORS compliance similar to construction impacts. It is unlikely that the construction or decommissioning of any of the cumulative projects would occur concurrently with the decommissioning of this project, because the decommissioning is not expected to occur for approximately 40 years. As a result, there may not be impacts related to land use compatibility and LORS compliance during decommissioning of the SES Solar Two Project generated by the cumulative projects. However, given the temporary nature of decommissioning activities and the eventual return of the lands to their current state, the impacts of the decommissioning of the proposed project would not be expected to contribute to cumulative impacts related to land use compatibility and LORS compliance. Therefore, the effects of decommissioning on land use compatibility and LORS compliance is not expected to be adverse.

C.8.10 COMPLIANCE WITH LORS

A detailed discussion of the proposed project's compliance with LORS applicable to land use, recreation, and wilderness is provided above in subsection C.8.4.2, and **Land Use Table 3** (Project Compliance with Adopted Land Use LORS).

C.8.11 NOTEWORTHY PUBLIC BENEFITS

The proposed project would permanently change the nature of land use at the project site from publicly- and privately-owned open space lands, to an intensive utility for the generation of power. Therefore, from a land use perspective, development of the proposed project would not result in any noteworthy public benefits because:

- the SES Solar Two Project site would be developed with 30,000 SunCatchers and associated ancillary facilities and linears, which would result in approximately 2,747 acres of total permanent surface disturbance. Construction would result in temporary surface disturbance of approximately 3,000 acres. Once constructed, the SES Solar Two Project would result in the total conversion of 6,140 acres in the Government Special Public zone of the Ocotillo/Nomirage Planning Area from BLM-administered public land Open Space land use, to solar energy capture and energy conversion apparatus, attendant outbuildings, supporting structures, roadways, and parking lots;
- the proposed project would affect both private lands within the jurisdiction of Imperial County and BLM-administered public lands under the jurisdiction of the BLM; and
- there would be a loss of recreational use at the project site that is used for dispersed camping and associated OHV use.

Therefore, although the development of the proposed project is intended to address the requirements of federal and state mandates for renewable energy, the land conversion and associated land use impacts would not yield any noteworthy public benefits related to land use, recreation, or wilderness.

C.8.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

LAND-1 The project owner shall comply with the Subdivision Map Act (Pub. Resources Code Section 66410-66499.58) by adhering to the provisions of Imperial County Land Use Ordinance, Title 9, Division 8, Subdivision Ordinance, Section 90801.01 to ensure legality of parcels and site control.

Verification: At least 30 days prior to construction of the SES Solar Two Project, the project owner shall submit evidence to the CPM, indicating approval of the merger of parcels by Imperial County, or written approval of another process (i.e., to adjust lot lines) that is acceptable to the county. The submittal to the CPM shall include evidence of compliance with all conditions and requirements associated with the approval of the Certificate of Merger and/or Notice of Lot Line Adjustment by the county. If all parcels or portions of parcels are not owned by the project owner at the time of the merger, a separate deed shall be executed and recorded with the county recorder. A copy of the recorded deed shall be submitted to the CPM, as part of the compliance package.

C.8.13 CONCLUSIONS

- No farmland conversion impacts are expected as a result of linear facilities' construction, and the proposed project would not involve other changes in the existing environment which could result in conversion of farmland, to non-agricultural uses.
- No conversion of rangelands would occur, and they would not be adversely affected by construction or operation of the proposed project.
- The conversion of 6,500 acres of land to support the proposed project's components and activities would directly disrupt current recreational activities in established federal, state, and local recreation areas and would result in adverse effects on recreational users of these lands.
- The Yuha ACEC and Jacumba Wilderness surrounding the project site attract visitors based on their scenic, biological, cultural, and recreational amenities. The proposed project would impact the wilderness values of these areas. However, due to the abundance of wilderness sites throughout the county, the proposed project would impact a small fraction of these lands.
- The proposed project would not contain or traverse any established BLM HAs or HMAs, and the HMA and HA are approximately 58 miles east side of the proposed project site. In addition, following construction, fencing around the site would keep any burros outside of the proposed project location. Therefore, the proposed project would not result in any interference with BLM's management of an HMA or HA.
- The proposed project would not disrupt or divide the physical arrangement of an established community.
- The applicant has submitted an application to the BLM requesting a right-of-way (ROW) to construct the proposed project and its related facilities. Pursuant to the California Desert Conservation Area (CDCA) Plan (1980, as amended), sites associated with power generation or transmission not identified in the CDCA Plan are considered through the Plan Amendment process. Under Federal law, BLM is

responsible for processing requests for ROWs to authorize such proposed projects and associated transmission lines and other appurtenant facilities on land it manages. If the ROW and proposed land use plan amendment are approved by BLM, the proposed solar thermal power plant facility on public lands would be authorized in accordance with Title V of the FLMPA of 1976 and the Federal Regulations at 43 CFR part 2800.

- Based on staff's independent review of applicable federal, state, and local LORS documents, the proposed project would comply with federal LORS, and with implementation of Condition of Certification **LAND-1** the proposed project would comply with the State Subdivision Map Act. However, the inconsistency with the S-2 zoning designation is a significant and unavoidable impact under CEQA.
- For purposes of CEQA compliance, the level of significance of each impact of the proposed project on land use resources has been determined and is discussed in detail in Section C.8.4.3 (CEQA Level of Significance). In summary, impacts on agricultural lands, rangelands, and wilderness lands would be less than significant, and there would be no impacts related to Williamson Act contracts. Impacts to recreation resources would be significant and unavoidable. Impacts to horses and burros would be less than significant. LORS compliance impact would be less than significant with implementation of Condition of Certification/Mitigation Measure **LAND-1.**
- Cumulative impacts to approximately 1 million acres of land in the southern California desert would all combine to result in adverse effects on agricultural lands and recreational resources and would result in a significant and unavoidable impact. In consideration of cumulative land use compatibility impacts, the implementation of renewable projects in Southern California would occur mostly in undeveloped desert lands or areas of rural development, and therefore, would not create physical divisions of established residential communities. Nonetheless, approximately 1 million acres of land are proposed for solar and wind energy development in the Southern California desert lands. The conversion of these lands would preclude numerous existing land uses including recreation, wilderness, rangeland, and open space, and therefore, result in a significant cumulative impact.
- The land use impacts associated with the alternatives would be similar to the proposed project. Condition of Certification/Mitigation Measure **LAND-1** would be required with each alternative, with the exception of Alternative 1, which would be constructed on BLM land only.

If the California Energy Commission and the U.S. Bureau of Land Management approve the proposed project, staff is proposing Condition of Certification/Mitigation Measure **LAND-1** to ensure that the project is constructed and operated in accordance with the Subdivision Map Act.

C.8.14 REFERENCES

BLM 1980 – U.S. Bureau of Land Management - California Desert Conservation (CDCA) Plan, 1980 as Amended.

BLM 2010a. U.S. Bureau of Land Management – Plaster City OHV Open Area. http://www.blm.gov/ca/st/en/fo/elcentro/recreation/ohvs/plaster_city.html. Accessed February 1, 2009.

BLM 2010b. U.S. Bureau of Land Management – Comments on the Draft SA/DEISm January 26, 2009.

BLM 2009a. U.S. Bureau of Land Management – Rangeland Administration System, http://www.blm.gov/ras/. Accessed May 14, 2009.

BLM 2009b. U.S. Bureau of Land Management – Jacumba Mountains Wilderness. http://www.blm.gov/ca/st/en/fo/elcentro/recreation/poi/el_centropoi.html. Accessed May 8, 2009.

BLM 2009c. U.S. Bureau of Land Management – Coyote Mountains Wilderness Area. http://www.blm.gov/az/st/en/prog/blm_special_areas/wildareas/coyote.html. Accessed May 8, 2009.

BLM 2009d. U.S. Bureau of Land Management – Recreation – Off Highway Vehicles. http://www.blm.gov/ca/st/en/fo/elcentro/recreation/ohvs.html. Accessed May8, 2009.

BLM 2009e. U.S. Bureau of Land Management – Wild Horses and Burros. http://www.blm.gov/ca/st/en/prog/wild_horse_and_burro.1.html. Accessed March 30, 2009

BLM 2009f. U.S. Bureau of Land Management – Wild Horses and Burros. http://www.blm.gov/wo/st/en/prog/wild_horse_and_burro/Fact_Sheet/herd_area_and_herd.html. Accessed March 30, 2009

BLM 2009g. U.S. Bureau of Land Management – GeoCommunicator. http://www.geocommunicator.gov/blmMap/Map.jsp?MAP=GA. Accessed May 11, 2009.

BLM 2009h. U.S. Bureau of Land Management – Wild Horses and Burros. http://www.blm.gov/wo/st/en/prog/wild_horse_and_burro.html#. Accessed March 30, 2009

BLM 2008. U.S. Bureau of Land Management – El Centro Field Office Eastern San Diego County Resource Management Plan and Record of Decision. http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/elcentro/planning/2007/fesdrmp.Par.29969.File.dat/ESDC_RMP26ROD.pdf. Accessed January 29, 2010.

CCR 2006 – California Code of Regulations, Title 14, Chapter 3 (CEQA Guidelines), §§15000-15387, as amended July 11, 2006.

CEC 2010 – CEC/S. Huerta. Record of Conversation – Staff and Department of Planning, County of Imperial. Dated February 2, 2010.

CEC 2009 – CEC/S. Huerta. Record of Conversation – Staff and Department of Planning, County of Imperial. Dated May 13, 2009.

CRS 2004 – Congressional Research Service – CRS Report for Congress. http://www.cnie.org/NLE/CRSreports/04aug/RS21917.pdf. Accessed May 15, 2009.

CSP 2009. California State Park – Ocotillo Wells SVRA. http://www.ohv.parks.ca.gov/default.asp?page_id=1217. Accessed May 15, 2009.

DOC 2006. California Department of Conservation – Imperial County Important Farmland 2006 Map. ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2006/imp06.pdf. Accessed May 8, 2009.

DOC 1997. California Department of Conservation, Office of Land Conservation – *California Agricultural Land Evaluation and Site Assessment Model* (Instruction Manual). 1997.

FLPMA 2001 – Federal Land Policy and Management Act, As Amended. Revised October 2001. http://www.blm.gov/flpma/index.html. Accessed May15, 2009.

FR 2008 – Federal Register / Vol. 73, No. 202 / Friday, October 17, 2008 / Notices. Department of the Interior, Bureau of Land Management, Notice of Intent to Prepare an Environmental Impact Statement/Staff Assessment and Proposed Land Use Plan Amendment for the Proposed SES Solar Two Project, Imperial County, CA.

Imperial County 2009. Imperial County – Planning Commission Minutes 2/25/09. http://www.icpds.com/CMS/Media/02-25-09-PC-MINUTES.pdf. Accessed February 2, 2010.

Imperial County 2008a. Imperial County – General Plan, Land Use Element. Revised January 29, 2008.

Imperial County 2008b. Imperial County – Land Use Ordinance, Title 9. Amended January 29, 2008.

Imperial County 2007. Imperial County – General Plan, Land Use Map. Revised November 2007.

Imperial County 2006a. General Plan – Conservation and Open Space Element. Revised October 2006.

Imperial County 2006b. Imperial County – General Plan, Geothermal/Alternative Energy and Transmission Element. Revised October 2006.

Imperial County 1996. Imperial County – Agricultural Element. 1996.

IVEDC 2009 – Imperial Valley Economic Development Corporation - Recreation. http://www.ivedc.com/?pid=46. Accessed May 15, 2009.

NRCS 2009a – Federal Protection Policy Act- Purpose. http://www.nrcs.usda.gov/programs/fppa/. Accessed April 22, 2009

NRCS 2009b – Natural Resource Conservation Service, Web Soil Survey. Site accessed at: http://www.websoilsurvey.nrcs.usda..gov/app/WebSoilSurvey,aspx. March 30, 2009.ONCAP 1994. Imperial County – Ocotillo/Nomirage Community Area Plan. April 1994.

PBS&J 2009 – PBS&J, (tn: 52157). Current Conditions of SES Solar Two, LLC. Dated June 2009. Submitted to CEC/C. Meyer/Dockets on 06/25/2009.

PRIA 1978 – United States Forest Service – Public Rangelands Improvement Act. http://www.fs.fed.us/rangelands/whoweare/lawsregs.shtml. Accessed March 15, 2009.

SES 2009 – SES Solar Two, LLC/URS/A. Leiba (tn: 51828). In Response to CEC and BLM Data Requests, Set 2, Part 1. Dated June 5, 2009. Submitted to CEC/C. Meyer/Dockets on 06/05/2009.

SES 2008a – SES Solar Two, LLC/SES/R. Liden (tn:46819). Submittal of the Application for Certification for the SES Solar Two, LLC Project. Dated June 30, 2008. Submitted to CEC/E. Allen/Dockets on 06/30/2008.

SES 2008b – SES Solar Two, LLC/SES/A. Leiba (tn:49322). Submittal of the Response to Data Requests 1-52 for the SES Solar Two, LLC Project. Dated December 8 2008. Submitted to CEC/C. Meyer/Dockets on 12/8/2008.

U.S. Code 2009 – Cornell University Law School – U.S. Code Collection. http://www.law.cornell.edu/uscode/16/usc_sec_16_00001131----000-.html. Accessed May 11, 2009.

U.S. Census Bureau 2009 – Population Finder. El Centro, California. http://factfinder.census.gov/servlet/SAFFPopulation?_event=ChangeGeoContext&geo_id=16000US0621782&_geoContext=&_street=&_county=el+centro%2C+ca&_cityTown=el+centro%2C+ca&_state=&_zip=&_lang=en&_sse=on&ActiveGeoDiv=&_useEV=&pctxt=fph&pgsl=010&_submenuId=population_0&ds_name=null&_ci_nbr=null&qr_name=null&reg=null%3Anull&_keyword=&_industry=. Accessed April 22, 2009.

UTV 2009 – UTV Industry News. *California Desert Receives $8.3 million OHV Grant.* http://www.utvguide.net/news/2009/07/. Accessed September 28, 2009.

YDMP 1985 – Bureau of Land Management – Yuha Desert Management Plan. March 1985.

Appendix LU-1 – LESA Model Worksheets

The California Agricultural LESA Model is composed of six different factors. Two "Land Evaluation" factors are based upon measures of soil resource quality. Four "Site Assessment" factors provide measures of a given project's size, water resource availability, surrounding agricultural lands, and surrounding protected resource lands. For a given project, each of these factors is separately rated on a 100 point scale. The factors are then weighted relative to one another and combined, resulting in a single numeric score for a given project, with a maximum attainable score of 100 points. It is this project score that becomes the basis for making a determination of a project's potential significance, based upon a range of established scoring thresholds. The California Agricultural LESA Instruction Manual found at the California Department of Conservation, Division of Land Resource Protection website provides detailed instructions on how to complete the LESA worksheet.

Calculation of the Land Evaluation (LE) Score

Part 1. Land Capability Classification (LCC) Score

(1) Determine the total acreage of the project.
(2) Determine the soil types within the project area and enter them in **Column A** of the **Land Evaluation Worksheet** provided on page A-2.
(3) Calculate the total acres of each soil type and enter the amounts in **Column B**.
(4) Divide the acres of each soil type (**Column B**) by the total acreage to determine the proportion of each soil type present. Enter the proportion of each soil type in **Column C**.
(5) Determine the LCC for each soil type from the applicable Soil Survey and enter it in **Column D**
(6) From the LCC Scoring Table below, determine the point rating corresponding to the LCC for each soil type and enter it in **Column E**.

LCC Scoring Table

LCC Class	I	IIe	IIs, w	IIIe	IIIs, w	IVe	IVs, w	V	VIe, s, w	VIIe, s, w	VIII
Points	100	90	80	70	60	50	40	30	20	10	0

(7) Multiply the proportion of each soil type (**Column C**) by the point score (**Column E**) and enter the resulting scores in **Column F**.
(8) Sum the LCC scores in **Column F**.
(9) Enter the LCC score in box <1> of the Final LESA Score Sheet on page A-10.

Part 2. Storie Index Score

(1) Determine the Storie Index rating for each soil type and enter it in **Column G**.
(2) Multiply the proportion of each soil type (**Column C**) by the Storie Index rating (**Column G**) and enter the scores in **Column H**.
(3) Sum the Storie Index scores in **Column H** to gain the Storie Index Score.
(4) Enter the Storie Index Score in box <2> of the Final LESA Score Sheet on page A-10.

Land Evaluation Worksheet
Land Capability Classification (LCC) and Storie Index Scores

A	B	C	D	E	F	G	H
Soil Map Unit	Project Acres	Proportion of Project Area	LCC	LCC Rating	LCC Score	Storie Index	Storie Index Score
101	205.3	0.117	7e	10	1.17	90	10.50
102	6.9	0.004	N/A	0	0.00	N/A	0.00
110	1.3	0.001	7w	10	0.01	50	0.04
119	15.4	0.009	7e	10	0.09	90	0.79
120	165.3	0.094	7e	10	0.94	N/A	0.00
121	41.3	0.023	7e	10	0.23	30	0.70
124	49	0.028	7e	10	0.28	30	0.84
126	2.6	0.001	7e	10	0.01	30	0.04
127	197.8	0.112	7e	10	1.12	50	5.62
130	551.1	0.313	7e	10	3.13	50	15.66
132	104	0.059	7e	10	0.59	50	2.96
138	417.7	0.237	7e	10	2.37	70	16.62
142	1.7	0.001	7w	10	0.01	70	0.07
Totals	1,759.40	1.00 (Must Sum To 1.0)		***LCC Total Score***	9.96	***Storie Index Total Score***	53.84

Site Assessment Worksheet 1.
Project Size Score

	I	J	K
	LCC Class I - II	LCC Class III	LCC Class IV- VIII
			205.3
			N/A
			1.3
			15.4
			165.3
			41.3
			49
			2.6
			197.8
			551.1
			104
			417.7
			1.7
Total Acres			1752.5
Project Size Scores			100
Highest Project Size Score		100	

Calculation of the Site Assessment (SA) Score

Part 1. Project Size Score

(1) Using **Site Assessment Worksheet 1** provided on page A-2, enter the acreage of each soil type from **Column B** in the **Column I, J or K** that corresponds to the LCC for that soil. (Note: While the Project Size Score is a component of the Site Assessment calculations, the score sheet is an extension of data collected in the Land Evaluation Worksheet, and is therefore displayed beside it.)

(2) Sum **Column I** to determine the total amount of class I and II soils on the project site.

(3) Sum **Column J** to determine the total amount of class III soils on the project site.

(4) Sum **Column K** to determine the total amount of class IV and lower soils on the project site.

(5) Compare the total score for each LCC group in the Project Size Scoring Table below and determine which group receives the highest score.

Project Size Scoring Table

Class I or II			Class III			Class IV or Lower	
Acreage	Points		Acreage	Points		Acreage	Points
>80	100		>160	100		>320	100
60-79	90		120-159	90		240-319	80
40-59	80		80-119	80		160-239	60
20-39	50		60-79	70		100-159	40
10-19	30		40-59	60		40-99	20
10<	0		20-39	30		40<	0
			10-19	10			
			10<	0			

(6) Enter the **Project Size Score** (the highest score from the three LCC categories) in box <3> of the Final LESA Score Sheet on page A-10.

Part 2. Water Resource Availability Score

(1) Determine the type(s) of irrigation present on the project site, including a determination of whether there is dry land agricultural activity as well.

(2) Divide the site into portions according to the type or types of irrigation or dry land cropping that is available in each portion. Enter this information in **Column B** of **Site Assessment Worksheet 2 - Water Resources Availability** provided on page A-5.

(3) Determine the proportion of the total site represented for each portion identified, and enter this information in **Column C**.

(4) Using the Water Resources Availability Scoring Table provided on page A-6, identify the option that is most applicable for each portion, based upon the feasibility of irrigation in drought and non-drought years, and whether physical or economic restrictions are likely to exist. Enter the applicable Water Resource Availability Score into **Column D**.

(5) Multiply the Water Resource Availability Score for each portion by the proportion of the project area it represents to determine the weighted score for each portion in **Column E**.

(6) Sum the scores for all portions to determine the project's total Water Resources Availability Score.

(7) Enter the Water Resource Availability Score in box <4> of the Final LESA Score Sheet on page A-10.

Site Assessment Worksheet 2.
Water Resource Availability

A Project Portion	B Water Source	C Proportion of Project Area	D Water Availability Score	E Weighted Availability Score (C x D)
1	Colorado River Basin	1	0	0
2				
3				
4				
5				
6				
		1.00 **(Must Sum to 1.0)**	***Total Water Resource Score***	**0.00**

Water Resource Availability Scoring Table

Option	Non-Drought Years				Drought Years			WATER RESOURCE SCORE
	RESTRICTIONS				RESTRICTIONS			
	Irrigated Production Feasible?	Physical Restrictions ?	Economic Restrictions ?		Irrigated Production Feasible?	Physical Restrictions ?	Economic Restrictions?	
1	YES	NO	NO		YES	NO	NO	100
2	YES	NO	NO		YES	NO	YES	95
3	YES	NO	YES		YES	NO	YES	90
4	YES	NO	NO		YES	YES	NO	85
5	YES	NO	NO		YES	YES	YES	80
6	YES	YES	NO		YES	YES	NO	75
7	YES	YES	YES		YES	YES	YES	65
8	YES	NO	NO		NO	_ _	_ _	50
9	YES	NO	YES		NO	_ _	_ _	45
10	YES	YES	NO		NO	_ _	_ _	35
11	YES	YES	YES		NO	_ _	_ _	30
12	Irrigated production not feasible, but rainfall adequate for dry land production in both drought and non-drought years.							25
13	Irrigated production not feasible, but rainfall adequate for dry land production in non-drought years but not in drought years).							20
14	Neither irrigated nor dry land production feasible.							0

Part 3. Surrounding Agricultural Land Use Score

(1) Calculate the project's Zone of Influence (ZOI) as follows:

(a) a rectangle is drawn around the project such that the rectangle is the smallest that can completely encompass the project area.

(b) a second rectangle is then drawn which extends one quarter mile (1,320 feet) on all sides beyond the first rectangle.

(c) The ZOI includes all parcels that are contained within or are intersected by the second rectangle, less the area of the project itself.

(2) Sum the area of all parcels to determine the total acreage of the ZOI.

(3) Determine which parcels are in agricultural use and sum the areas of these parcels.

(4) Divide the area in agriculture found in step (3) by the total area of the ZOI found in step (2) to determine the percent of the ZOI that is in agricultural use.

(5) Determine the Surrounding Agricultural Land Score utilizing the Surrounding Agricultural Land Scoring Table below.

Surrounding Agricultural Land Scoring Table

Percent of ZOI in Agriculture	Surrounding Agricultural Land Score
90-100	100
80-89	95
70-79	90
65-69	85
60-64	80
55-59	70
50-54	60
45-49	50
40-44	40
35-39	30
30-34	20
20-29	10
<19	0

(6) Enter the Surrounding Agricultural Land Score in box <5> of the Final LESA Score Sheet on page A-10.

Part 4. Surrounding Protected Resource Land Score

The Surrounding Protected Resource Land scoring relies upon the same Zone of Influence information gathered in Part 3, and figures are entered in Site Assessment Worksheet 3, which combines the surrounding agricultural and protected lands calculations.

(1) Use the total area of the ZOI calculated in Part 3 for the Surrounding Agricultural Land Use score.

(2) Sum the area of those parcels within the ZOI that are protected resource lands, as defined in the LESA Instruction Manual (e.g., Williamson Act contracted lands, publicly owned lands maintained as park, forest, or watershed resources).

(3) Divide the area that is determined to be protected in step (2) by the total acreage of the ZOI to determine the percentage of the surrounding area that is under resource protection.

(4) Determine the Surrounding Protected Resource Land Score utilizing the Surrounding Protected Resource Land Scoring Table below.

Surrounding Protected Resource Land Scoring Table

Percent of ZOI Protected	Protected Resource Land Score
90-100	100
80-89	95
70-79	90
65-69	85
60-64	80
55-59	70
50-54	60
45-49	50
40-44	40
35-39	30
30-34	20
20-29	10
<20	0

(5) Enter the Surrounding Protected Resource Land score in box <6> of the Final LESA Score Sheet on page A-10.

Site Assessment Worksheet 3.
Surrounding Agricultural Land and Surrounding Protected Resource Land

A	B	C	D	E	F	G
Zone of Influence					Surrounding Agricultural Land Score (from table on page A-7)	Surrounding Protected Resource Land Score (from table on page A-8)
Total Acres	Acres in Agriculture	Acres of Protected Resource Land	Percent in Agriculture (B/A)	Percent Protected Resource Land (C/A)		
10,900	160	0	1%	0	0	0

* The total number and percentage of acres in agriculture are based on the March 20, 2008 letter (pg. 3) from the San Luis Obispo County Agriculture Department, which states their LESA model assumed that surrounding agriculture is >90%.

Final LESA Score Sheet

Calculation of the Final LESA Score

(1) Multiply each factor score by the factor weight to determine the weighted score and enter in Weighted Factor Scores column.

(2) Sum the weighted factor scores for the LE factors to determine the total LE score for the project.

(3) Sum the weighted factor scores for the SA factors to determine the total SA score for the project.

(4) Sum the total LE and SA scores to determine the Final LESA Score for the project.

		Factor Scores	Factor Weight	Weighted Factor Scores
LE Factors				
Land Capability Classification (see page A-2)	<1>	9.96	0.25	2.49
Storie Index Rating (see page A-2)	<2>	53.84	0.25	13.46
LE Subtotal			**0.50**	**15.95**
SA Factors				
Project Size (see page A-2)	<3>	100	0.15	15
Water Resource Availability (see page A-5)	<4>	0	0.15	0
Surrounding Agricultural Land (see page A-9)	<5>	0	0.15	0
Surrounding Protected Resource Land (see page A-9)	<6>	0	0.05	0
SA Subtotal			**0.50**	**15**
			Final LESA Score	**30.95**

California Agricultural LESA Scoring Thresholds

Total LESA Score		Scoring Decision
0 to 39 points		Not Considered Significant
40 to 59 points		Considered Significant only if LE and SA subscores are each greater than or equal to 20 points
60 to 79 points		Considered Significant unless either LE or SA subscore is less than 20 points
80 to 100 points		Considered Significant

The California Agricultural LESA Model is designed to make determinations of the potential significance of a project's conversion of agricultural lands during the Initial Study phase of the CEQA review process. Scoring thresholds are based upon both the total LESA score as well the component LE and SA subscores. In this manner the scoring thresholds are dependent upon the attainment of a minimum score for the LE and SA subscores so that a single threshold is not the result of heavily skewed subscores (i.e., a site with a very high LE score, but a very low SA score, or vice versa). For additional information on the significance scoring thresholds under the California Agricultural LESA Model, consult Section 4 in the LESA Instruction Manual.

C.9 - NOISE AND VIBRATION

Testimony of Erin Bright

C.9.1 SUMMARY OF CONCLUSIONS

California Energy Commission staff concludes that the Stirling Energy Systems Solar Two Project can be built and operated in compliance with all applicable noise and vibration laws, ordinances, regulations, and standards and, if built in accordance with the conditions of certification proposed below, would produce no significant adverse noise impacts on people within the affected area, either direct, indirect, or cumulative.

C.9.2 INTRODUCTION

The construction and operation of any power plant creates noise, or unwanted sound. The character and loudness of this noise, the times of day or night that it is produced, and the proximity of the facility to sensitive receptors combine to determine whether the facility would meet applicable noise control laws and ordinances and whether it would cause significant adverse environmental impacts under CEQA. In some cases, vibration may be produced as a result of power plant construction practices, such as blasting or pile driving. The groundborne energy of vibration has the potential to cause structural damage and annoyance.

The purpose of this analysis is to identify and examine the likely noise and vibration impacts from the construction and operation of the Stirling Energy Systems Solar Two (SES Solar Two) Project and to recommend procedures to ensure that the resulting noise and vibration impacts would be adequately mitigated to comply with applicable laws, ordinances, regulations, and standards (LORS) and to avoid creation of significant adverse noise or vibration impacts. For an explanation of technical terms and acronyms employed in this section, please refer to **Noise Appendix A** immediately following.

C.9.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

California Environmental Quality Act

The California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified and that such impacts be eliminated or mitigated to the extent feasible. Section XI of Appendix G of CEQA Guidelines (*See* Cal. Code Regs., tit. 14, Section 15063) sets forth some characteristics that may signify a potentially significant impact. Specifically, a significant effect from noise may exist if a project would result in:

1. exposure of persons to, or generation of, noise levels in excess of standards established in the local General Plan or noise ordinance or applicable standards of other agencies;
2. exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels;

3. substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or
4. substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The Energy Commission staff, in applying item 3 above to the analysis of this and other projects, has concluded that a potential for a significant noise impact exists where the noise of the project plus the background exceeds the background by 5 dBA or more at the nearest sensitive receptor. A change in level of at least 5 dB is required before any noticeable change in community response would be expected.

Staff considers it reasonable to assume that an increase in background noise levels up to 5 dBA in a residential setting is insignificant; an increase of more than 10 dBA is considered significant. An increase between 5 and 10 dBA should be considered adverse, but may be either significant or insignificant, depending on the particular circumstances of the case.

Factors to be considered in determining the significance of an adverse impact (as defined above) include:

1. the resulting combined noise level;[1]
2. the duration and frequency of the noise;
3. the number of people affected;
4. the land use designation of the affected receptor sites; and
5. public concern or controversy expressed at workshops or hearings or in correspondence.

Noise impacts due to construction activities are usually considered to be insignificant if:

- the construction activity is temporary;
- use of heavy equipment and noisy activities are limited to daytime hours; and
- all industry-standard noise abatement measures are implemented for noise-producing equipment.

Staff uses the above method and threshold to protect the most sensitive populations, including the minority population.

[1] For example, a noise level of 40 dBA would be considered quiet in many locations. A noise limit of 40 dBA would be consistent with the recommendations of the California Model Community Noise Control Ordinance for rural environments and with industrial noise regulations adopted by European jurisdictions. If the project would create an increase in ambient noise no greater than 10 dBA at nearby sensitive receptors, and the resulting noise level would be 40 dBA or less, the project noise level would likely be insignificant.

Laws, Ordinances, Regulations, and Standards

Noise Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal (OSHA): 29 U.S.C. § 651 et seq.	Protects workers from the effects of occupational noise exposure.
State (Cal/OSHA): Cal. Code Regs., tit. 8, §§ 5095–5099	Protects workers from the effects of occupational noise exposure.
Local Imperial County General Plan - Noise Element Imperial County Noise Ordinance	 Establishes acceptable noise levels and limits hours of construction. Establishes acceptable noise levels.

FEDERAL

Under the Occupational Safety and Health Act of 1970 (29 USC § 651 et seq.), the Department of Labor, Occupational Safety and Health Administration (OSHA) has adopted regulations designed to protect workers against the effects of occupational noise exposure (29 CFR § 1910.95). These regulations list permissible noise exposure levels as a function of the amount of time during which the worker is exposed (see **NOISE Appendix A, Table A4** immediately following this section). The regulations further specify a hearing conservation program that involves monitoring the noise to which workers are exposed, assuring that workers are made aware of overexposure to noise, and periodically testing the workers' hearing to detect any degradation.

There are no federal laws governing off-site (community) noise.

The only guidance available for evaluation of power plant vibration is guidelines published by the Federal Transit Administration (FTA) for assessing the impacts of groundborne vibration associated with construction of rail projects. These guidelines have been applied by other jurisdictions to assess groundborne vibration of other types of projects. The FTA-recommended vibration standards are expressed in terms of the "vibration level," which is calculated from the peak particle velocity measured from groundborne vibration. The FTA measure of the threshold of perception is 65 VdB,[2] which correlates to a peak particle velocity of about 0.002 inches per second (in/sec). The FTA measure of the threshold of architectural damage for conventional sensitive structures is 100 VdB, which correlates to a peak particle velocity of about 0.2 in/sec.

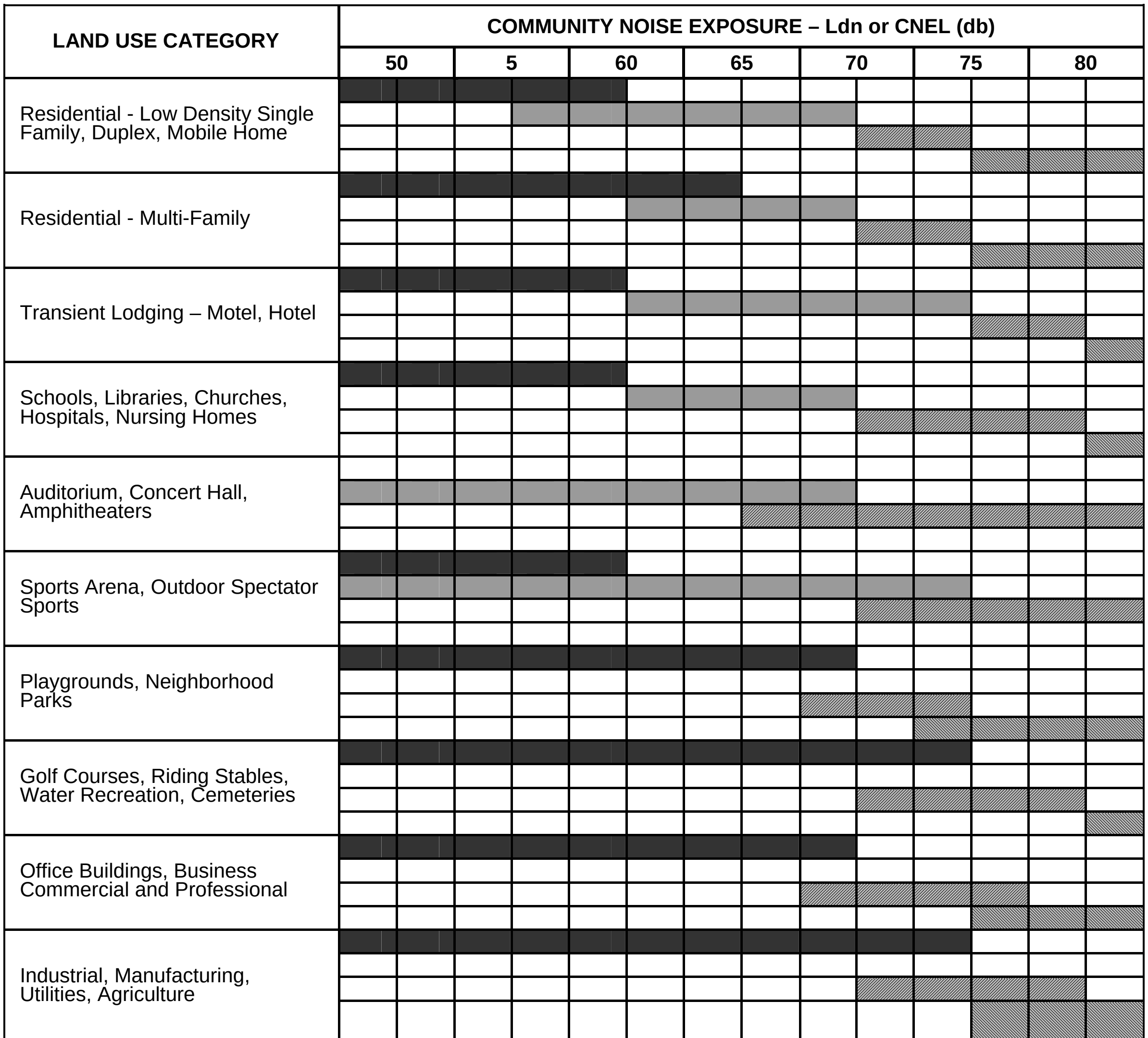
STATE

California Government Code section 65302(f) encourages each local governmental entity to perform noise studies and implement a noise element as part of its General Plan. In addition, the California Office of Planning and Research has published guidelines for preparing noise elements, which include recommendations for evaluating

[2] VdB is the common measure of vibration energy.

the compatibility of various land uses as a function of community noise exposure. The State land use compatibility guidelines are listed in **Noise Table 2**.

Noise Table 2
Land Use Compatibility for Community Noise Environment



	Normally Acceptable	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
	Conditionally Acceptable	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design.
	Normally Unacceptable	New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirement must be made and needed noise insulation features included in the design.
	Clearly Unacceptable	New construction or development generally should not be undertaken.

Source: State of California General Plan Guidelines, Office of Planning and Research, June 1990.

The California Occupational Safety and Health Administration (Cal/OSHA) has promulgated Occupational Noise Exposure Regulations (Cal. Code Regs., tit. 8, §§ 5095–5099) that set employee noise exposure limits. These standards are equivalent to the federal OSHA standards (see the **Worker Safety and Fire Protection** section of this document, and **NOISE Appendix A, Table A4**).

LOCAL

Imperial County General Plan Noise Element

The County's General Plan Noise Element sets standards for the control of noise. The Noise Element defines "sensitive receptors" to include residences, schools, hospitals, parks and office buildings; it further states that riparian bird species may also be considered sensitive receptors (Imperial County 2001, § II.C). Imperial County has adopted the State of California land use compatibility guidelines (shown above in **Noise Table 2**) in their general plan (Imperial County 2001). The noise levels considered generally acceptable and conditionally acceptable for single-family residences are 60 dB Community Noise Equivalent Level (CNEL) and 70 dB CNEL, respectively.

Objectives of the Noise Element include controlling noise at the source where feasible (Imperial County 2001, § III.B, Goal 1, Objective 1.3).

The Noise Element also sets property line noise limits for sensitive receptors. These limits are summarized in **Noise Table 3**.

Noise Table 3
Imperial County General Plan Property Line Noise Limits

Zone	Time	1-hour Average Sound Level, dB
Residential	7 a.m. to 10 p.m.	50
	10 p.m. to 7 a.m.	45
Multi-Residential	7 a.m. to 10 p.m.	55
	10 p.m. to 7 a.m.	50
Commercial	7 a.m. to 10 p.m.	60
	10 p.m. to 7 a.m.	55
Light Industrial and Industrial Park	Anytime	70
General Industrial	Anytime	75

Source: Imperial 2001, Table 9

The Noise Element further states that construction noise shall not exceed 75 dB L_{eq} at the nearest sensitive receptor. Construction equipment operation shall be limited to the following hours:

- Monday through Friday 7 a.m. to 7 p.m.
- Saturday 9 a.m. to 5 p.m.
- Sunday and Holidays Not allowed

(Imperial County 2001 § IV.C.3)

If the noise level at a receptor, with the project complete, is within the “normally acceptable” range of the Noise/Land Use Compatibility Guidelines cited above (**Noise Table 2**), and the project has increased noise levels 3 dB CNEL or more, then the project is deemed to have created a potentially significant noise impact, and mitigation measures must be considered (Imperial County 2001, § IV.C.4.a, IV.C.4.b).

The Noise Element allows the institution of required noise reduction measures either at the source of the noise, along the path of the noise from source to receptor, or at the receptor (Imperial County 2001, § IV.D.8). Preference is given to reduction at the source or along the path, but in certain cases, such as when there is only one receptor, reduction at the receptor is recognized as most cost effective, and therefore acceptable (Imperial 2001, § IV.D.8.c).

Imperial County Noise Ordinance

The County’s Noise Ordinance (Imperial County 1998) establishes sound level limits identical to the property line noise limits presented in the Imperial County General Plan, as summarized in **Noise Table 3**, above.

C.9.4 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The analysis of proposed project effects must comply with both CEQA and NEPA requirements given the respective power plant licensing and land jurisdictions of the California Energy Commission and U.S. Bureau of Land Management (BLM). Because this document is intended to meet the requirements of both NEPA and CEQA, the methodology used for determining environmental impacts of the proposed project includes a consideration of guidance provided by both laws.

As noted above, CEQA identifies criteria that may be used to determine the significance of identified impacts. A significant impact is defined by CEQA as “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project” (Cal. Code Reg., tit. 14 (hereinafter State CEQA Guidelines) Section 15382).

In comparison, NEPA states that “‘Significantly’ as used in NEPA requires considerations of both context and intensity…” (40 CFR 1508.27). Therefore, thresholds serve as a benchmark for determining if a project action will result in a significant adverse environmental impact when evaluated against the baseline. NEPA requires that an Environmental Impact Statement (EIS) is prepared when the proposed federal action (project) as a whole has the potential to “significantly affect the quality of the human environment.”

Criteria for determining significance in this section are based on Appendix G of the CEQA Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission staff. In addition, staff’s evaluation of the environmental effects of the proposed project on land uses (i.e., those listed below) includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27.

Effects of the proposed project on noise and vibration (and in compliance with both CEQA and NEPA) have been determined using the thresholds listed below.

C.9.5 PROPOSED PROJECT

C.9.5.1 SETTING AND EXISTING CONDITIONS

The proposed SES Solar Two Project would be constructed on a 6,500 acre site located approximately 4 miles east of the town of Ocotillo in Imperial County. The site is primarily on undisturbed federal land managed by the BLM (SES Solar Two, LLC 2008a, AFC §§ 3.2, 3.3.1).

The ambient noise regime in the project vicinity consists of aircraft traffic, highway traffic, wind and wildlife. The nearest sensitive receptor is a small group of residences located approximately 0.6 miles (1 kilometer) west of the project's northwest border. Additional sensitive receptors are located southwest and northeast of the project boundaries at greater distances (SES Solar Two, LLC 2008a, AFC 5.12.1.4, Figure 5.12-1).

Ambient Noise Monitoring

In order to establish a baseline for comparison of predicted project noise to existing ambient noise, the applicant has presented the results of an ambient noise survey (SES Solar Two, LLC 2008a, AFC § 5.12.1.4, Appendix CC-1, Tables CC-1-1 through CC-1-4). The survey was conducted on January 29, 30 and 31, 2008, and monitored existing noise levels at the following locations, shown on **Noise and Vibration Figure 1**:

1. Measuring Location 1: Near a residence located approximately 5,300 feet south-west of the project site, at 426 Evan Hewes Highway. This represents the sensitive receptor most likely to be impacted by project noise. Long-term (25-hour) monitoring showed ambient noise levels typical of a desert environment.
2. Measuring Location 2: Near the project site western border, approximately 4300 feet from the nearest sensitive residential receptors at 1516 Painted Gorge Road..
3. Measuring Location 5: Near a residential community located approximately 10,500 feet to the northeast of the project site.

Ambient noise measurements were not taken at the nearest sensitive receptors, a group of five mobile residences located approximately 3,300 feet from the project's western border, at 1516 Painted Gorge Road. The applicant asserts that, on the basis of comparable noise conditions such as noise source proximity and exposure, ambient noise at these nearest receptors can be assumed similar to that of ML1 (Data Response 138). Given the similarities between the noise environments at the receptors at Painted Gorge Road and ML1, and that the long-term measurements at ML2 were considerably higher than those at ML1 (66 dBA Leq at ML2 compared to 49 dBA Leq at ML1) staff agrees that the more conservative measurements from ML1 are an appropriate proxy for these nearest sensitive receptors. This grouping of sensitive receptors is referred to as "Painted Gorge" in this analysis.

Noise Table 4 summarizes the ambient noise measurements:

Noise Table 4
Summary of Measured Ambient Noise Levels

Measurement Location	Measured Noise Levels, dBA		
	L_{eq} – Daytime[1]	L_{eq} – Nighttime[2]	L_{90} – Nighttime[3]
ML1: Southwest Residence	49	42	38
ML2: West Project Boundary	66	72	72
Painted Gorge Residences	49	42	38
ML5: Northeast Residence	56	52	48

Source: SES Solar Two, LLC 2008a, AFC Appendix CC-1, Tables CC-1-1 through CC-1-5; data response 138

[1] Staff calculations of average of 15 daytime hours
[2] Staff calculations of average of 9 nighttime hours
[3] Staff calculations of average of 4 consecutive quietest hours of the nighttime

C.9.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

DIRECT IMPACTS AND MITIGATION

Noise impacts associated with the project can be created by short-term construction activities and by normal long-term operation of the power plant.

Construction Impacts and Mitigation

Construction of SES Solar 2 is expected to occur in two phases over a period of 40 months (SES Solar Two, LLC 2008a, AFC § 5.12.2.1). Phase I would be constructed first, on the western half of the project site; Phase II would subsequently be constructed on the eastern half of the project site.

Compliance with LORS

Construction of an industrial facility such as a power plant is typically noisier than permissible under usual noise ordinances. In order to allow the construction of new facilities, construction noise during certain hours of the day is commonly exempt from enforcement by local ordinances.

The Applicant has predicted the noise impacts of project construction on the nearest sensitive receptors (SES Solar Two, LLC 2008a, AFC § 5.12.2.1, Tables 5.12-4 through 5.12-6, supplement to data response 139). Assembly and installation of solar collectors, Sun Catchers, for the project is expected to be performed in blocks around the site with additional, more substantial structural construction taking place at the Main Services Complex centrally located on the site. The applicant has estimated that the noise resulting from construction of the collector block closest to the Painted Gorge receptor northwest of the project border would be no more than 66 dBA at the receptor. Similarly, noise resulting from the construction of the collector blocks closest to locations ML1 and

ML5 would be no more than 62 dBA and 56 dBA at ML1 and ML5, respectively. A maximum construction noise level of 74 dBA L_{eq} is estimated to occur at a distance of 3,300 feet (1 kilometer) from the acoustic center of the construction activity (the Main Services Complex) for all other project construction (such as roads and buildings) and attenuate to no more than 58 dBA L_{eq} at Painted Gorge, and 56 dBA L_{eq} at ML1and ML5. Overall construction noise would, therefore, be no more than 67 dBA at the Painted Gorge location, 63 dBA at location ML1, and 59 dBA at location ML5 (SES Solar Two, LLC 2008a, AFC § 5.12.2.1, Tables 5.12-4 through 5.12-6; and staff calculations). A comparison of construction noise estimates to measured ambient conditions is summarized in **Noise Table 5**.

Noise Table 5
Predicted Power Plant Construction Noise Impacts

Receptor	Highest Construction Noise Level[1] (dBA L_{eq})	Measured Existing Ambient[2] (dBA L_{eq})	Cumulative (dBA L_{eq})	Change (dBA)
ML1 – Southwest Residence	63	49 daytime	63 daytime	+14 daytime
Painted Gorge Residences	67	49 daytime	67 daytime	+18 daytime
ML5 – Northeast Residence	59	56 daytime	61 daytime	+5 daytime

1 Source: SES Solar Two, LLC 2008a, AFC § 5.12.2.1, Tables 5.12-4 through 5.12-6; and staff calculations
2 Source: SES Solar Two, LLC 2008a, AFC Appendix CC-1, Tables CC-1-1 through CC-1-5; data response 138 and staff calculations of average of daytime hours.

The Imperial County General Plan Noise Element limits noise levels at residential receptors to no more than 75 dBA L_{eq}. The General Plan also limits noisy construction to daytime hours. Noisy construction work would be allowed only during the daytime hours of 7:00 a.m. to 7:00 p.m. on weekdays, 9:00 a.m. to 5:00 p.m. on Saturdays, and not at all on Sundays. To ensure that these hours are, in fact, enforced, staff proposes Condition of Certification **NOISE-6**.

Compliance with **NOISE-6** would insure that the noise impacts of Solar Two construction activities would comply with the local noise LORS.

CEQA Impacts

Power Plant Site

To evaluate construction noise impacts, staff compares the projected noise levels to the ambient levels. Since construction noise typically varies continually with time, it is most appropriately measured by, and compared to, the L_{eq} (energy average) metric.

The applicant estimates that construction of the SES Solar Two Project would take place in two phases over a period of 40 months, which is significantly longer than the 12 to 16 month construction period of a traditional power plant. However, the construction of Solar Two would be conducted modularly, each module taking approximately 4 months to construct. Thus, maximum construction noise would occur during the construction of the module closest to the receptor for a duration of 4 months and would decrease as construction activity moved on to the next module, further from the receptor. Construction for Solar Two would therefore still constitute a temporary noise impact.

Aggregate construction noise may be expected to reach levels as high as 67 dBA L_{eq} at the nearest sensitive receptor, the residences at Painted Gorge Road, for a period of approximately 4 months; an increase of 18 dBA during daytime hours (see **NOISE Table 5**, above). Such an increase represents nearly a quadrupling of noise level at the receptor and would generally be considered a significant impact. The projected construction noise levels, however, are most likely conservative, calculated from manufacturers' estimated data and engine power sound generation formulae; actual noise levels may be less than predicted. Since noisy construction work will be restricted to daytime hours, staff believes it will be noticeable, but tolerable, at the nearest residences. Because the maximum construction noise would be temporary and limited to daytime hours, staff considers the noise impacts due to construction activity to be less than significant.

In the event that actual construction noise should annoy nearby residents, staff proposes Conditions of Certification **NOISE-1** and **NOISE-2**, which would establish a Notification Process to make nearby residents aware of the project, and a Noise Complaint Process that requires the applicant to resolve any problems caused by noise from the project.

Linear Facilities

Linear facilities include a new 3.4 mile water supply pipeline extending from the Imperial Irrigation District Westside Main canal to the eastern project boundary, as well as new electrical transmission lines interconnecting to the transmission system to the east of the project site. Both the water supply pipeline and the transmission lines would extend past the project site boundaries and would pass relatively close to two different sensitive receptors (ML6 and ML9, respectively, as shown on **Noise and Vibration Figure 1**) (SES Solar Two, LLC 2008a, AFC Figure 5.12-1). While the construction noise levels for the linears would be noticeable, construction on linears proceeds rapidly, so no particular area is exposed to noise for more than a few days.

Pile Driving

The applicant does not explicitly state that pile driving would be necessary for construction of Solar Two, however staff has analyzed the potential noise impacts of pile driving in case it is found necessary during the construction process. If pile driving is required for construction of the project, the noise from this operation could be expected to reach 104 dBA at a distance of 50 feet. Pile driving noise would thus be projected to reach levels of 68 dBA at the Painted Gorge residences, the nearest residential receptor (staff calculation). Added to the existing daytime ambient level of 49 dBA L_{eq}, this would combine to produce 68 dBA, an increase of 19 dBA over ambient noise levels (see **NOISE Table 6,** below). While this would produce a noticeable impact, staff believes that limiting pile driving to daytime hours, in conjunction with its temporary nature, would result in impacts tolerable to residents. Staff proposes Condition of Certification **NOISE-6** to ensure that pile driving noise, should it occur, would be limited to daytime hours.

Noise Table 6
Pile Driving Noise Impacts

Receptor	Pile Driving Noise Level (dBA L_{eq})	Daytime Ambient Noise Level (dBA L_{eq})	Cumulative Level (dBA)	Change (dBA)
Painted Gorge Road	68	49	68	+19
ML1	64	49	64	+15
ML5	58	56	60	+4

1 Source: SES Solar Two, LLC 2008a, AFC Appendix CC-1, Tables CC-1-1 through CC-1-5; data response 138; and staff calculations

Vibration

The only construction operation likely to produce vibration that could be perceived off site would be pile driving, should it be employed. Vibration attenuates rapidly; it is likely that no vibration would be perceptible at any appreciable distance from the project site. Staff therefore believes there would be no significant impacts from construction vibration.

Worker Effects

The applicant has acknowledged the need to protect construction workers from noise hazards and has recognized those applicable LORS that would protect construction workers (SES Solar Two, LLC 2008a, AFC § 5.12.2.1). To ensure that construction workers are, in fact, adequately protected, staff has proposed Condition of Certification **NOISE-3**, below.

Operation Impacts and Mitigation

The primary noise sources of Solar Two would consist of the reciprocating Stirling Engines (including generator, cooling fan and air compressor) utilized on each of the Sun Catchers that make up the project, as well as step-up transformers and a new substation (SES Solar Two, LLC 2008a, AFC § 3.4.4.1, 5.12.2.2). Staff compares the projected noise with applicable LORS. In addition, staff evaluates any increase in noise levels at sensitive receptors due to the project in order to identify any significant adverse impacts.

Compliance with LORS

The applicant performed noise modeling to determine the project's noise impacts on sensitive receptors (SES Solar Two, LLC 2008a, AFC § 5.12.2.2, Table 5.12-8; Data Response 139 supplement, Table 3).

As seen in **Noise Table 7**, the project's operational noise level at the nearest sensitive receptor would be no more than 52 dBA CNEL, which complies with the noise level limits specified in the Imperial County General Plan Noise Element.

Noise Table 7
Plant Operating Noise LORS Compliance

Receptor	LORS	LORS Limit	Projected Noise Level (CNEL)
ML1	Imperial County General Plan Noise Element	60 dBA CNEL daytime	50 dBA
Painted Gorge Residences			52 dBA
ML5			48 dBA

Source: Imperial County 2001, and SES Solar Two, LLC 2008a, AFC Table 5.12-8, supplement to data response 139.

CEQA Impacts

Power plant noise is unique. Essentially, a power plant operates as a steady, continuous, broadband noise source, unlike the intermittent sounds that comprise the majority of the noise environment. As such, power plant noise contributes to, and becomes part of, the background noise level, or the sound heard when most intermittent noises cease. Where power plant noise is audible, it will tend to define the background noise level. For this reason, staff compares the projected power plant noise to the existing ambient background (L_{90}) noise levels at the affected sensitive receptors. If this comparison identifies a significant adverse impact, then feasible mitigation must be incorporated in the project to reduce or remove the impact.

In many cases, a power plant will be intended to operate around the clock for much of the year. As a solar thermal generating facility, Solar Two would operate only during the daytime hours, typically 15 hours per day during the summer (with fewer hours during the fall, winter, and spring), when sufficient solar insulation is available.

Typically, daytime ambient noise consists of both intermittent and constant noises. The noise that stands out during this time is best represented by the average noise level, or L_{eq}. Staff's evaluation of the above noise surveys shows that the daytime noise environment in the Solar Two project area consists of both intermittent and constant noises. Thus, staff compares the project's daytime noise levels to the daytime ambient L_{eq} levels at the project's noise-sensitive receptors.

As seen in **Noise Table 8**, power plant noise levels are predicted to be less than 52 dBA CNEL (45 dBA L_{eq}) at all sensitive receptors during daytime operation.

Noise Table 8
Power Plant Noise Impacts at Nearest Sensitive Receptors

Location	Power Plant Noise Level, dBA L_{eq}[1]	Ambient Noise Level, dBA L_{eq}[2]	Cumulative Noise Level, dBA	Change from Ambient Level dBA
ML1	43	49	50	+1
Painted Gorge	45	49	50	+1
ML5	41	56	56	+0

[1] Source: SES Solar Two, LLC 2008a, AFC Table 5.12-8, supplement to data response 139, and staff calculations.
[2] Source: SES Solar Two, LLC 2008a, AFC Appendix CC-1, Tables CC-1-1 through CC-1-5; data response 138 and staff calculations of average of fifteen consecutive daytime hours.

When projected plant noise is added to the daytime ambient value (as calculated by staff), the cumulative level is higher than the ambient value at the Painted Gorge residences and location ML1 by an inaudible amount (see **NOISE Table 8**), and the same as the ambient level at ML5. No change in ambient noise at any sensitive receptor at night would result from plant operation.

Tonal Noises

One possible source of disturbance would be strong tonal noises. Tonal noises are individual sounds (such as pure tones) that, while not louder than permissible levels, stand out in sound quality. The applicant can to avoid the creation of annoying tonal (pure-tone) noises by balancing the noise emissions of various power plant features during plant design. To ensure that tonal noises do not cause annoyance, staff proposes Condition of Certification **NOISE-4**, below.

Linear Facilities

Noise effects from the electrical interconnection line typically do not extend beyond the right-of-way easement of the line and would thus be inaudible to any receptors.

Vibration

Vibration from an operating power plant could be transmitted by two chief means; through the ground (groundborne vibration) and through the air (airborne vibration).

The Solar Two project would be essentially comprised of a large number of solar dish generators, the operating components of each consisting of a relatively small reciprocating engine, cooling fans and air compressor. All of these pieces of equipment must be carefully balanced in order to operate. Given the distributive layout of the project, Energy Commission staff believes that the ground borne vibration from Solar Two would be undetectable by any likely receptor.

Airborne vibration (low frequency noise) can rattle windows and objects on shelves and can rattle the walls of lightweight structures. None of the project equipment is likely to produce low frequency noise; this makes it highly unlikely that Solar Two would cause perceptible airborne vibration effects.

Worker Effects

The applicant has acknowledged the need to protect plant operating and maintenance workers from noise hazards and has committed to comply with applicable LORS (SES Solar Two, LLC 2008a, AFC § 5.12.2.2). To ensure that plant operation and maintenance workers are, in fact, adequately protected, Energy Commission staff has proposed Condition of Certification **NOISE-5**, below.

FACILITY CLOSURE

In the future, upon closure of SES Solar Two, all operational noise from the project would cease, and no further adverse noise impacts from operation of Solar Two would be possible. The remaining potential temporary noise source is the dismantling of the structures and equipment and any site restoration work that may be performed. Since this noise would be similar to that caused by the original construction, it can be treated similarly. That is, noisy work could be performed during daytime hours, with machinery and equipment properly equipped with mufflers. Any noise LORS that are in existence at that time would apply. Applicable conditions of certification included in the Energy Commission decision would also apply unless modified.

C.9.5.3 CEQA LEVEL OF SIGNIFICANCE

For the purposes of CEQA compliance, the significance of construction and operating noise impacts of the proposed project at the nearest sensitive receptors has been determined.

Construction Impacts

As discussed in detail in section C10.4.2 above (under the subsection entitled “Construction Impacts and Mitigation”), the noise level increase at the nearest sensitive receptors resulting from construction of the project (presented in **Noise Table 5**) would be noticeable. However, given the temporary nature of construction noise and the fact that noisy construction activity would be restricted to daytime hours (by both the local LORS and Condition of Certification **NOISE-6**), the impacts due to construction noise are considered less than significant.

Operation Impacts

As discussed in detail in section C10.4.2 above (under the subsection entitled “Operation Impacts and Mitigation”), power plant noise levels are predicted to be less than 45 dBA Leq at all sensitive receptors during daytime operation, which would result in an inaudible increase over ambient noise. No change in ambient noise at any sensitive receptor at night would result from plant operation. Thus, operation noise impacts of the project would be insignificant.

C.9.6 300 MW ALTERNATIVE

The 300 MW alternative would essentially consist of just Phase 1 of the proposed 750 MW project (see Alternatives Figure 1) being built (as opposed to both phases for the 750 MW project), and would consist of 12,000 SunCatchers with a net generating capacity of approximately 300 MW occupying approximately 2,600 acres of land. This alternative would transmit power to the grid through the SDG&E Imperial Valley Substation and would require infrastructure similar to the proposed 750 MW project, including a water supply pipeline, transmission line, road access, operations facilities, substation, and hydrogen system (SES 2008a). Infrastructure associated with this alternative would require approximately 40 acres. This alternative would retain 40% of the SunCatchers and would affect 40% of the land of the proposed 750 MW project.

C.9.6.1 Setting and Existing Conditions

The 300 MW alternative would be constructed within the boundaries of the proposed SES Solar Two Project, described in Section C.9.4.1. The site is primarily on undisturbed federal land managed by the BLM (SES Solar Two, LLC 2008a, AFC §§ 3.2, 3.3.1). As a result, the setting is the same as that of the proposed project. The ambient noise regime in the project vicinity consists of aircraft traffic, highway traffic, wind and wildlife. The nearest sensitive receptor is a small group of residences located approximately 0.6 miles (1 kilometer) west of the project's northwest border. Additional sensitive receptors are located southwest and northeast of the project boundaries at greater distances (SES Solar Two, LLC 2008a, AFC 5.12.1.4, Figure 5.12-1).

C.9.6.2 Assessment of Impacts and Discussion of Mitigation

Given the distributive nature of the operational noise produced by the chosen project technology, the 300 MW alternative would most likely correspond to lower operational noise impacts at noise receptors located east of the project. Operational noise impacts at those receptors west of the project would likely be the same as that of the proposed 750 MW project. Certainly, the noise impacts of the 300 MW alternative would not be greater than the noise impacts from the proposed 750 MW project, which, as discussed above in section 10.4.2, are not significant.

Because this alternative would result in fewer construction activities conducted at greater distances from sensitive receptors than the proposed project, the analysis for the proposed project demonstrates that the 300 MW alternative can be built and operated in compliance with all applicable noise and vibration laws, ordinances, regulations, and standards. Also, if built in accordance with the conditions of certification proposed for the proposed project, it would produce no significant adverse noise impacts on people within the affected area, either direct, indirect, or cumulative.

C.9.6.3 CEQA Level of Significance

Like the proposed project, the 300 MW alternative, if built and operated in conformance with the proposed conditions of certification defined for the proposed project, would comply with all applicable noise and vibration LORS and would produce no significant adverse noise impacts on people within the project area, directly, indirectly, or cumulatively.

C.9.7 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives developed to reduce impacts to the waters of the U.S. would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative is illustrated in **Alternatives Figure 1B**. This alternative would have the same outer project boundaries as the proposed project, but it would include prohibition of installing permanent structures within drainages, thereby reducing the available acreage for development to 4,690 acres, and reducing the number of SunCatchers from 30,000 under the proposed project to 25,290.

C.9.7.1 Setting and Existing Conditions

The Drainage Avoidance #1 alternative would be constructed within the boundaries of the proposed SES Solar Two Project, described in Section C.9.4.1. The site is primarily on undisturbed federal land managed by the BLM (SES Solar Two, LLC 2008a, AFC §§ 3.2, 3.3.1). As a result, the setting is the same as that of the proposed project. The ambient noise regime in the project vicinity consists of aircraft traffic, highway traffic, wind and wildlife. The nearest sensitive receptor is a small group of residences located approximately 0.6 miles (1 kilometer) west of the project's northwest border. Additional sensitive receptors are located southwest and northeast of the project boundaries at greater distances (SES Solar Two, LLC 2008a, AFC 5.12.1.4, Figure 5.12-1).

C.9.7.2 Assessment of Impacts and Discussion of Mitigation

Noise impacts associated with the project can be created by short-term construction activities and by normal long-term operation of the power plant. Construction noise estimated in **Noise Table 5** would also apply to the Drainage Avoidance #1 alternative. Similarly, **Noise Table 8** presents data for noise impacts during facility operation, which define noise levels that may be greater than those that would occur with this alternative because this alternative would have few SunCatchers.

Because this alternative would result in fewer construction activities conducted at greater distances from sensitive receptors than the proposed project, the analysis for the proposed project demonstrates that the Drainage Avoidance #1 alternative can be built and operated in compliance with all applicable noise and vibration laws, ordinances, regulations, and standards. Also, if built in accordance with the conditions of certification proposed for the proposed project, it would produce no significant adverse noise impacts on people within the affected area, either direct, indirect, or cumulative.

C.9.7.3 CEQA Level of Significance

Like the proposed project, the Drainage Avoidance #1 alternative, if built and operated in conformance with the proposed conditions of certification defined for the proposed project, would comply with all applicable noise and vibration LORS and would produce no significant adverse noise impacts on people within the project area, directly, indirectly, or cumulatively.

C.9.8 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative would eliminate both the eastern and westernmost portions of the proposed project, where the largest drainage complexes are located. This alternative is shown in **Alternatives Figure 1C**. It would reduce the overall size of the project site by 3,347 acres (from 6,500 acres to 3,153 acres) It would also reduce the number of SunCatchers from 30,000 under the proposed project to 16,915. In this alternative, permanent structures would be allowed within all drainages inside the revised project boundaries.

C.9.8.1 Setting and Existing Conditions

The Drainage Avoidance #2 alternative would be constructed within the boundaries of the proposed SES Solar Two Project, described in Section C.9.4.1. The site is primarily on undisturbed federal land managed by the BLM (SES Solar Two, LLC 2008a, AFC §§ 3.2, 3.3.1). As a result, the setting is the same as that of the proposed project. The ambient noise regime in the project vicinity consists of aircraft traffic, highway traffic, wind and wildlife.

The nearest sensitive receptor to this alternative would be further away because the alternative would avoid development at the east and west ends of the proposed site. Therefore, the small group of residences located approximately 0.6 miles (1 kilometer) west of the project's northwest border would be approximately one additional kilometer from the alternative boundary. The additional sensitive receptors located southwest and northeast of the project boundaries would similarly be about one kilometer further from the boundaries of this alternative than they are from the proposed project boundaries (SES Solar Two, LLC 2008a, AFC 5.12.1.4, Figure 5.12-1).

C.9.8.2 Assessment of Impacts and Discussion of Mitigation

Noise impacts associated with the project can be created by short-term construction activities and by normal long-term operation of the power plant. Construction noise estimated in **Noise Table 5** would also apply to the Drainage Avoidance #2 alternative, though noise levels for this alternative would be lower for receptors east and west of the project. Similarly, **Noise Table 8** presents data for noise impacts during facility operation, which would exceed those of this smaller alternative at all sensitive receptors.

Because this alternative would result in fewer construction activities and at greater distances from sensitive receptors than the proposed project, the analysis for the proposed project demonstrates that the Drainage Avoidance #2 alternative can be built and operated in compliance with all applicable noise and vibration laws, ordinances, regulations, and standards. Also, if built in accordance with the conditions of certification proposed for the proposed project, it would produce no significant adverse noise impacts on people within the affected area, either direct, indirect, or cumulative.

C.9.8.3 CEQA Level of Significance

Like the proposed project, the Drainage Avoidance #2 alternative, if built and operated in conformance with the proposed conditions of certification defined for the proposed project, would comply with all applicable noise and vibration LORS and would produce no significant adverse noise impacts on people within the project area, directly, indirectly, or cumulatively.

C.9.9 NO PROJECT / NO ACTION ALTERNATIVE

There are three No Project/No Action Alternatives evaluated in this section, as follows:

C.9.9.1 NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on SES Solar Two project application and on CDCA land use plan amendment

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

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the construction and operation noise-related impacts of the SES Solar Two project would not occur at the proposed site. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations

C.9.9.2 NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on SES Solar Two project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed SES Solar Two 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. Different solar technologies use different machinery during construction and would create different ambient noise levels during operation; however, it is expected all technologies would require the use of large construction vehicles that would create unwanted noise and some intermittent noise during operations. However, as with the proposed project, it is expected that solar technologies create minor increases in ambient noise during operation. As such, this No Project/No Action Alternative could result in an impact from increased ambient noise during construction and operation similar to under the proposed project.

C.9.9.3 NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on SES Solar Two project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed SES Solar Two 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 with the existing ambient noise from its existing condition. Ambient noise of the site is not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in impacts from any increase in noise at the project site. 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.9.10 CUMULATIVE IMPACT ANALYSIS

Geographic Extent

The geographic scope for considering cumulative noise impacts on sensitive receptors for this project consists of the region immediately surrounding those receptors identified in the project application.

Existing Cumulative Conditions

Any existing cumulative noise conditions are included in the existing ambient noise survey conducted at the sensitive receptors.

Future Foreseeable Projects

Foreseeable Projects in the Plaster City Area

There are no future foreseeable projects near enough to SES Solar Two to create cumulative noise impacts.

Foreseeable Renewable Projects in the California and Arizona Desert

Projects further afield than the immediate vicinity of the project, whether renewable or otherwise, would be outside the geographic scope of consideration for noise impacts of the project and would thus pose no potential for cumulative noise impacts.

C.9.11 COMPLIANCE WITH LORS

A detailed discussion of the proposed project’s compliance with LORS applicable to noise and vibration is provided above in subsection C.9.4.2.

C.9.12 NOTEWORTHY PUBLIC BENEFITS

The proposed project would affect the daytime ambient noise levels in the project area. While this change would not be noticeable at the sensitive receptors near the project, and thus not significant, development of the proposed project would not result in any noteworthy public benefits.

C.9.13 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

NOISE-1 At least 15 days prior to the start of ground disturbance, the project owner shall notify all residents within two miles of the site, by mail or other effective means, of the commencement of project construction. At the same time, the project owner shall establish a telephone number for use by the public to report any undesirable noise conditions associated with the construction and operation of the project and include that telephone number in the above notice. If the telephone is not staffed 24 hours per day, the project owner shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This telephone number shall be posted at the project site during construction in a manner visible to passersby. This telephone number shall be maintained until the project has been operational for at least one year.

<u>Verification:</u> Prior to ground disturbance, the project owner shall transmit to the Compliance Project Manager (CPM) a statement, signed by the project owner's project manager, stating that the above notification has been performed and describing the method of that notification, verifying that the telephone number has been established and posted at the site, and giving that telephone number.

NOISE COMPLAINT PROCESS

NOISE-2 Throughout the construction and operation of Solar Two, the project owner shall document, investigate, evaluate, and attempt to resolve all project-related noise complaints. The project owner or authorized agent shall:

- Use the Noise Complaint Resolution Form (below), or a functionally equivalent procedure acceptable to the CPM, to document and respond to each noise complaint;
- Attempt to contact the person(s) making the noise complaint within 24 hours;
- Conduct an investigation to determine the source of noise related to the complaint;
- Take all feasible measures to reduce the noise at its source if the noise is project related; and
- Submit a report documenting the complaint and the actions taken. The report shall include: a complaint summary, including final results of noise reduction efforts, and if obtainable, a signed statement by the complainant stating that the noise problem is resolved to the complainant's satisfaction.

Verification: Within five days of receiving a noise complaint, the project owner shall file a copy of the Noise Complaint Resolution Form with the CPM, documenting the resolution of the complaint. If mitigation is required to resolve a complaint, and the complaint is not resolved within a three-day period, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is implemented.

NOISE-3 The project owner shall submit to the CPM for review and approval a noise control program and a statement, signed by the project owner's project manager, verifying that the noise control program will be implemented throughout construction of the project. The noise control program shall be used to reduce employee exposure to high noise levels during construction and also to comply with applicable OSHA and Cal/OSHA standards.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit to the CPM the noise control program and the project owner's project manager's signed statement. The project owner shall make the program available to Cal/OSHA upon request.

NOISE RESTRICTIONS

NOISE-4 Within 30 days of the project first achieving a sustained output of 80% or greater of rated capacity, the project owner shall conduct a 25-hour community noise survey, utilizing the same monitoring sites employed in the pre-project ambient noise survey as a minimum. The survey shall also include the octave band pressure levels to ensure that no new pure-tone noise components have been introduced. No single piece of equipment shall be allowed to stand out as a source of noise that draws legitimate complaints. If the results from the survey indicate that the project noise levels are in excess of 45 dBA L_{eq} at the residence located at 1510 Painted Gorge Road, additional mitigation measures shall be implemented to reduce noise to a level of compliance with this limit.

Verification: Within 30 days after completing the survey, the project owner shall submit a summary report of the survey to the CPM. Included in the report will be a description of any additional mitigation measures necessary to achieve compliance with the above listed noise limits, and a schedule, subject to CPM approval, for implementing these measures. Within 30 days of completion of installation of these measures, the project owner shall submit to the CPM a summary report of a new noise survey, performed as described above and showing compliance with this condition.

NOISE-5 Following the project's first achieving a sustained output of 80% or greater of rated capacity, the project owner shall conduct an occupational noise survey to identify the noise hazardous areas in the facility.

The survey shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations sections 5095–5099 and Title 29, Code of Federal Regulations section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure.

The project owner shall prepare a report of the survey results and, if necessary, identify proposed mitigation measures that will be employed to comply with the applicable California and federal regulations.

Verification: Within 30 days after completing the survey, the project owner shall submit the noise survey report to the CPM. The project owner shall make the report available to OSHA and Cal/OSHA upon request.

CONSTRUCTION TIME RESTRICTIONS

NOISE-6 Heavy equipment operation and noisy construction work relating to any project features shall be restricted to the times of day delineated below:

Mondays through Fridays:	7:00 a.m. to 7:00 p.m.
Saturdays:	9:00 a.m. to 5:00 p.m.
Sundays and Holidays:	No Construction Allowed

Haul trucks and other engine-powered equipment shall be equipped with mufflers that meet all applicable regulations. Haul trucks shall be operated in accordance with posted speed limits. Truck engine exhaust brake use shall be limited to emergencies.

Verification: Prior to ground disturbance, the project owner shall transmit to the CPM a statement acknowledging that the above restrictions will be observed throughout the construction of the project.

C.9.14 CONCLUSIONS

Staff concludes that SES Solar Two, if built and operated in conformance with the proposed conditions of certification below, would comply with all applicable noise and vibration LORS and would produce no significant adverse noise impacts on people within the project area, directly, indirectly, or cumulatively.

EXHIBIT 1 - NOISE COMPLAINT RESOLUTION FORM

SES Solar Two Project
(08-AFC-5)

NOISE COMPLAINT LOG NUMBER ________________________

Complainant's name and address:

Phone number: ________________________

Date complaint received: ________________________
Time complaint received: ________________________

Nature of noise complaint:

Definition of problem after investigation by plant personnel:

Date complainant first contacted: ________________________

Initial noise levels at 3 feet from noise source _________ dBA Date: _____________
Initial noise levels at complainant's property: __________ dBA Date: ____________

Final noise levels at 3 feet from noise source: ________ dBA Date: _____________
Final noise levels at complainant's property: __________ dBA Date: ____________

Description of corrective measures taken:

Complainant's signature: ________________________ Date: ____________

Approximate installed cost of corrective measures: $ ____________
Date installation completed: ____________
Date first letter sent to complainant: ____________ (copy attached)
Date final letter sent to complainant: ____________(copy attached)

This information is certified to be correct:

Plant Manager's Signature: ________________________

(Attach additional pages and supporting documentation, as required).

C.9.15 REFERENCES

Imperial County 2001. Imperial County General Plan, Noise Element.

Imperial County 1998 – Imperial County Land Use Ordinance, Title 9, Division 7: Noise Abatement and Control. Effective November 24, 1998.

SES Solar Two, LLC 2008a – Application for Certification for the Stirling Energy Systems (SES) Solar Two Project (tn: 46819), Volumes 1 and 2. Submitted to the California Energy Commission, June 30, 2008.

NOISE APPENDIX A
FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

To describe noise environments and to assess impacts on noise sensitive area, a frequency weighting measure, which simulates human perception, is customarily used. It has been found that "A-weighting" of sound intensities best reflects the human ear's reduced sensitivity to low frequencies and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. Decibels are logarithmic units that conveniently compare the wide range of sound intensities to which the human ear is sensitive. **NOISE Table A1** provides a description of technical terms related to noise.

Noise environments and consequences of human activities are usually well represented by an equivalent A-weighted sound level over a given time period (L_{eq}), or by average day and night A-weighted sound levels with a nighttime weighting of 10 dBA (L_{dn}). Noise levels are generally considered low when ambient levels are below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. Outdoor day-night sound levels vary over 50 dBA depending on the specific type of land use. Typical L_{dn} values might be 35 dBA for a wilderness area, 50 dBA for a small town or wooded residential area, 65 to 75 dBA for a major metropolis downtown (e.g., San Francisco), and 80 to 85 dBA near a freeway or airport. Although people often accept the higher levels associated with very noisy urban residential and residential-commercial zones, those higher levels nevertheless are considered to be levels of noise adverse to public health.

Various environments can be characterized by noise levels that are generally considered acceptable or unacceptable. Lower levels are expected in rural or suburban areas than would be expected for commercial or industrial zones. Nighttime ambient levels in urban environments are about seven decibels lower than the corresponding average daytime levels. The day-to-night difference in rural areas away from roads and other human activity can be considerably less. Areas with full-time human occupation that are subject to nighttime noise, which does not decrease relative to daytime levels, are often considered objectionable. Noise levels above 45 dBA at night can result in the onset of sleep interference effects. At 70 dBA, sleep interference effects become considerable (U.S. Environmental Protection Agency, Effects of Noise on People, December 31, 1971).

To help the reader understand the concept of noise in decibels (dBA), **NOISE Table A2** illustrates common noises and their associated sound levels, in dBA.

Noise Table A1
Definition of Some Technical Terms Related to Noise

Terms	Definitions
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this testimony are A-weighted.
L_{10}, L_{50}, & L_{90}	The A-weighted noise levels that are exceeded 10%, 50%, and 90% of the time, respectively, during the measurement period. L_{90} is generally taken as the background noise level.
Equivalent Noise Level, L_{eq}	The energy average A-weighted noise level during the noise level measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 4.8 decibels to levels in the evening from 7 p.m. to 10 p.m., and after addition of 10 decibels to sound levels in the night between 10 p.m. and 7 a.m.
Day-Night Level, L_{dn} or DNL	The Average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10 p.m. and 7 a.m.
Ambient Noise Level	The composite of noise from all sources, near and far. The normal or existing level of environmental noise at a given location.
Intrusive Noise	That noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.
Pure Tone	A pure tone is defined by the Model Community Noise Control Ordinance as existing if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the two contiguous bands by 5 decibels (dB) for center frequencies of 500 Hz and above, or by 8 dB for center frequencies between 160 Hz and 400 Hz, or by 15 dB for center frequencies less than or equal to 125 Hz.

Source: Guidelines for the Preparation and Content of Noise Elements of the General Plan, Model Community Noise Control Ordinance, California Department of Health Services 1976, 1977.

Noise Table A2
Typical Environmental and Industry Sound Levels

Noise Source (at distance)	A-Weighted Sound Level in Decibels (dBA)	Noise Environment	Subjective Impression
Civil Defense Siren (100')	140-130		Pain Threshold
Jet Takeoff (200')	120		Very Loud
Very Loud Music	110	Rock Music Concert	
Pile Driver (50')	100		
Ambulance Siren (100')	90	Boiler Room	
Freight Cars (50')	85		
Pneumatic Drill (50')	80	Printing Press Kitchen with Garbage Disposal Running	Loud
Freeway (100')	70		Moderately Loud
Vacuum Cleaner (100')	60	Data Processing Center Department Store/Office	
Light Traffic (100')	50	Private Business Office	
Large Transformer (200')	40		Quiet
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing

Source: Handbook of Noise Measurement, Arnold P.G. Peterson, 1980

Subjective Response to Noise

The adverse effects of noise on people can be classified into three general categories:

- Subjective effects of annoyance, nuisance, dissatisfaction.
- Interference with activities such as speech, sleep, and learning.
- Physiological effects such as anxiety or hearing loss.

The sound levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Workers in industrial plants can experience noise effects in the last category. There is no completely satisfactory way to measure the subjective effects of noise or of the corresponding reactions of annoyance and dissatisfaction, primarily because of the wide variation in individual tolerance of noise.

One way to determine a person's subjective reaction to a new noise is to compare the level of the existing (background) noise, to which one has become accustomed, with the level of the new noise. In general, the more the level or the tonal variations of a new noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

With regard to increases in A-weighted noise levels, knowledge of the following relationships can be helpful in understanding the significance of human exposure to noise.

1. Except under special conditions, a change in sound level of 1 dB cannot be perceived.
2. Outside of the laboratory, a 3-dB change is considered a barely noticeable difference.
3. A change in level of at least 5 dB is required before any noticeable change in community response would be expected.
4. A 10-dB change is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response (Kryter, Karl D., The Effects of Noise on Man, 1970).

Combination of Sound Levels

People perceive both the level and frequency of sound in a non-linear way. A doubling of sound energy (for instance, from two identical automobiles passing simultaneously) creates a 3-dB increase (i.e., the resultant sound level is the sound level from a single passing automobile plus 3 dB). **NOISE Table A3** indicates the rules for decibel addition used in community noise prediction.

NOISE Table A3
Addition of Decibel Values

When two decibel values differ by:	Add the following amount to the larger value
0 to 1 dB	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0
Figures in this table are accurate to ± 1 dB.	

Source: Architectural Acoustics, M. David Egan, 1988.

Sound and Distance

Doubling the distance from a noise source reduces the sound pressure level by 6 dB.

Increasing the distance from a noise source 10 times reduces the sound pressure level by 20 dB.

Worker Protection

OSHA noise regulations are designed to protect workers against the effects of noise exposure and list permissible noise level exposure as a function of the amount of time to which the worker is exposed, as shown in **NOISE Table A4**.

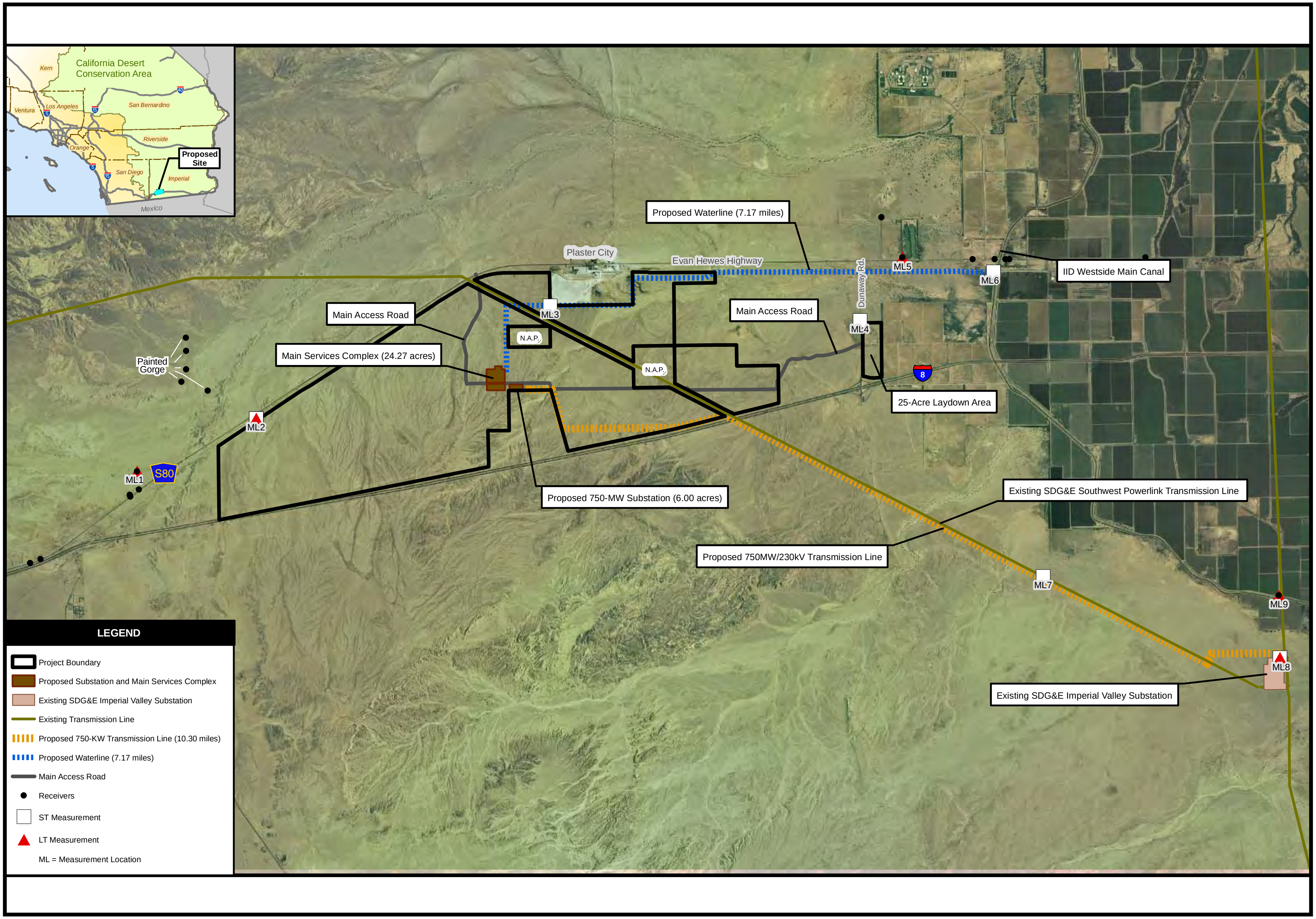
NOISE Table A4
OSHA Worker Noise Exposure Standards

Duration of Noise (Hrs/day)	A-Weighted Noise Level (dBA)
8.0	90
6.0	92
4.0	95
3.0	97
2.0	100
1.5	102
1.0	105
0.5	110
0.25	115

Source: 29 CFR § 1910.95.

NOISE AND VIBRATION - FIGURE 1

SES Solar Two - Noise Survey Locations



SOURCE: 08-AFC-5.12-1

C.10 - SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

Testimony of Amanda Stennick

C.10.1 SUMMARY OF CONCLUSIONS

The U.S. Bureau of Land Management and Energy Commission staff (hereafter jointly referred to as “staff”) have reviewed the proposed Stirling Energy Systems Solar Two Project in accordance with the requirements of the National Environmental Policy Act and the California Environmental Quality Act. With respect to California Environmental Quality Act and National Environmental Policy Act, staff concludes that the 750-megawatt Stirling Energy Systems Solar Two Project would not under California Environmental Quality Act cause a significant adverse direct or indirect impact or contribute to a cumulative socioeconomic impact on the area’s housing, schools, parks and recreation, police, emergency medical services, or hospitals, because the project’s construction and operation workforce currently resides in the regional or local labor market area, and construction would be short-term. Staff also concludes that the project would not require the construction of new or altered public facilities.

The construction and operation of the proposed project would not result in any disproportionate socioeconomic impacts to low-income or minority populations. Gross public benefits from the project include capital costs, construction and operation payroll, and sales tax from construction and operation spending.

Please refer to the **Land Use, Recreation, and Wilderness** section of this document for further analysis of recreation impacts.

C.10.2 INTRODUCTION

Staff’s socioeconomics impact analysis evaluates project-induced changes on community services and/or infrastructure, and related community issues such as environmental justice Staff discusses the estimated beneficial impacts of the construction, operation, and decommissioning of the Stirling Energy Systems Solar Two (SES Solar Two) Project and other related socioeconomic economic impacts.

<u>Project Closure and Decommissioning</u>

According to Section 3.12 of the applicant’s project description, the solar generating facility is expected to have a lifespan of 40 years. At any point during this time, temporary or permanent closure of the solar facility could occur. Temporary closure would be a result of necessary maintenance, hazardous weather conditions, or damage due to a natural disaster. Permanent closure would be a result of damage that is beyond repair, adverse economic conditions, or other significant reasons.

Both temporary and permanent closures would require the applicant to submit to the Energy Commission a contingency plan or a decommissioning plan. A decommissioning plan would be implemented to ensure compliance with applicable socioeconomic LORS, removal of equipment and shutdown procedures, site restoration, potential decommissioning alternatives, and the costs and source of funds associated with decommissioning activities.

Upon closure of the facility or decommissioning, it is likely that the applicant would be required to restore lands affected by the project to their pre-project state. Given the fact that the proposed project site is located on undeveloped land with current evidence of high levels of disturbance (due to OHV use), staff anticipates that project decommissioning would have impacts similar in nature to proposed project construction activities. Therefore, given the temporary nature of decommissioning activities and the eventual return of the lands to their current state, staff concludes the effects of decommissioning on socioeconomic resources would not be adverse.

C.10.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The analysis of proposed project effects must comply with both California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) requirements given the respective power plant licensing and land jurisdictions of the California Energy Commission and U.S. Bureau of Land Management (BLM). CEQA requires that the significance of individual effects be determined by the Lead Agency; however, the use of specific significance criteria is not required by NEPA.

Because this document is intended to meet the requirements of both NEPA and CEQA, the methodology used for determining environmental impacts of the proposed project includes a consideration of guidance provided by both laws.

CEQA requires a list of criteria that are used to determine the significance of identified impacts. A significant impact is defined by CEQA as “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project” (State CEQA Guidelines Section 15382).

In comparison, NEPA states that “‘Significantly’ as used in NEPA requires considerations of both context and intensity…” (40 CFR 1508.27). Therefore, thresholds serve as a benchmark for determining if a project action will result in a significant adverse environmental impact when evaluated against the baseline. NEPA requires that an Environmental Impact Statement (EIS) is prepared when the proposed federal action (project) as a whole has the potential to “significantly affect the quality of the human environment.”

Thresholds for determining significance in this section are based on Appendix G of the CEQA Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission staff. In addition, staff’s evaluation of the environmental effects of the proposed project on socioeconomic resources (i.e., those listed below) includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27.

Effects of the proposed project on socioeconomic resources (and in compliance with both CEQA and NEPA) have been determined using the thresholds listed below.

According to Appendix G of the CEQA guidelines, a project may have a significant effect on population, housing, and public services if the project will:

- Induce substantial population growth in an area, either directly or indirectly;
- Displace substantial numbers of people and/or existing housing, necessitating the construction of replacement housing elsewhere; or
- Adversely impact acceptable levels of service for fire and police protection, schools, parks and recreation, and other public facilities.

A socioeconomic analysis looks at beneficial impacts from construction and operation spending, and property and sales taxes as well as potential adverse impacts on housing, schools, and public services. To determine whether a project would have any significant impacts, staff analyzes whether the current status of these community services and capacities can absorb the project-related impacts in each of these areas. If the project's impacts could appreciably strain or degrade these services, staff considers this to be a significant adverse impact under CEQA and would propose mitigation.

In this analysis, staff used fixed percentage criteria for determining the presence of a minority or low-income population for environmental justice. Impacts on housing, schools, emergency medical services, law enforcement, parks and recreation, and cumulative impacts are based on professional judgments or input from local and state agencies. Substantial employment of people coming from regions outside the study area has the potential to create significant adverse socioeconomic impacts under CEQA. Significance criteria for subject areas such as utilities, fire protection, water use, and wastewater disposal are identified in the **Soil and Water Resources**, **Reliability**, **Worker Safety and Fire Protection**, and **Waste Management** sections of this document.

Laws, Ordinances, Regulations, and Standards

The following table contains all applicable socioeconomic laws, ordinances, regulations, and standards (LORS).

SOCIOECONOMCS Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Emergency Economic Stabilization Act of 2008 (P.L. 110-343) Business Solar Investment Tax Credit (IR Code §48)	Extends the 30% investment tax credit (ITC) for solar energy property for eight years through December 31, 2016. The bill allows the ITC to be used to offset both regular and alternative minimum tax (AMT) and waives the public utility exception of current law (i.e., permits utilities to directly invest in solar facilities and claim the ITC). The five-year accelerated depreciation allowance for solar property is permanent and unaffected by passage of the eight-year extension of the solar ITC.

Applicable Law	Description
State	
California Education Code, Section 17620	The governing board of any school district is authorized to levy a fee, charge, dedication, or other requirement for the purpose of funding the construction or reconstruction of school facilities.
California Government Code, Sections 65996-65997	These sections include provisions for school district levies against development projects. As amended by Senate Bill (SB) 50 (stats. 1998, ch. 407, sec. 23), these sections state that, except for fees established under Education Code 17620, state and local public agencies may not impose fees, charges, or other financial requirements to offset the cost of school facilities.
California Revenue and Tax Code 70-74.7	Property taxes are not assessed on solar facilities. Assembly Bill 1451 extended the current property tax exclusion for new construction of solar energy systems to January 1, 2017.

C.10.4 PROPOSED PROJECT

C.10.4.1 SETTING AND EXISTING CONDITIONS

The SES Solar Two Project site would be located primarily (approximately 95%) on federal land managed by the Bureau of Land Management (BLM), 14 miles west of El Centro, California in unincorporated western Imperial County. The project site would be situated in the eastern section of Imperial County's Ocotillo/Nomirage Planning Area. The applicant expects construction of the SES Solar Two Project would take place in two phases and employ an average of 360 persons per month, totaling 24,086 personnel months for the 40-month construction period; when fully operational the project would employ 164 full-time workers and would operate 7 days a week, with maintenance activities occurring 7 days a week, 24 hours a day. (SES 2008a).

In 2000, as reported by the U.S. Census, the population of the Ocotillo/Nomirage planning area was 719 and 800 in 2006. Imperial County had a total population of 142,361 in 2000 and 161,867 in 2007 (California Department of Finance 2000 and (SES 2008a).

The unemployment rate for Imperial County was 24.5% in February 2009 (not seasonally adjusted). This is not full employment for Imperial County. Over the past few decades, full employment has been typically defined as approximately 4.0% to 5.5% unemployment. For California, the unemployment rate was 10.9% in February 2009 (not seasonally adjusted) (State of California Employment Development Department 2008a).

ENVIRONMENTAL JUSTICE/DEMOGRAPHIC SCREENING

Executive Order 12898, "Federal Actions to address environmental justice in Minority Populations and Low-Income Populations," focuses federal attention on the environment and human health conditions of minority communities and calls on agencies to achieve environmental justice as part of this mission. The order requires the US Environmental Protection Agency (EPA) and all other federal agencies (as well as state agencies receiving federal funds) to develop strategies to address this issue. The agencies are required to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations.

Civil Rights Act of 1964, Public Law 88-352, 78 Stat.241 (Codified as amended in scattered sections of 42 U.S.C.) Title VI of the Civil Rights Act prohibits discrimination on the basis of race, color, or national programs in all programs or activities receiving federal financial assistance.

California law defines environmental justice as "the fair treatment of people of all races, cultures and income with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies" (Government Code Section 65040.12 and Public Resources Code Section 72000).

All Departments, Boards, Commissions, Conservancies and Special Programs of the Resources Agency must consider environmental justice in their decision-making process if their actions have an impact on the environment, environmental laws, or policies. Such actions that require environmental justice consideration may include:

- Adopting regulations;
- Enforcing environmental laws or regulations;
- Making discretionary decisions of taking actions that affect the environment;
- Providing funding for activities affecting the environment; and
- Interacting with the public on environmental issues.

In considering environmental justice in energy siting cases, staff uses a demographic screening analysis to determine whether a low-income and/or minority population exists within the potentially affected area of the proposed site. The potentially affected area consists of a six-mile radius of the site and is consistent with air quality modeling of the range of a project's air quality impacts. The demographic screening is based on information contained in two documents: *Environmental Justice: Guidance Under the National Environmental Policy Act* (Council on Environmental Quality, December, 1997) and *Guidance for Incorporating Environmental Justice Concerns in EPA's Compliance Analyses* (U.S. Environmental Protection Agency, April, 1998). The screening process relies on Year 2000 U.S. Census data to determine the presence of minority and below-poverty-level populations.

In addition to the demographic screening analysis, staff follows the steps recommended by the U.S. EPA's guidance documents which are outreach and involvement, and if warranted, a detailed examination of the distribution of impacts on segments of the population.

Staff has followed each of the above steps for the following 11 sections in the FSA: Air Quality, Hazardous Materials, Land Use, Noise, Public Health, Socioeconomics, Soils and Water, Traffic and Transportation, Transmission Line Safety/Nuisance, Visual Resources, and Waste Management. Over the course of the analysis for each of the 11 areas, staff considered potential impacts and mitigation measures, significance, and whether there would be a significant impact on an environmental justice population.

Minority Populations

According to *Environmental Justice: Guidance Under the National Environmental Policy Act*, minority individuals are defined as members of the following groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.

A minority population, for the purposes of environmental justice, is identified when the minority population of the potentially affected area is greater than 50% or meaningfully greater than the percentage of the minority population in the general population or other appropriate unit of geographical analysis;

For the SES Solar Two Project, the total population within the six-mile radius of the proposed site is 4,583 persons, and the total minority population is 3,725 persons or 81.27% of the total population (see **Socioeconomics Figure 1**). Therefore, staff in 11 technical areas identified in the Executive Summary has considered environmental justice in their environmental impact analyses.

Below-Poverty-Level Populations

Staff has also identified the below-poverty-level population based on Year 2000 U.S. Census block group data within a six-mile radius of the project site. The below-poverty-level population within a six-mile radius of the SES Solar Two Project consists of 163 people or about 11% of the total population in that area.

C.10.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The socioeconomic resource areas evaluated by staff are based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines and shown in **Socioeconomics Table 2**. Staff's assessment of impacts on population, housing, emergency medical services, police protection, schools, emergency medical services, and parks and recreation, are based on professional judgments, input from local and state agencies, and the industry-accepted two hour commute range for construction workers. Criteria for subject areas such as utilities, fire protection, water supply, and wastewater disposal are analyzed in the **Reliability**, **Worker Safety and Fire Protection**, and **Water Resources** sections of this document.

DIRECT/INDIRECT/INDUCED IMPACTS

Induce Substantial Population Growth

For the purpose of this analysis, staff defines "induce substantial population growth" as workers permanently moving into the project area because of project construction and operation, thereby encouraging construction of new homes or extension of roads or other infrastructure. To determine whether the project would induce population growth, staff analyzes the availability of the local workforce and the population within the region. Staff defines "local workforce" as Imperial, San Diego, Riverside, and San Bernardino Counties. Construction workers beyond a two-hour commute (either in- or out-of-state) would likely relocate for the workweek but would return to their primary residences and families on weekends.

Staff used the Imperial, San Diego, Riverside, and San Bernardino labor market area for its evaluation of construction worker availability and Imperial County for community services and infrastructure impacts from construction of the SES Solar Two project.

Project construction of the power generation facility is expected to occur over a 40 month period. The applicant proposes that project construction would start in first or second quarter of 2010. The greatest number of construction workers (peak) would occur in the seventh month of construction. The number of construction workers would range from about 101 in the first month of construction to approximately 731 workers at peak construction. There would be an average of 360 workers per month during construction (SES 2008a).

SOCIOECONOMICS Table 2 shows that total labor by skill, in Imperial, San Diego, Riverside, and San Bernardino Counties, with annual averages for 2009, is adequate when compared to Solar Two project needs. Peak construction activity would employ approximately 731 workers and represents less than 1% of the Imperial County), San Diego County, Riverside and San Bernardino Counties) Metropolitan Statistical Areas (MSA).

SOCIOECONOMICS Table 2
Total Labor in Imperial, San Diego, Riverside, and San Bernardino Counties by Skill for Construction In 2009

Occupational Title	Annual Average 2009	Maximum Needed Per Month for SES Solar Two
Carpenters	55,075	47
Concrete Crews	8,840	46
Electricians	13,980	113
Ironworkers	760	48
Laborers	38,255	142
Miscellaneous Crews	N/A*	10
Operators	8,675	86
Plumbers	12,550	26
Solar Two Technicians	N/A*	32
SunCatchers Assemblers	N/A*	64
SunCatchers Electricians	13,980	16
SunCatchers Ironworkers	760	32
SunCatchers Laborers	38,255	16
SunCatchers Material Handlers	N/A*	16
SunCatchers Operators	8,675	8
SunCatchers Teamsters	32,265	12
SunCatchers Technicians	N/A*	32
Teamsters	32,265	60

Occupational Title	Annual Average 2009	Maximum Needed Per Month for SES Solar Two
Technicians	N/A	5

Source: SES 2008a and State of California Employment Development Department 2008a, b, and c.

*Not Available.

Because the majority of the construction workforce currently resides within Imperial, San Diego, San Bernardino, and Riverside Counties, construction, operation, and demolition of the project would have little impact with respect to inducing substantial population growth. For operations, the workforce is modest (164 workers) and most would reside in Imperial, San Diego, San Bernardino, and Riverside Counties (SES 2008a). Demolition workforce would likely total the peak number of construction workforce. Staff concludes that inducement of substantial population growth either directly or indirectly by the SES Solar Two project, under CEQA would not be significant or adverse.

Housing Supply

As shown on the State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, 2001-2008, with 2000 Benchmark. Sacramento, California, May 2008, housing supply within the four-county area is more than adequate should some project construction or operation workers choose to relocate. For example, housing units (single- and multiple-family, and mobile homes) in Imperial County (unincorporated and incorporated) totaled about 55,600 with an overall vacancy rate of 11%; Riverside County was about 775,000 units with an overall 13% vacancy rate; San Bernardino County was about 686,000 units with an overall 12% vacancy rate; and San Diego County had about 1,140,000 units with an overall 4.4% vacancy rate.

Housing, should it be required for a percentage of the construction and operation work-forces would likely be within a one- to two-hour commute of the project site. Staff concludes that adequate housing exists and no new housing construction would be required. Because of the large labor force within commuting distance of the project, staff expects the majority of construction workers would commute to the project daily from their existing residences. No new housing construction would be required.

Displace Existing Housing and Substantial Numbers of People

The SES Solar Two Project site would be located 14 miles west of El Centro, California on federal land managed by the BLM in unincorporated western Imperial County. The project site would be situated in the eastern section of Imperial County's Ocotillo/Nomirage Planning Area. As cited in the Ocotillo/Nomirage Community Area Plan, "Due to water constraints, it is not anticipated the Ocotillo/Nomirage Community Area will experience a significant amount of population growth."

Because the project would be constructed on 95% of federal lands, it would not displace existing housing. Private lands within the project site are zoned for Open Space use

(Section 5.9 of the AFC). Few residences are present in the area, and no inhabited residence would be displaced as a result of project construction. Therefore, staff concludes that the proposed project would not displace any people or necessitate construction of replacement housing elsewhere.

Result in Substantial Physical Impacts to Government Facilities

As discussed under the subject headings below, the SES Solar Two would not cause significant impacts to service ratios, response times, or other performance objectives relating to emergency medical services, law enforcement, or schools. Fire protection, including the applicant's proposed onsite Fire Protection and Prevention Plan, is analyzed in the **Worker Safety and Fire Protection** section of this document.

Emergency Medical Services

The project would be located in a remote area in Imperial County, California. The nearest hospital is El Centro Regional Medical Center, located in El Centro, California, about 15 miles from the site with an estimated 14-minute response time. Additional emergency medical service would be provided by Pioneers Memorial Healthcare, a full-service facility located about 28 miles northeast of the project site in the city of Brawley.

Including emergency services provided by Imperial County EMS Area 1 and a full-time fire station and advanced life support ambulance station located in Octotillo, there are seven life-support ambulances in the area with a proposal for additional EMS near the city of Imperial, about 20 miles away. Fire Chief Petrie of the El Centro Fire Department and Mr. Kelly of the Imperial County Public Health and Emergency Services indicated that there is adequate capacity of local EMS to accommodate construction and operation of the project (SES 2008a and URS 2008).

The estimated response time for the Ocotillo/Nomirage planning area is 10 to 25 minutes. In the event of a life threatening injury, air support would be directed through the Imperial County Sheriff's Department. Air support would be provided by Reach Air, which has major trauma treatment capability. Emergency air lift services can be provided locally in the City of Brawley, in San Diego County, and from as far away as Yuma, Arizona, depending on the availability of emergency air response equipment and crews.

Worker Safety and Fire Protection staff reports that construction, and in particular power plant construction is hazardous relative to other workplaces. Over the last 20 or more years, significant injury in power plants licensed by the Energy Commission has been infrequent but has significant potential if safety is not a top priority. For additional discussion see the **Worker Safety and Fire Protection** section of this SA/DEIS.

The applicant's proposed safety procedures and employee training would minimize potential unsafe work conditions and the need for outside emergency medical response. Staff concludes that the emergency medical services described above would be adequate during construction and operation. Thus, the project would not require construction of new or physically altered emergency medical facilities.

Law Enforcement

The Imperial County Sheriff's Department would provide police protection and public safety services (traffic and neighborhood police control, emergency calls, and crime prevention) to the SES Solar Two project during construction and operation. The Imperial County Sheriff's Department has an office located in El Centro, located 14 miles from the project site. Imperial County Sheriff's Department has 229 full time employees with 111 sworn officers and 36 vehicles. Additional response support could be supplied by other patrols within the county and the California Highway Patrol (CHP). As reported by Chief Deputy Gutierrez and cited in the AFC, the level of crime in the project area is low relative to other locations in Imperial County (SES 2008a).

The SES Solar Two project should not impact criminal activity, traffic, or crowd control, from a population perspective, since most of the construction labor force would be local. For the operations phase, the change in workforce is modest (164), with most coming from the four-county area within commuting distance of the project. The SES Solar Two Project would include appropriate site security measures during construction (fencing) and operation (24-hour site security monitoring in a control room via closed-circuit television and intercom system, security fencing, 24-hour security officers and off-site emergency response teams for after hour emergencies) which would minimize the potential need for the Imperial County Sheriff's Department assistance (SES 2008a).

In comparison to residential or commercial developments, power plants do not attract large numbers of people and thus require little in the way of law enforcement. Because of this factor and the proposed onsite safety and security measures, staff concludes that the existing law enforcement resources would be adequate to provide services to the SES Solar Two during construction and operation. Thus, the project would not require new or physically altered law enforcement facilities. Staff concludes that, under CEQA there would be no impacts to law enforcement services.

Education

For the 2008-2009 school year, Imperial Unified School District, which serves the SES Solar Two site, had six schools and a total of 3,602 students.

Staff's analysis shows that the construction workforce from Imperial, San Diego, San Bernardino, and Riverside Counties would be more than adequate to serve construction needs. This workforce would commute either daily or weekly to the site. Due to the commuting habits of construction workers, staff does not expect any construction workers to relocate their families to the area. Thus, the proposed project would not require construction of new or physically altered school facilities.

A total of 164 operation workers are needed to operate the SES Solar Two. As previously stated, the applicant and staff expect to hire the operation workforce from within the area and no operation workers are expected to relocate with their families. However, if all 164 operation workers relocate within Imperial Unified School District, an average family size of 3.32 persons per household (U.S. Census Bureau, Household and Families, 2000 for Imperial County) would result in the addition of about 217 children to the local schools. Under this worst-case scenario, staff believes the school district could easily accommodate additional students. The AFC references a conversation with Kay

McAllaster, Director of Business Services at the Imperial Unified School District who stated that local schools are currently at capacity. However, Imperial Unified School District expects additions to enrollment based on projected growth rates and expected development. Ms. McAllaster predicts that the District would be able to accommodate growth resulting from this and other projects at existing schools. Thus, operation of the proposed project would not require construction of new or physically altered school facilities.

Like all school districts in the state, the Imperial Unified School District is entitled to collect school impact fees for new construction within their district under the California Education Code Section 17620. These fees are based on the project's square feet of industrial space. Because the main services complex of the SES Solar Two (considered "industrial space") would be constructed entirely on BLM land, no private land would be affected and therefore, the provisions of Education Code Section 17620 would not apply to this project.

Increase the Use of Existing Recreation Facilities

The Imperial County Parks and Recreation Department maintains a variety of community parks, off-road parks, and special activities. The community parks amenities include swimming pools, picnic tables, baseball/softball fields, basketball courts, community centers, playgrounds, walking trails, and barbeques (http://www.imperial.ca.us).

Given the existing labor force within two hour commuting time of the project, staff does not expect employees to relocate to the immediate project area. Staff concludes that there are a number and variety of parks within the regional project area and the project would not require construction of new parks nor substantially increase the use of existing parks. Therefore, the construction and operation workforce would not have a significant adverse impact on parks and recreation. For additional discussion on recreation uses, see the **Land Use, Recreation, and Wilderness** section of this document.

NOTEWORTHY PUBLIC BENEFITS

Noteworthy public benefits include the direct, indirect, and induced impacts of a proposed power plant. For example, the dollars spent on or resulting from the construction and operation of the SES Solar Two would have a ripple effect on the local economy. This ripple effect is measured by an input-output economic model. The model relies on a series of multipliers to provide estimates of the number of times each dollar of input or direct spending cycles through the economy in terms of indirect and induced output, or additional spending, personal income, and employment. The typical input-output model used by economists and the one used for this analysis by the applicant is the IMPLAN model. IMPLAN multipliers indicate the ratio of direct impacts to indirect and induced impacts. Staff reviewed the results of the IMPLAN model and found them to be reasonable considering data provided by the applicant as well as data obtained by staff from governmental agencies, trade associations, and public interest research groups.

SES Solar Two owners would employ workers and purchase supplies and services for the life of the project. Employees would use salaries and wages to purchase goods and services from other businesses. Those businesses make their own purchases and hire employees, who also spend their salaries and wages throughout the local and regional economy. This effect of indirect (jobs, sales, and income generated) and induced (employees' spending for local goods and services) spending continues with subsequent rounds of additional spending, which is gradually diminished through savings, taxes, and expenditures made outside the area. For purposes of this analysis, direct impacts were said to exist if the project resulted in permanent jobs and wages; indirect impacts, if jobs, wages, and sales resulted from project construction; induced impacts, from the spending of wages and salaries on food, housing, and other consumer goods. The economic benefits of the proposed project, as required by the Energy Commission regulations and resulting from the IMPLAN model are shown in **Socioeconomics Table 3**.

SOCIOECONOMICS Table 3
Data and Information[1]

Estimated Project Costs	$1.14 billion
Estimate of Locally Purchased Materials: Construction Operation (Operation and Maintenance)	 $2.41 million $7.4 million annually
Estimated Annual Property Taxes	None – SES Solar Two is expected to be allowed a 100% property tax exemption as part of Section 73 of the California Revenue and Tax Code for solar systems. Also, it is primarily on federal land managed by the BLM which is exempt from local property taxes. Because of AB 1451, if the California property tax exemption for solar systems is not renewed when it expires during the 2015-2016 fiscal year, then the project's property tax on private land would be $840,750 annually.
Estimated School Impact Fees	None – the "industrial square footage" of the project would be constructed on federal land managed by the BLM.
Estimated Direct Employment: Construction (average) Operation	 360 workers (average per month) 164 workers
Secondary Impacts (Indirect and Induced)	
Construction	 314 workers $13,021,074 $39,815,155
Operation (Phase 2): Employment Income Output	 77 workers $3,410,893 $9,984,482

[1] Table 3 uses 2008 dollars for total project costs. Construction would be for 40 months and the project's life is planned for 40 years. Unemployment information is for Imperial County. Population is for a 6 mile radius from the power plant.

Estimated Payroll (three-county area of Imperial, San Diego, and Riverside Counties): Construction Operation	 $42.1 million total $8,924,810 annually
Estimated Sales Taxes: Construction Operation	 $623,100 $387,500 annually
Existing Unemployment Rate	25.1% in March 2009 for Imperial County (not seasonally adjusted) and 11.5% in March 2009 for California (not seasonally adjusted)
Percent Minority Population (6-mile radius)	81.27%
Percent Poverty Population (6-mile radius)	11%

C.10.4.3 CEQA LEVEL OF SIGNFICANCE

As discussed in the subject headings above, under CEQA, project-related socioeconomic impacts would be less than significant for population, employment, housing, schools, parks and recreation, emergency medical services, and law enforcement.

C.10.5 300 MEGAWATT ALTERNATIVE

The 300 MW alternative would essentially be Phase 1 of the proposed 750 MW project (see Alternatives Figure 1), and would consist of 12,000 SunCatchers with a net generating capacity of approximately 300 MW occupying approximately 2,600 acres of land. This alternative would transmit power to the grid through the SDG&E Imperial Valley Substation and would require infrastructure similar to the proposed 750 MW project, including a water supply pipeline, transmission line, road access, operations facilities, substation, and hydrogen system (SES 2008a). Infrastructure associated with this alternative would require approximately 40 acres. This alternative would retain 40% of the SunCatchers and would affect 40% of the land of the proposed 750 MW project.

C.10.5.1 SETTING AND EXISTING CONDITIONS

The setting for this alternative would be approximately 2,600 acres, reducing the project footprint by 60%. The socioeconomic resources described in the proposed project setting would be the same as those for this alternative.

C.10.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Similar to the proposed project, this alternative would not impact socioeconomic resources. With a 60% reduction in the site, any socioeconomic impact would also be proportionately less. Construction activities would be reduced, resulting in a shorter overall construction schedule, fewer tax benefits to local governments, and less local spending.

C.10.5.3 CEQA LEVEL OF SIGNIFICANCE

Similar to the proposed project, no significant adverse impacts would result from construction and operation of the 300 MW alternative. The benefits of the project to the local economy would be somewhat reduced due to the smaller scale of the project.

C.10.6 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives developed to reduce impacts to the waters of the U.S. would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative is illustrated in **Alternatives Figure 1B**. This alternative would have the same outer project boundaries as the proposed project, but it would include prohibition of installing permanent structures within drainages, thereby reducing the available acreage for development to 4,690 acres, and reducing the number of SunCatchers from 30,000 under the proposed project to 25,290.

C.10.6.1 SETTING AND EXISTING CONDITIONS

The setting for the Drainage Avoidance #1 alternative is the same as that of the proposed project, because the boundaries of both project areas would be the same. The socioeconomic resources described in the proposed project setting would be the same as those for this alternative.

C.10.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Section C.10.4.2 describes the impacts of the proposed project. The impacts of the Drainage Avoidance #1 alternative would be very similar, but slightly reduced due to the smaller number of SunCatchers required for this alternative. Construction activities would be reduced, resulting in a shorter overall construction schedule, fewer tax benefits to local governments, and less local spending.

C.10.6.3 CEQA LEVEL OF SIGNIFICANCE

Similar to the proposed project, no significant adverse impacts would result from construction, operation, or demolition of the Drainage Avoidance #1 alternative. The benefits of the project to the local economy would be somewhat reduced due to the smaller scale of the project.

C.10.7 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative would eliminate both the eastern and western-most portions of the proposed project, where the largest drainage complexes are located. This alternative is shown in **Alternatives Figure 1C**. It would reduce the overall size of the project site by 3,347 acres (from 6,500 acres to 3,153 acres) It would also reduce the number of SunCatchers from 30,000 under the proposed project to 16,915. Under this alternative, construction activities would be reduced, resulting in a shorter overall construction schedule, fewer tax benefits to local governments, and less local spending.

C.10.7.1 SETTING AND EXISTING CONDITIONS

The setting for the Drainage Avoidance #2 alternative is the same as that of the proposed project, because while this alternative is smaller, it is located within the boundaries of the proposed project. The socioeconomic resources described in the proposed project setting would be the same as those for this alternative.

C.10.7.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Section C.10.4.2 describes the impacts of the proposed project. The impacts of the Drainage Avoidance #2 alternative would be very similar, but reduced due to the smaller number of SunCatchers required in the alternative. Construction activities would be reduced, resulting in a shorter overall construction schedule, fewer tax benefits to local governments, and less local spending.

C.10.7.3 CEQA LEVEL OF SIGNIFICANCE

Similar to the proposed project, no significant adverse impacts would result from construction and operation of the Drainage Avoidance #2 alternative. The benefits of the project to the local economy would be somewhat reduced due to the smaller scale of the project.

C.10.8 NO PROJECT/NO ACTION ALTERNATIVES

There are three No Project/No Action Alternatives evaluated in this section, as follows:

NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on SES Solar Two project application and on CDCA land use plan amendment

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

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, none of the construction or operation benefits would occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, one of which would be a solar project requiring a land use plan amendment. Therefore, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on SES Solar Two project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed SES Solar Two Project would not be approved by the Energy Commission 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, socioeconomic impacts and benefits would be similar to the socioeconomic impacts and benefits from the proposed project. As such, this No Project/No Action Alternative could result in socioeconomic benefits similar to the benefits under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on SES Solar Two project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed SES Solar Two Project would not be approved by the Energy Commission and 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 socioeconomic setting of the site would not change from existing conditions. This No Project/No Action Alternative would not result in socioeconomic benefits beyond those of the existing base line. 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 socioeconomic impacts in other locations.

With the No Project/No Action Alternative, the proposed action would not be undertaken and no impacts would occur to the socioeconomic environment of the project area.

C.10.8.1 SETTING AND EXISTING CONDITIONS

The socioeconomic setting for the No Project/No Action Alternative would be the same as the proposed project site and associated linear facilities. Subsection C.10.4.2 describes in detail the socioeconomic resources that would be affected. The socioeconomic resources described in the proposed project setting would be the same as those for this alternative.

C.10.8.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Under the No Project/No Action alternative, the socioeconomics-related impacts of the SES Solar Two project would not occur at the proposed site. In addition, the benefits of the proposed project (construction spending, tax benefits, etc.) would not occur in Imperial County and the surrounding area.

C.10.8.3 CEQA LEVEL OF SIGNIFICANCE

Under the No Project/No Action alternative, the socioeconomic benefits of the proposed project site and area would be similar as those currently occurring under the existing conditions in the area. Given that there would be no significant change over the existing conditions, impacts to socioeconomic resources of the No Project/No Action alternative would be less-than-significant.

C.10.9 CUMULATIVE IMPACTS AND MITIGATION

Under CEQA Guidelines, “a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts” (14 Cal Code Regs §15130(a)(1)). Cumulative impacts must be addressed if the incremental effect of a project, combined with the effects of other projects is “cumulatively considerable” (14 Cal Code Regs §15130(a)). Such incremental effects are to be “viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects” (14 Cal Code Regs §15164(b)(1)). Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis.

CEQA also states that both the severity of impacts and the likelihood of their occurrence are to be reflected in the discussion, “but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion of cumulative impacts shall be guided by standards of practicality and reasonableness, and shall focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact” (14 Cal Code Regs §15130(b)).

NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR §1508.7). Under NEPA, both context and intensity are considered. When considering intensity of an effect, we consider “[w]hether the action is related to other actions with individually minor but cumulatively significant impacts. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.” 40 CFR §1508.27(b)(7).

Cumulative impacts could occur when more than one project has an overlapping construction schedule that creates a demand for workers that cannot be met by local labor, resulting in an influx of non-local workers and their dependents, or if project may have a significant effect on population, housing, and public services and the project would:

- Induce substantial population growth in an area, either directly or indirectly;

- Displace substantial numbers of people and/or existing housing, necessitating the construction of replacement housing elsewhere; or
- Adversely impact acceptable levels of service for fire and police protection, schools, parks and recreation, and other public facilities.

Geographic Extent

Cumulative impacts can occur if implementation of the SES Solar Two project could combine with those of other local or regional projects. Analysis of cumulative impacts is partially based on data/information in the following tables which can be found in the **Cumulative Scenario** section of this document:

- Table 2 Existing Projects in the Plaster City Area; and
- Table 3 Foreseeable Project in the Plaster City Area.

Other sources of data/information were the Solar Two AFC, BLM's El Centro Office list of solar projects, and Energy Commission filings.

The geographic extent of cumulative impacts related to socioeconomics is Imperial County. This geographic extent is appropriate because socioeconomic factors such as public services and benefits would be within Imperial County. As stated above, the geographic extent for the labor force would be Imperial, San Diego, Riverside, and San Bernardino Counties.

Socioeconomic Resources evaluates the impacts of the proposed project on top of the current baseline and the past, present (existing) and future projects near the SES Solar Two, LLC site as illustrated in **Cumulative Impacts - Figure 3, Plaster City Area Existing and Future/Foreseeable Projects** and listed in **Table 2 (Existing Projects in the Plaster City Region)**. The intensity, or severity, of the cumulative effects should consider the magnitude, geographic extent, duration and frequency of the effects (CEQ, 1997). The magnitude of the effect reflects the relative size or amount of the effect; the geographic extent considers how widespread the effect may be; and the duration and frequency refer to whether the effect is a one-time event, intermittent, or chronic (CEQ, 1997).

Reasonably foreseeable projects that could contribute to the cumulative effects scenario depend on the extent of resource effects, but could include projects in the immediate Plaster City area as well as other large renewable projects in Imperial County, or the greater California Desert. These projects are illustrated in **Cumulative Impacts Figures 1 and 2**. As shown here, there are a number of projects in the immediate area around Plaster City whose impacts could combine with those of the proposed SES Solar Two, LLC Project. As shown on **Cumulative Impacts Figure 2** and in **Table 1**, solar and wind development applications for use of BLM land have been submitted for approximately 107,000 acres of the land in the Imperial County region of the California Desert Conservation Area.

Cumulative Impacts Table 2 lists existing projects in the Solar Two project area, and **Cumulative Impacts Table 3** lists future foreseeable projects in the project area.

Cumulative Impact Analysis

Local Projects

Large power plant projects pending United States Bureau of Land Management (BLM) applications near the SES Solar Two Project and other reasonable foreseeable projects in Imperial County include:

Sun Peak Solar (formerly BCL Associates) 500 MW photovoltaic solar electric generation facility. Construction would be starting in 2010 and would be for 6.5 years. The highest monthly peak would be 364 construction workers.

- Power Partner SW c/o enXco Development Corporation has two projects (one a 300 MW Solar electric generation facility) that would have a 30 month construction period from 2010-2013 with a peak labor force of 600 construction workers. The operational workforce is about 50 workers over a 30 year operational life (SES 2008a and Owen 2008);
- Pacific Solar Investments, Inc. c/o Iberdrola Renewables estimates would construct a 1,500 MW solar trough project from July 2009 to October 2014. This project would have estimated employment peak of 1,650 construction workers (SES 2008a and Mays 2008);
- OptiSolar, Inc. photovoltaic solar project involving 7,400 acres provided no comment (SES 2008a);
- Light Source Renewables estimates it would construct a 250 MW solar parabolic trough plant beginning in third quarter of 2012 through the fourth quarter of 2014, with an operating life of 30 years. “Full swing” construction in quarter one of 2013 to quarter one of 2014 would be 500 workers. The operations workforce would be 50 to 75 full time equivalent personnel (Whitworth 2009);
- Solar Reserve LLC estimates it would construct a 250 MW solar power tower beginning in January 1, 2012. Construction would last for 30 months and the project is expected to be commercially ready for operation on July 1, 2014. It would have an estimated average construction workforce of 250 employees with a peak of 400 to 500 employees. The operation workforce would be 40-45 employees during normal operation for at least 30 years (Wang 2009); and
- Sempra Generation estimates it would construct Niland Solar Project a 500-MW solar parabolic trough plant, beginning in 2011 and ending in 2015. Each 100-MW block would have a construction force of up to approximately 300 workers. This plant would be fully operational in 2016 with each phase operating for 30 years. Operation of the Niland Solar Project would have four full-time maintenance personnel (Burke 2009).
- Other major construction projects in Imperial County which might overlap the 40 month construction period of SES Solar Two are:
- The San Diego Gas and Electric (SDG&E) Sunrise Powerlink Power Project, a 150-mile transmission line between the cities of El Centro and San Diego was approved by the Public Utilities Commission (PUC). Start of construction is unknown. Peak construction workforce’s estimate would be 800 workers for the two-

year project. The expected project life is 58 years and would have an operational workforce of 40-50 people per year (SES 2008a and Woldeman 2008);

- The Green Path transmission line project owned by Imperial Irrigation District (IID) is a 230-kV project which has been approved by the IID Board. The project would involve two new 230 kV transmission line connections from the Imperial Valley Substation to the Dixieland Substation in Imperial County. Construction would start in early 2010 to late 2010 with a workforce at peak of 32. The expected life of the project would be 60 to 70 years but no operational workforce information was provided (Diamond 2009); and
- The upgrade of the Seeley County Wastewater Treatment Plant involves an unknown number of construction workers at peak and an unknown number of operations workers. When this data becomes available, staff will incorporate this into the **Socioeconomics** section.

Overall, a worst-case cumulative peak for these 12 projects would require 6,119 construction workers, which represents approximately 2.5% of the El Centro MSA (Imperial County), San Diego–Carlsbad–San Marcos MSA (San Diego County), and Riverside–San Bernardino–Ontario MSA (Riverside and San Bernardino Counties) labor market construction and extraction workforce of 246,545. The operational workforce from the 12 projects is estimated at 760 workers in Imperial County which had a high unemployment rate of about 25.0% in March 2009 (not seasonally adjusted).

These 12 projects should have beneficial public impacts since they would lower the unemployment rate in Imperial County. Other cumulative benefits could include direct impacts of operations and maintenance, payroll, taxes and fees, and associated secondary impacts. In addition, staff has found no significant adverse socioeconomic impacts under CEQA on housing, schools, emergency medical services, law enforcement, parks and recreation due to an influx of construction or operation workers.

Overall, staff finds no significant adverse socioeconomic cumulative impacts under CEQA associated with the proposed SES Solar Two project.

C.10.10 IMPORTANT PUBLIC BENEFITS

As described above, include capital expenditures, construction and operation payroll, and sales tax from construction and operation spending.

C.10.11 COMPLIANCE WITH LORS

Staff concludes that construction, operation, and demolition of the SES Solar Two Project would comply with all applicable federal and state LORS.

C.10.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

Staff proposes no conditions of certification.

C.10.13 CONCLUSIONS

Staff concludes that construction, operation, and demolition of the proposed SES Solar Two would not cause, under CEQA, a significant direct, indirect, or cumulative adverse socioeconomic impact on the study area's housing, schools, parks and recreation, law enforcement, and emergency services. Socioeconomic impacts of the SES Solar Two project would not combine with impacts of any past, present, or reasonably foreseeable local projects to result in cumulatively considerable local impacts. Hence, there are no socioeconomic environmental justice issues related to this project. The SES Solar Two Project, as proposed, is consistent with applicable Socioeconomic LORS.

Estimated gross public benefits from the SES Solar Two Project include increases in sales, employment, and income in Imperial County and the surrounding region during construction and operation. There would be an estimated average of 360 direct project-related construction jobs for the 40 months of construction. SES Solar Two would have an estimated total project cost of $1.14 billion and a construction payroll of $42.1 million annually, with a local operation payroll of $8,924,810 annually. Total sales and use taxes during construction are estimated to be approximately $623,100; during operation the local sales tax is estimated to be $387,500 annually. An estimated $2.41 million would be spent locally for materials and equipment during construction, and an additional $7.4 million would be spent annually for the project's local operations and maintenance budget.

SOCIOECONOMICS Table 3 on page C.10-13 of this document provides a summary of socioeconomic data and information from this analysis, with emphasis on the economic benefits of the SES Solar Two project.

C.10.14 REFERENCES

Burke, Marilyn, 2009 (tn 52750) – E-mail to Joseph Diamond, Energy Commission Staff on Sempra Generation's Niland Solar Project's CEQA cumulative review – Imperial County. January 23, 2009.

CDE (California Department of Education 2006-2007a – State of California Education Profile, Fiscal Year 2006-2007. http://www.ed-data.k12.ca.us

CDE, 2006-2007b – Imperial Countywide Profile, Fiscal Year: 2006-07. http://www.ed-data.k12.ca.us

CDE, 2006-2007c – Imperial Unified School District Profile Fiscal Year 2006-2007. http://www.ed-data.k12.ca.us

California Department of Finance, 2000 – Demographic Research Unit, California State Census Data Center Census 2000 PL94-171, Table Two Population by Race/ Ethnicity Incorporated Cities by County.

CEC (California Energy Commission), 2006 – Statewide transmission and power plant maps 2006, Census 2000 PL-171 Data-Matrix PL2. http://www.city-data.com/ county/Imperial-County-CA.html, July 2, 2008.

CEC, 2003 – *Environmental Performance Report Staff Report*. August.

CEC, 2005 – *Environmental Performance Report of California's Electrical Generation System*. June.

Council on Environmental Quality, 1997 – *Environmental Justice: Guidance Under the National Environmental Policy Act.* December 10. http://www.lm.doe.gov/ env_justice/pdf/justice.pdf.

Council on Environmental Quality, 1998 – Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses. April. http://www.epa.gov/ compliance/resources/policies/ej/ej_guidance_nepa_epa0498.pdf

Diamond, Joseph, 2008 (tn 47505) – ROC with Mr. Clare Lees of Sun Peak Solar (formerly BCL and Associates) about Cumulative project information associated with Solar (Stirling). August 11, 2008.

El Centro Medical Center, 2008 – About The Hospital El Centro Medical Center, July 29, 2008.

Executive Order 12898 (*Federal Register*, Vol. 59, No. 32, February 11, 1994)

Mays, Wayne, 2008 (tn 52748) – E-mail to Joseph Diamond, Energy Commission Staff on Pacific Solar Investments construction and work force information. August 15, 2008.

Owen, Dai, 2008 (tn 47529) – E-mail to Joseph Diamond, Energy Commission Staff for enXco projects concerning Imperial Valley Cumulative Economic Impacts, August 12, 2008.

Pioneers Memorial Hospital, 2008 – Pioneers Memorial Hospital. July 30, 2008.

Salton Sea Unit 6 Amendment, 2009 – Amended Salton Sea Unit 6 Project. Volumes 1-2, Submitted to the California Energy Commission, February 2009.

SES (Stirling Energy Systems Solar Two, LLC) 2008a – Application for Certification for the Stirling Energy Systems (SES) Solar Two Project, Volumes 1 and 2. Submitted to the California Energy Commission, June 30, 2008.

SES 2008d – Supplement to the Application for Certification for the SES Solar Two Project. Submitted to the California Energy Commission, September 2008.

SES 2008f – Applicant's Response to BLM and Energy Commission Data Request Set 1, Part 1 (1-52), December 8, 2008.

State of California Employment Development Department, 2008a – Labor Market Information-Occupational Employment Projects 2004-2014 El Centro Metropolitan Statistical Area (Imperial County). http:www.labormarketinfo.edd.ca.gov

State of California Employment Development Department, 2008b – Occupational Employment Projections 2004-2014 San Diego–Carlsbad–San Marcos Metropolitan Statistical Area (San Diego County). http://www.labormarketinfo.edd.ca.gov

State of California Employment Development Department, 2008c – Occupational Employment Projections 2004-2014 Riverside–San Bernardino–Ontario Metropolitan Statistical Area (Riverside and San Bernardino Counties). http://www.labormarketinfo.edd.ca.gov

State of California, Employment Development Department, 2009 – Report 400 C Monthly Labor Force Data for Counties March-2009 Not Seasonally Adjusted. http:www.calmis.ca.gov/file/lfmonth/countyur-400c.pdf

State of California, Department of Finance – E-5 Population and Housing Estimates for Cities, Counties and the State, 2001-2008, with 2000 Benchmark. Sacramento, California, May 2008.

US Census Bureau, 2006 – Imperial County California 2006 American Community Survey Data Profile Highlights, July 29, 2008.

US Census, 2000 – U.S. Census Bureau. Poverty Thresholds 2000. http://www.census.gov/hhes/www/poverty/threshld.html

US Census, 2008 – U.S. Census Bureau. Year 2000 Census Lookup. Internet Site: http://factfinder.census.gov/servlet/BasicFactsServlet

URS, 2008 (tn 47902) – Solar Two Responses to Imperial County Comments. September 3, 2008.

Wang, Andrew, 2009 (tn 49990) – E-mail to Joseph Diamond, Energy Commission Staff on Solar Reserve's socioeconomic impact. January 21, 2009.

Whitworth, Paul, 2009 (tn 49986) – E-mail to Joseph Diamond, Energy Commission Staff on LightSource Renewables Socioeconomic Cumulative Information For (Stirling) Solar Two. January 21, 2009.

C.11 - TRAFFIC AND TRANSPORTATION

Testimony of Steven J. Brown PE

C.11.1 SUMMARY OF CONCLUSIONS

The Stirling Energy Systems Solar Two Project (SES Solar Two) would be consistent with the Circulation and Scenic Highways Element of the County of Imperial General Plan and all other applicable laws, ordinances, regulations, and standards related to traffic and transportation. SES Solar Two would not have a significant adverse impact on the local and regional roadway network. During the construction and operation phases, local roadway and highway demand resulting from the movement of workers and materials would not increase beyond significance thresholds for congestion established by the County of Imperial for local roads and the State of California for state highways.[1]

Conditions of certification were developed by staff to ensure that the construction-related travel is handled in a safe manner through an appropriate traffic control plan and that any pavement damage is repaired. A condition of certification was also developed to address potential glare impacts to motorists and pilots.

C.11.2 INTRODUCTION

The Traffic and Transportation analysis focuses on the Stirling Energy Systems Solar Two (SES Solar Two) Project’s affect on transportation systems in the vicinity of the site. The analysis examines the compatibility of the SES Solar Two with applicable laws, ordinances, regulations, and standards (LORS). In addition, the analysis identifies potential impacts related to the construction and operation of SES Solar Two on the surrounding transportation systems and roadways. Mitigation measures (conditions of certification) are recommended, when applicable.

C.11.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Significance criteria are based on California Environmental Quality Act (CEQA) Guidelines, the CEQA Environmental Checklist and on performance standards and thresholds established by interested agencies. The National Environmental Protection Act (NEPA) does not provide any standards specific to transportation. A project may have a significant effect if the project would:

- cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system;
- exceed an established level of service standard applicable for the designated roads or highways;
- alters waterborne, rail, or air traffic;
- alters existing patterns of circulation or the movement of people/goods;

[1] The federal government (NEPA) has not established any standards for congestion, as this is a matter of local preference.

- increases traffic hazards to motor vehicles, bicyclists, or pedestrians;
- result in inadequate emergency access;
- result in inadequate parking capacity; or
- conflict with adopted policies, plans, or programs.

Level of Service

When evaluating SES Solar Two–related potential impacts on the local transportation system, staff used level of service (LOS) determinations as the foundation on which to base its analysis. Level of service is a measure of congestion as experienced by motorists.

Intersection operations were evaluated using the *Highway Capacity Manual 2000* (HCM) methodology. This methodology assesses delay at an unsignalized intersection for movements operating under traffic control. For example, at an intersection where only the side-street has a stop sign, delay will be reported for movements controlled by the stop sign. The delay is then assigned a corresponding letter grade that represents the overall condition of the intersection. These grades range from LOS A (free flow) to LOS F (congested).

The LOS standards for the Project are as follows:

- LOS D or better conditions on a State of California highways
- LOS C or better conditions on an Imperial County roadways

A significant impact would be caused if the Project causes intersection operations to exceed the accepted LOS standards on a State or County roadway.

Laws, Ordinances, Regulations, and Standards

Staff uses LORS as significance criteria to determine if the proposed SES Solar Two project would have a significant adverse impact on the environment. The federal, state, and local regulations that are applicable to the proposed SES Solar Two are listed in **Traffic and Transportation Table 1**. The SES Solar Two will include chemical storage tanks on site along with delivery of hydrogen gas to the site. It is staffs' understanding, that the applicant intends to comply with all LORS related to the transport of hazardous materials.

Traffic and Transportation Table 1
Traffic and Transportation LORS

Applicable LORS	Description
Federal	
Code of Federal Regulations Title 49, Sections 171-177 & 350-399.	Governs the transportation of hazardous materials and related guidelines.
Code of Federal Regulations Part 77, Federal Aviation Administration Regulations	Implements standards for determining obstructions in navigable airspace. Sets forth requirements for notice to the FAA of certain proposed construction or alteration. Also, provides for aeronautical studies of obstructions to air navigation to determine their effect on the safe and efficient use of airspace.
Code of Federal Regulations Title 49, Sections 350-399 and Appendices A-G	Includes procedures and regulations pertaining to interstate and intrastate transport (includes hazardous materials program procedures) and provides safety measures for motor carriers and motor vehicles who operate on public highways.
State	
California Vehicle Code Division 2, Chapter 2.5, Division 6, Chapter 7, Division 13, Chapter 5, Division 14.1, Chapter 1 and 2, Division 14.8, Division 15	Includes regulations pertaining to licensing, size, weight and load of vehicles operated on highways, safe operation of vehicles, and the transportation of hazardous materials.
California Streets and Highways Code Division 1 and 2, Chapter 3 and Chapter 5.5	Includes regulations for the care and protection of State and County highways, and provisions for the issuance of written permits.
Local	
County of Imperial General Plan Circulation and Scenic Highways Element	Requires that developments contribute positively to the County's transportation network and that negative impacts are reduced. For example, requirements include new developments provide local roads to serve the needs of the development, future construction does not interfere with present and potential highway and right-of-way needs, and freight loading/unloading does not occur on public roadways. In addition, construction of private streets in developments is allowed.

C.11.4 PROPOSED PROJECT

C.11.4.1 PROJECT DESCRIPTION

The proposed SES Solar Two is a solar energy collection facility operated by Stirling Energy Systems, LLC. The SES Solar Two proposes to install approximately 30,000 solar dish systems in a 6,500 acre project site. The construction will be completed in two phases and is expected to last for approximately 40 months.

The proposed SES Solar Two site is located on approximately 6,140 acres of federal land managed by the Bureau of Land Management and approximately 360 acres of privately owned land. The site is approximately 100 miles east of the City of San Diego, 14 miles west of the City of El Centro, and four miles east of the unincorporated community of Ocotillo Wells.

Access to the SES Solar Two site is by a private access road from Evan Hewes Highway. Regional vehicular access to the site is to be provided by Interstate 8 (I-8) and the parallel Evan Hewes Highway.

C.11.4.2 SETTING AND EXISTING CONDITIONS

The proposed SES Solar Two site is located south of Evan Hewes Highway, west of Dunaway Road, and north of I-8 in unincorporated Imperial County. Evan Hewes Highway and Dunaway Road would provide direct access to the site. The primary SES Solar Two access is proposed to be located on Evan Hewes Highway.

Local Highways and Roads

The following describes the roadways in the vicinity of the SES Solar Two site:

Evan Hewes Highway is an east-west roadway that parallels I-8 to the north. The roadway begins east of the City of Holtville with its junction at I-8 and travels through El Centro and Seeley before ending in Ocotillo. The roadway is typically used for local travel and provides an alternative to I-8. In the vicinity of the SES Solar Two site, Evan Hewes Highway is two lanes and lacks bicycle or pedestrian facilities (i.e.- no bike lanes or sidewalks). The posted speed limit adjacent to the SES Solar Two site is 55 mph.

Evan Hewes Highway is classified as Imperial County Route S80 and has been classified as a historic highway by the State of California as it was once part of United States Highway 80.

Dunaway Road is a relatively short roadway that connects I-8 and Evan Hewes Highway. The north-south roadway is unimproved with no curb and gutter and provides one lane of travel in each direction. The roadway does not have bicycle or pedestrian facilities. The speed limit adjacent to the SES Solar Two site is 55 mph.

Interstate 8 is an interregional highway between San Diego and Arizona. Through Imperial County, I-8 provides two lanes (in each direction) of grade-separate highway. The posted speed limit is 70 mph and there are no bicycle or pedestrian facilities..

According to the California Department of Transportation (Caltrans) 2007 average annual daily traffic counts, I-8 carries 13,300 vehicles per day (in both directions) adjacent to the SES Solar Two site. This is a low traffic volume for a four lane, grade separated highway.

Public Transportation

The SES Solar Two area is not serviced by transit. Imperial Valley Transit is the transit service provider in the area; however, no regularly scheduled lines run near the SES Solar Two site.

Imperial Valley Transit does offer a limited service to their "remote zones." The service provided is identified as a "lifeline service" and reaches Ocotillo once a week, which is in the general area of the SES Solar Two site.

Bicycle and Pedestrian Facilities

There are no bicycle facilities (such as on-street lanes and off-street paths) adjacent to the proposed SES Solar Two site. Bicycle activity in the vicinity of the SES Solar Two site is minimal-to-none.

The County of Imperial Bicycle Master Plan Update (from September 2003) identifies all planned bicycle facilities in the County. However, the SES Solar Two site is located outside of the Master Plan's study area. No bicycle facilities are planned for the study area.

There are no pedestrian facilities (such as sidewalks and walkways) adjacent to the proposed SES Solar Two site. Pedestrian activity in the vicinity of the SES Solar Two site is minimal-to-none.

Airports

The FAA has notification requirements for airports which are located within a 20,000 foot horizontal distance of the SES Solar Two site. No airport is located within 20,000 feet of the SES Solar Two site boundary. For informational purposes, the following lists the airports nearest the SES Solar Two site (all distances are based on aerial photography and should be considered approximate):

- Emory Ranch Airport (small private airport) is 50,000 feet west of the SES Solar Two site
- Naval Air Facility El Centro is 41,000 feet northeast of the SES Solar Two site
- Imperial County Airport is 72,000 feet northeast of the SES Solar Two site

Railroads

A railroad line parallels the northern boundary of the SES Solar Two site (between Evan Hewes Highway and the SES Solar Two boundary). In the vicinity of the SES Solar Two site, Dunaway Road crosses the railroad at-grade. Additionally, there is an unimproved (dirt) roadway that crosses the railroad at the location of the proposed main access to the SES Solar Two site. The proposed main driveway is located off of Evan Hewes Highway along the northern portion of the SES Solar Two site. The applicant is proposing to construct an at-grade rail crossing as part of the main driveway access to the site.

The railroad line in question is owned and controlled by a subsidiary of the San Diego Metropolitan Transit Service (MTS) and operated as a private transit system. The portion of the line adjacent to the project site is part of the "Desert Line" of the San

Diego and Arizona Eastern Railway, which is a short-line freight route from the Mexico border to the Union Pacific Line in El Centro.

The Desert Line has been out of service to the east of Tecate since 1983. MTS is trying to assemble the funding needed to repair and upgrade the line to restore freight service.

C.11.4.3 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The direct and indirect impacts of the proposed SES Solar Two on the transportation system are discussed in this section. The assessment of transportation-related impacts is based on evaluations and technical analysis which compare the pre-SES Solar Two conditions to the post-SES Solar Two conditions.

Study Intersection / Road Segment Locations

The following locations on the surrounding roadway network were reviewed:

- I-8 WB Ramp/Imperial Highway
- I-8 EB Ramp/Imperial Highway
- SR 98/Imperial Highway
- I-8 WB Ramp/Dunaway Road
- I-8 EB Ramp/Dunaway Road
- I-8: West of Imperial Highway
- I-8: East of Dunaway Road
- SR 98: West of Imperial Highway
- Imperial Highway: North of SR 98
- Evan Hewes Highway: East of Imperial Highway
- Evan Hewes Highway: West of Dunaway Road
- Dunaway Road: North of I-8 Westbound Ramps

Direct/Indirect Impacts and Mitigation

The direct and indirect impacts of the SES Solar Two project are addressed for modes of travel and significance criteria previously addressed. Two major project scenarios have been evaluated: construction and operational phase. The SES Solar Two project would experience approximately 10 times more daily traffic during the peak construction period than would occur during the operational phase; therefore, an evaluation of construction impacts has been included. Traffic during the de-commissioning period would be expected at a level between those experienced during operation and construction, and likely closer to the operational levels.

Impacts were addressed for two separate future year scenarios: construction year (2010) and SES Solar Two opening year (2017). Existing traffic volumes were increased to account for future growth unrelated to the SES Solar Two, based on direction from the Imperial County Traffic Engineer and consistent with other studies in the area. Other planned projects in the vicinity of the site were determined to contribute to both year 2010 and year 2017 traffic levels; therefore, trips from the planned projects were added into the future traffic volumes.

Construction Period Impacts and Mitigation

Potential traffic impacts associated with construction of the SES Solar Two were evaluated for both construction workforce traffic and construction truck traffic.

To determine the amount of construction workforce vehicle trips to the SES Solar Two site during peak construction, the applicant assumed that workers would commute alone during the morning and afternoon peak intervals (7 to 9 AM and 4 to 6 PM). The average number of construction workers would be approximately 731 during the peak one month period (expected to occur at month seven of the 40 month construction schedule).

Based on regional demographics and availability of skilled laborers, it is expected that 90% of the construction employees will reside in Southern California. During construction, it is anticipated that construction workers and technical workers will reside in temporary housing or apartments during the week. The temporary housing is expected to be located in the El Centro area.

To reach the SES Solar Two site, the applicant assumes construction workers traveling from the east and west would primarily use I-8 (65% from the east and 15% from the west). The remaining trips would use Evan Hewes Highway, with 15% traveling from the east and 5% traveling from the west. Staff believes that these are reasonable assumptions since they appear to be the most direct routes.

Although the SES Solar Two will be located west of Dunaway Road and south of Evan Hewes Highway, construction parking is to be located on an approximately 100 acre parcel immediately east of Dunaway Road. All parking from the construction workforce would be located on this off-site, off-street staging area. Workers would be bused across Dunaway Road into the SES Solar Two site.

Construction of the proposed project would require the use of heavy equipment for the installation of associated systems and structures. Heavy equipment would be used throughout the construction period, including trenching and earthmoving equipment, forklifts, cranes, cement mixers and drilling equipment. However, this heavy equipment would be delivered by non-SES Solar Two employees and has been separately added to the SES Solar Two trip generation. SES Solar Two construction is expected to require 2,198 truck trips[2] per month (24 working days) during the peak month. It has been estimated that 30% of the trucks would arrive/depart during the peak hours of adjacent street traffic.

The project will generate a substantial level of overall traffic and heavy-vehicle traffic during construction. The heavy vehicles in particular have the potential to damage the

[2] "Trips" in the transportation analysis refers to travel in one direction. For example, the project is expected to have 1,099 trucks come to the site in the peak month, which will result in 2,198 "trips."

surface of local roadways. Condition of Certification **TRANS-3** requires the applicant to document before/after conditions and to repair any damage caused by the project.

Total peak construction traffic (workforce and trucks) would be 758 vehicle trips (731 workers plus 27 trucks) per peak hour. The peak construction increase in traffic would represent a noticeable change when compared to existing conditions, particularly on Dunaway Road between the SES Solar Two driveway and I-8. Traffic volumes would increase from existing daily traffic volume of 780 vehicles to 2,240 vehicles during the Construction Year. While the percentage increase is substantial, the roadway will not be congested, as the road capacity is approximately 10,000 vehicles per day.

Traffic and Transportation Table 2 identifies the expected change in daily traffic volume on all the study roadways during the peak construction period.

While traffic volumes will increase, the LOS at the study intersections and roadway segments would remain within the LOS thresholds identified by the local jurisdictions. All study roadway segments and intersections are expected to operate at LOS C or better conditions with the SES Solar Two–related construction traffic as shown in **Traffic and Transportation Table 4**. Therefore, impacts from SES Solar Two–related construction traffic are less than significant.

Traffic and Transportation Table 2
Comparison of Construction Year (2010) Traffic on Study Roadways

Roadway Segment	Existing ADT	Year 2010 ADT w/o Project	Year 2010 ADT with Project	Percent Change Associated with Project
I-8: West of Imperial Highway	15,300	16,830	17,245	3%
I-8: East of Dunaway Road	13,400	14,740	15,940	8%
SR 98: West of Imperial Highway	1,500	1,575	1,590	1%
Imperial Highway: North of SR 98	315	330	365	11%
Evan Hewes Highway: East of Imperial Highway	1,250	1,300	1,535	18%
Evan Hewes Highway: West of Dunaway Road	515	535	1,170	119%

Roadway Segment	Existing ADT	Year 2010 ADT w/o Project	Year 2010 ADT with Project	Percent Change Associated with Project
Dunaway Road: North of I-8 Westbound Ramps	780	810	2,240	176%

Notes: ADT – average daily traffic
Source: URS Corporation. *Application for Certification SES Solar Two, LLC*. June 2008. This data was modified by staff to generate 2010 estimate for I-8 to reflect 4 years of growth at 2.5% (not compounded) to reflect that while the Caltrans data was published in 2008, it reflected data from 2006.

Traffic and Transportation Table 3
Construction Year (2010) Intersection Level of Service Summary

Study Inter-section	Existing Conditions				Year 2010 w/o Project				Year 2010 with Project			
	AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
I-8 WB Ramp/ Imperial Highway	1.7	A	3.3	A	1.7	A	3.3	A	1.6	A	1.1	A
I-8 EB Ramp/ Imperial Highway	5.6	A	3.3	A	5.6	A	3.3	A	5.1	A	2.7	A
SR 98/ Imperial Highway	0.7	A	0.8	A	0.9	A	0.8	A	1.3	A	1.6	A
I-8 WB Ramp/ Dunaway Road	2.5	A	1.9	A	2.6	A	2.1	A	15.3	C	0.2	A
I-8 EB Ramp/ Dunaway Road	6.9	A	7.4	A	6.9	A	6.9	A	9.6	A	8.8	A

Notes: 'Average Delay' reported in seconds per vehicle.
All study intersections are unsignalized.
LOS – level of service
Source: URS Corporation. *Application for Certification SES Solar Two, LLC*. June 2008.

Vehicular delay for each intersection is based on multiple factors, including peak hour traffic volumes, arrival patterns, lane configurations, etc. The outcome of the calculation is based upon the volume of each and is reported in seconds per vehicle. In some instances, the delay for the intersection may improve with the addition of traffic volume, because the outcome is "weighted" based upon the volume of individual movements.

Traffic and Transportation Table 4 summarizes the level of service of the study roadway segments.

While the project will not create any impacts with respect to traffic congestion, it will create unusual traffic conditions that may be hazardous — such as the delivery of oversized equipment. To mitigate these potential hazards, staff has recommended Condition of Certification TRANS-1 that requires the development and implementation of a traffic control plan during construction.

Traffic and Transportation Table 4
Construction Year (2010) Roadway Segment Level of Service Summary

Roadway Segment	Existing Conditions		Year 2010 w/o Project		Year 2010 with Project	
	ADT	LOS	ADT	LOS	ADT	LOS
I-8: West of Imperial Highway	15,300	A	16,830	A	17,245	A
I-8: East of Dunaway Road	13,400	A	14,740	A	15,940	A
SR 98: West of Imperial Highway	1,500	A	1,575	A	1,590	A
Imperial Highway: North of SR 98	315	A	330	A	365	A
Evan Hewes Highway: East of Imperial Highway	1,250	A	1,300	A	1,535	A
Evan Hewes Highway: West of Dunaway Road	515	A	535	A	1,170	A
Dunaway Road: North of I-8 Westbound Ramps	780	A	810	A	2,240	B

Notes: ADT – average daily traffic
LOS – level of service
Source: URS Corporation. *Application for Certification SES Solar Two, LLC*. June 2008. This data was modified by staff to generate 2010 estimate for I-8 to reflect 4 years of growth at 2.5% (not compounded) to reflect that while the Caltrans data was published in 2008, it reflected data from 2006.

Operation Impacts and Mitigation

Operation of the facility would require a labor force of up to 164 full-time employees. The estimated peak hour trips would be 100 cars and four vanpool vehicles. Additional non-employee trips are also to be expected, such as eight daily visitor trips, deliveries, and other related services. The non-employee SES Solar Two–related trips have been assumed to occur during the peak hours with 24 during the AM peak hour and 14 during the PM peak hour. It was assumed that the geographic location of housing for operational workers would be similar to those of the construction workers, and therefore, they would access the site in a similar spatial pattern.

Trips added by the project during operations would not deteriorate the LOS of the study roadways or intersections. All study roadways and intersections would operate at LOS B or better conditions with the SES Solar Two–related traffic (refer to the following tables for LOS summaries of study intersections and roadway segments). Therefore, impacts from SES Solar Two–related traffic are less than significant.

Traffic and Transportation Table 5 compares the expected traffic volumes during standard operations to the base traffic volumes on the study roadway segments. As shown in the table, the majority of the SES Solar Two–related traffic would use the segment of Evan Hewes Highway west of Dunaway Road. However, the average daily traffic volumes are expected to be relatively low for a roadway with the characteristics of Evan Hewes Highway. As shown, over half of the study roadway segments are expected to experience an increase in SES Solar Two–related traffic of 1% or less.

Traffic and Transportation Table 5
Comparison of Standard Operations (Year 2017) Traffic on Study Roadways

Roadway Segment	Existing ADT	Year 2017 ADT w/o Project	Year 2017 ADT with Project	Percent Change due to Project
I-8: West of Imperial Highway	15,300	19,510	19,550	< 1%
I-8: East of Dunaway Road	13,400	17.085	17,305	1%
SR 98: West of Imperial Highway	1,500	1,875	1,880	< 1%
Imperial Highway: North of SR 98	315	395	400	1%
Evan Hewes Highway: East of Imperial Highway	1,250	1,565	1,615	3%
Evan Hewes Highway: West of Dunaway Road	515	645	880	36%
Dunaway Road: North of I-8 Westbound Ramps	780	975	1,090	12%

Notes: ADT – average daily traffic

Source: URS Corporation. *Application for Certification SES Solar Two, LLC*. June 2008. This data was modified by staff to generate 2017 estimate for I-8 to reflect 11 years of growth at 2.5% (not compounded) to reflect that while the Caltrans data was published in 2008, it reflected data from 2006.

Traffic and Transportation Table 6 summarizes the level of service of the study intersections for existing conditions and for future conditions, with and without the SES Solar Two during standard operations.

Traffic and Transportation Table 6
Standard Operations (Year 2017) Intersection Level of Service Summary

Study Inter-section	Existing Conditions				Year 2017 w/o Project				Year 2017 with Project			
	AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
I-8 WB Ramp/ Imperial Highway	1.7	A	3.3	A	1.7	A	2.8	A	1.5	A	2.8	A
I-8 EB Ramp/ Imperial Highway	5.6	A	3.3	A	5.7	A	3.2	A	6.1	A	3.2	A
SR 98/ Imperial Highway	0.7	A	0.8	A	0.8	A	0.9	A	0.9	A	0.9	A
I-8 WB Ramp/ Dunaway Road	2.5	A	1.9	A	1.0	A	0.4	A	3.3	A	0.4	A
I-8 EB Ramp/ Dunaway Road	6.9	A	7.4	A	8.3	A	10.9	B	8.3	A	10.9	B

Notes: ‘Average Delay’ reported in seconds per vehicle.
All study intersections are unsignalized.
LOS – level of service

Source: URS Corporation. *Application for Certification SES Solar Two, LLC*. June 2008.

Traffic and Transportation Table 7 summarizes the level of service of the study roadway segments during standard operations. As shown, the study roadway segments are expected to operate at the same condition, LOS A, as in existing conditions.

Traffic and Transportation Table 7
Standard Operations (Year 2017) Roadway Segment Level of Service Summary

Roadway Segment	Existing Conditions		Year 2017 w/o Project		Year 2017 with Project	
	ADT	LOS	ADT	LOS	ADT	LOS
I-8: West of Imperial Highway	15,300	A	19,510	A	19,550	A
I-8: East of Dunaway Road	13,400	A	17,085	A	17,305	A
SR 98: West of Imperial Highway	1,500	A	1,875	A	1,880	A
Imperial Highway: North of SR 98	315	A	395	A	400	A
Evan Hewes Highway: East of Imperial Highway	1,250	A	1,565	A	1,615	A
Evan Hewes Highway: West of Dunaway Road	515	A	645	A	880	A
Dunaway Road: North of I-8 Westbound Ramps	780	A	975	A	1,090	A

Notes: ADT – average daily traffic
LOS – level of service

Source: URS Corporation. *Application for Certification SES Solar Two, LLC*. June 2008. This data was modified by staff to generate 2017 estimate for I-8 to reflect 11 years of growth at 2.5% (not compounded) to reflect that while the Caltrans data was published in 2008, it reflected data from 2006.

Emergency Services Vehicle Access

The environmental review of emergency service vehicle access considers the off-site accessibility by emergency vehicles to the site. It is staff's opinion that the regional access to the site is adequate given that an emergency vehicle can access the site directly from Evan Hewes Highway or Dunaway Road, with very direct and proximate access to/from Interstate 8. Emergency vehicles can therefore approach the site from adjacent cities using different routes and would not be barred from access due to a singular problem on a surrounding roadway. Therefore, the emergency vehicle access for SES Solar Two is considered adequate

On-site circulation of emergency vehicles is subject to site plan review by local agencies (Imperial County, in this case) and the standards of the Uniform Fire Code and Uniform Building Code.

Water, Rail, and Air Traffic

The proposed SES Solar Two is not located adjacent to a navigable body of water; therefore, the SES Solar Two is not expected to alter water-related transportation.

The project proposes to construct a private crossing of a railroad line as part of its primary access. The rail line in question is controlled by a subsidiary of the San Diego Metropolitan Transit Service (MTS) and operated as a private transit system, not subject to PUC authority. This freight line is currently not providing any service due to needed track repairs and upgrades. However, there is the potential for rail/vehicle conflicts in the future when rail service re-opens.

The SES Solar Two project owner has negotiated a lease agreement[3] with MTS to provide a private crossing "located west of Plaster City, south of Evan Hewes Highway at Road 2003 along the Desert Line at approximately Milepost 128.5." This agreement requires the project owner to pay annual license fee, maintain appropriate insurance, and provide the necessary crossing improvements (not specified).

TRANS-2 requires the SES Solar Two project owner to provide an executed agreement of the above prior to project construction and to obtain approval from the MTS for the permanent form of the railroad crossing.

The proposed project lacks any concentrated heat rejection source, so there would not be any corresponding turbulence impacts to low flying aircraft.

The applicant's submittals state that the relationship between the SunCatcher mirror and the face of the Stirling Engine changes when moving from stow position, when responding to cloud cover, or to high winds. As a result staff believes that possible malfunctions in mirror control might reasonably occur, presenting a potential glare or temporary blindness hazard to off-site viewers including motorists or airplane pilots. Staff concludes that there should be some method to assure that this is unlikely and that legitimate complaints of such malfunctions are recorded and corrected. Staff therefore recommends Condition of Certification **TRANS-4.**

Vapor Plumes

The proposed project has no cooling towers or boilers, so no visible water vapor plumes are anticipated that would cause a visual impact to motorists.

<u>Transport of Hazardous Materials</u>

Both the construction and operation of the proposed SES Solar Two would involve the transport of hazardous materials to the site. The transport vehicles are required to follow federal regulations governing the proper containment vessels and vehicles, including appropriate identification of the nature of the contents.

Delivery to the site would require vehicles to cross a private crossing of a railroad line as part of its primary access. The rail line in question is controlled by a subsidiary of the San Diego Metropolitan Transit Service (MTS), and this freight line is not currently active. The SES Solar Two project has negotiated a lease agreement with the MTS to traverse the railroad line. Should the rail line become active, either MTS or the SES Solar Two (via a revised lease agreement) will need to provide the appropriate railroad crossing warning equipment.

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[3] Metropolitan Transit System, San Diego. License to place permanent improvements in MTS/SD&AE Right-of-Way. January 7, 2010. MTS Doc #S200-10-424, ADM 160.1. CEC Doc 08-AFC-5

In addition to the governing federal regulations, Condition of Certification **HAZ-3** requires the applicant to develop and implement a Safety management Plan for the delivery of hazardous materials. Please see the **HAZARDOUS MATERIALS MANAGEMENT** section of this document.

Parking Capacity

Construction period parking demands are to be accommodated by an approximately 100 acre lay-down area adjacent to the development site.

On-site parking for standard operations will be accommodated by a paved employee parking lot. The lot will be located in the Administrative, Assembly, and Construction Area which will cover approximately 42 acres. With the proposed construction parking area (100 acres adjacent to the site) and on-site parking for operational employees, the project will not result in any parking spill-over to sensitive areas and will not create an adverse impact.

Conflict with Policies, Plans, or Programs

SES Solar Two would not conflict with any formal policies, plans, or programs related to transportation aspects of the project.

C.11.4.3 CEQA/NEPA LEVEL OF SIGNIFICANCE

The proposed project would not violate any standards or thresholds associated with CEQA or NEPA. The conditions of certification identified by staff are meant to ensure compliance with best practices for construction and preclude a potential glare impact..

C.11.5 300 MEGAWATT ALTERNATIVE

The 300 MW alternative would essentially be Phase 1 of the proposed 750 MW project (see Alternatives Figure 1), and would consist of 12,000 SunCatchers with a net generating capacity of approximately 300 MW occupying approximately 2,600 acres of land. This alternative would transmit power to the grid through the SDG&E Imperial Valley Substation and would require infrastructure similar to the proposed 750 MW project, including a water supply pipeline, transmission line, road access, operations facilities, substation, and hydrogen system (SES 2008a). Infrastructure associated with this alternative would require approximately 40 acres. This alternative would retain 40% of the SunCatchers and would affect 40% of the land of the proposed 750 MW project.

SETTING AND EXISTING CONDITIONS

The setting for this alternative would be approximately 2,600 acres or 40% of the lands affected by the proposed project. Lands affected by this alternative would be located on the western portion of the proposed project site, and would all be under the jurisdiction of the BLM.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The 300 MW Alternative, if constructed with the same peak workforce as the proposed project, would result in the same levels of construction traffic and parking demand as the proposed project. However these conditions would occur for a shorter period of time given that the alternative would be approximately 40% of the size of the proposed project.

CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, with implementation of recommended conditions of certification, impacts would remain less than significant.

C.11.6 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives developed to reduce impacts to the waters of the U.S. would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative is illustrated in **Alternatives Figure 1B**. This alternative would have the same outer project boundaries as the proposed project, but it would include prohibition of installing permanent structures within drainages, thereby reducing the available acreage for development from 6,500 to 4,690, and reducing the generation capacity from 750 MW under the proposed project to 632 MW (84% of the proposed generation capacity). Rather than the 30,000 SunCatchers included in the proposed project, there would be approximately 25,000 of them installed.

SETTING AND EXISTING CONDITIONS

The setting for this alternative would be approximately 4,690 acres or 84% of the lands affected by the proposed project. Lands affected by this alternative would be located entirely with the proposed project site, so the description of the existing conditions for the proposed project also apply to this alternative.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Drainage Avoidance #1 Alternative, if constructed with the same peak workforce as the proposed project, would result in the same levels of construction traffic and parking demand as the proposed project. However these conditions would occur for a shorter period of time given that the alternative would be approximately 84% of the size of the proposed project.

CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, with implementation of recommended conditions of certification, impacts would remain less than significant.

C.11.7 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 Alternative would eliminate both the eastern and western-most portions of the proposed project, where the largest drainage complexes are located. This alternative is shown in **Alternatives Figure 1C**. It would reduce the overall size of the project area by over 50% (from 6,500 acres to 3,153 acres). It would also reduce the generation capacity from 750 MW to 423 MW (retaining only about 32% of the proposed number of SunCatchers). In this alternative, permanent structures would be allowed within all drainages inside the revised, smaller project boundaries.

SETTING AND EXISTING CONDITIONS

The setting for this alternative would be approximately 3,153 acres or less than 50% of the lands affected by the proposed project. Lands affected by this alternative would be located entirely with the proposed project site, so the description of the existing conditions for the proposed project also apply to this alternative.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Drainage Avoidance #2 Alternative, if constructed with the same peak workforce as the proposed project, would result in the same levels of construction traffic and parking demand as the proposed project. However these conditions would occur for a much shorter period of time given that the alternative would be approximately 50% of the size of the proposed project.

CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, with implementation of recommended conditions of certification, impacts of the Drainage Avoidance #2 Alternative would remain less than significant.

C.11.8 NO PROJECT/NO ACTION ALTERNATIVES

There are three No Project/No Action Alternatives evaluated in this section, as follows:

NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on SES Solar Two project application and on CDCA land use plan amendment

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

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the transportation and traffic related impacts of the SES Solar Two project would not occur at the proposed site. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations

NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on SES Solar Two project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed SES Solar Two 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, the increases in traffic from the construction and operation of the solar project would likely be similar to the transportation and traffic related impacts from the proposed project. As such, this No Project/No Action Alternative could result in impacts to traffic and transportation similar to the impacts under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on SES Solar Two project application and amend the CDCA land use plan to make the area unavailable for future solar development

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

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no increase in traffic. As a result, this No Project/No Action Alternative would not result in the impacts to traffic and transportation under 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.11.9 CUMULATIVE IMPACTS AND MITIGATION

In addition to the proposed SES Solar Two, the following have been identified as planned developments in the vicinity of the proposed SES Solar Two site: Miller Burson Development Draft EIR, Las Aldeas Specific Plan Draft EIR, Lotus Ranch Traffic Impact Analysis, Desert Village #6, Courtyard Villas, Colace Brothers Industrial Park, and Desert Springs Resort Traffic Impact Study. The cumulative impacts from the aforementioned related projects were reviewed and compared to the impacts with the proposed SES Solar Two. Traffic volumes at the study intersections, where the related projects are expected to add a substantial amount of trips, are not anticipated to be significantly affected with the standard operations of the proposed SES Solar Two.

Based on the magnitude of the SES Solar Two operations trip generation and the location of the planned developments, staff believes that there would not be significant cumulative impacts associated with the standard operations of the proposed SES Solar Two.

Construction schedules for the projects defined in Section B.3.4 are not yet defined so potential overlap in construction activities cannot be determined. However, the large renewable projects are widely scattered across the California desert, and few are located in Imperial County, so cumulatively considerable impacts from construction are unlikely.

C.11.10 COMPLIANCE WITH LORS

The proposed SES Solar Two is intending to comply with all federal, state, and local LORS. Development and operation of the SES Solar Two as planned would not conflict with the LORS as described in this section. **Traffic and Transportation Table 8** summarizes the SES Solar Two's conformance with all applicable LORS.

Traffic and Transportation Table 8
SES Solar Two Compliance with Adopted Traffic and Transportation LORS

Applicable LORS	Description
Federal	
Code of Federal Regulations Part 77, Federal Aviation Administration Regulations	Implements standards for determining obstructions in navigable airspace. Sets forth requirements for notice to the FAA of certain proposed construction or alteration. Also, provides for aeronautical studies of obstructions to air navigation to determine their effect on the safe and efficient use of airspace. Consistent: The SES Solar Two is not located within 20,000 feet of an airport.
Code of Federal Regulations Title 49, Sections 171-177, Sections 350-399 and Appendices A-G	Includes procedures and regulations pertaining to interstate and intrastate transport (includes hazardous materials program procedures) and provides safety measures for motor carriers and motor vehicles who operate on public highways. Consistent: Enforcement is conducted by state and local law enforcement agencies, and through state agency licensing and ministerial permitting (e.g., California Department of Motor Vehicles licensing, Caltrans permits), and/or local agency permitting (e.g., County of Imperial). **HAZ-3** requires the owner to develop and implement a Safety Management Plan related to hazardous materials.

Applicable LORS	Description
State	
California Vehicle Code Division 2, Chapter 2.5, Division 6, Chapter 7, Division 13, Chapter 5, Division 14.1, Chapter 1 and 2, Division 14.8, Division 15	Includes regulations pertaining to licensing, size, weight and load of vehicles operated on highways, safe operation of vehicles, and the transportation of hazardous materials. Consistent: Enforcement is provided by state and local law enforcement agencies, and through ministerial state agency licensing and permitting, and/or local agency permitting.
California Streets and Highways Code Division 1 and 2, Chapter 3 and Chapter 5.5	Includes regulations for the care and protection of State and County highways, and provisions for the issuance of written permits. Consistent: Enforcement is provided by state and local law enforcement, and through ministerial state agency licensing and permitting, and/or local agency permitting.
Local	
County of Imperial General Plan Circulation and Scenic Highways Element	Requires that developments contribute positively to the County's transportation network and that negative impacts are reduced. For example, requirements include new developments provide local roads to serve the needs of the development, future construction does not interfere with present and potential highway and right-of-way needs, and freight loading/unloading does not occur on public roadways. In addition, construction of private streets in developments is allowed. Consistent: The SES Solar Two is consistent because it includes paved access to County roadways, provides off-street parking for new development, ensures LOS C conditions or better on the applicable local roads, and provides on-site freight loading/unloading. In addition, the SES Solar Two is consistent as it provides internal (private) roadways for on-site access.

C.11.11 NOTEWORTHY PUBLIC BENEFITS

The proposed project would result in traffic and transportation impacts related to project construction. These impacts are not found to be significant, but they are considered to be adverse, and not desirable conditions.

While the development of the proposed project is intended to address the requirements of federal and state mandates to develop renewable energy, it would not yield any noteworthy public benefits related to traffic and transportation.

C.11.12 PROPOSED CONDITIONS OF CERTIFICATION

TRANS-1 The SES Solar Two project owner shall, in coordination with Imperial County, develop and implement a construction traffic control plan prior to earth moving activities. The plan should include scheduled delivery of heavy equipment and building material deliveries, coordination with the County of Imperial to mitigate any potential adverse traffic impacts from other proposed construction projects that may occur during the construction phase of SES Solar Two, and adequate access for emergency vehicles to the SES Solar Two site.

Specifically, the overall traffic control plan shall include the following:

- Schedule delivery of heavy equipment and building material deliveries, as well as the movement of hazardous materials to the site, including the adjacent lay-down area;
- Coordinate with the Imperial County to mitigate any potential adverse traffic impacts from other proposed construction projects that may occur during the construction phase of the project; and
- Ensure there is adequate access for emergency vehicles at the project site.

The construction traffic control plan shall also include the following for activities of substantial stature:

- Signing, lighting, and traffic control device placement; and
- Temporary travel lane closures and potential need for flaggers.

Verification: At least 60 days prior to start of site mobilization, the project owner shall provide to the County of Imperial for review and comment and the Compliance Project Manager (CPM) for review and approval a copy of the construction traffic control plan.

TRANS-2 Prior to construction, the project owner shall receive the signed agreement from the San Diego Metropolitan Transit System (MTS) regarding the authority to construct the proposed railroad crossing. After the physical improvements are completed to the railroad crossing, the project owner shall receive written approval from the MTS as to the adequacy of the improvements.

Verification: At least 60 days prior to the start of site mobilization, the project owner shall provide the CPM a copy of the executed agreement with MTS regarding the proposed railroad crossing. No more than 3 months after completion of the railroad crossing improvements, the project owner shall provide the CPM with a copy of written approval from MTS regarding the adequacy of the grade crossing improvements.

TRANS-3 Prior to construction, the project owner shall document the existing condition of the primary roadways that will be used by the construction workers and heavy vehicle deliveries (up to 3 miles of the site). Subsequent to construction, the project owner shall document the condition of these same roadways and either directly reconstruct or reimburse the County of Imperial for needed repairs.

Verification: At least 3 months prior to the start of site mobilization, the project owner shall submit a review of existing roadway pavement conditions to Imperial County for review and comment and the CPM for review and approval. This review will include photographs and the analysis of pavement and sub-surface conditions. The CPM will need to approve the summary of existing pavement conditions prior to the commencement of construction.

No later than 2 months after the end of construction activities, the applicant shall submit an analysis of the roadway pavement conditions to Imperial County for review and comment and the CPM for review and approval. The review will include photographs, the analysis of pavement and sub-surface conditions, and a schedule for repair.

After the repairs are completed, the applicant shall submit a letter to Imperial County and the CPM indicating such repairs are finished and ready for inspection.

TRANS-4 The project owner shall prepare and implement a SunCatcher Mirror Positioning Plan that would avoid the potential for human health and safety and significant visual distractions from solar radiation exposure.

Verification: At least 90 days before the commercial operation of either of the SES Solar Two power plants, the project owner shall submit the SunCatcher Mirror Positioning Plan (MPP) to BLM's Authorized Officer and the CPM for review and approval. The project owner shall also submit the plan to California Department of Transportation (Caltrans), California Highway Patrol (CHP), the Federal Aviation Administration (FAA), and Imperial County for review and comment and forward any comments received to BLM's Authorized Officer and the CPM. The Mirror Positioning Plan shall accomplish the following:

1. Identify the mirror movements and positions (including reasonably possible malfunctions) that could result in possible exposure of observers at various locations including those in aircraft, motorists, pedestrians, and hikers to reflected solar radiation from the mirrors.
2. Describe within the MPP how programmed SunCatcher operation would avoid the potential for human health and safety hazards attributable to solar radiation at locations of observers where momentary solar radiation exposure might be greater than the Maximum Permissible Exposure of 10 kW/m^2 for a period of 0.25 second or less or where excessive brightness might be hazardous to motorists.
3. Prepare a monitoring plan that would a) obtain field measurements in response to legitimate complaints; b) verify that the Mirror Positioning Plan would avoid the potential for health and safety hazards, including temporary or permanent blindness, at locations of possible observers; c) provide requirements and procedures to document, investigate, and resolve legitimate complaints regarding glare or excessive brightness.
4. The monitoring plan shall be coordinated with the FAA, Caltrans, CHP, and Imperial County and be updated on an annual basis for the first five years and at 2-year intervals after that.

C.11.13 CONCLUSIONS

1. The SES Solar Two project as proposed would comply with all applicable LORS related to traffic and transportation. It would result in less than significant impacts to the traffic and transportation system.
2. The SES Solar Two project as proposed would cause no significant direct or cumulative traffic and transportation impacts, and therefore, no environmental justice issues.

3. Staff is proposing Condition of Certification **TRANS-1** which would require a construction traffic control plan to be developed and implemented prior to earth moving activities
4. Staff is proposing Condition of Certification **TRANS-2** which would require the applicant to provide the executed license agreement and subsequent approval of the physical improvements associated with the proposed railroad crossing.
5. Staff is proposing Condition of Certification **TRANS-3,** which would require mitigation plans for the roads that would be used for construction if they are damaged by project-related construction.
6. Because of the SES Solar Two's distance from the nearest airport, no direct impact on the Emory Ranch Airport, Naval Air Facility El Centro or the Imperial County Airport would occur. However, there is a potential for malfunctions in the mirror control, which could lead to glare problems for motorists and/or pilots. Therefore, Staff is proposing Condition of Certification **TRANS-4** to address this issue.

C.11.14 REFERENCES

California Code – Vehicle Code. 2008.

California Code – Streets and Highways Code. 2008.

California Energy Commission – Victorville 2 Hybrid Power Project, Application For Certification (07-AFC-1) San Bernardino County. March 19, 2008.

Caltrans (California Department of Transportation) – *2007 Traffic Volumes*. 2008.

Code of Federal Regulations – *Title 14 Aeronautics and Space, Federal Aviation Administration.* 2008.

Code of Federal Regulations – *Title 49 Environment, Subtitle B – Other Regulations Relating to Transportation.* 2008.

County of Imperial – Circulation and Scenic Highways Element of the General Plan. 1993.

County of Imperial Public Works Department – Comment Letter regarding Pre-Application Meeting for the proposed Sterling Energy Systems Facility. July 21, 2008.

Linscott Law & Greenspan Engineers – *Traffic Impact Analysis Lotus Ranch.* May 12, 2006.

Metropolitan Transit System, San Diego – *License to place permanent improvements in MTS/SD&AE Right-of-Way. January 7, 2010. MTS Doc #S200-10-424, ADM 160.1. CEC Doc 08-AFC-5*

SANDAG – *Metropolitan Transportation Plan, June 2007 Fact Sheet regarding San Diego & Arizona Eastern Railway.*

Stantec – *Desert Springs Resort Traffic Impact Study.* August 31, 2007.

URS Corporation – *Application for Certification SES Solar Two, LLC*. June 2008.

URS Corporation – *Responses to CURE Data Requests 1-143*, May 2009

C.12 - TRANSMISSION LINE SAFETY AND NUISANCE

Testimony of Obed Odoemelam, Ph.D.

C.12.1 SUMMARY OF CONCLUSIONS

The applicant, Stirling Energy Systems Solar Two, LLC, proposes to transmit the power from Phase I of the proposed Stirling Engine Solar Two Project to the San Diego Gas and Electric transmission grid through a new, 10.3-mile double-circuit 230-kV transmission line constructed to run parallel to the existing Southwest Powerlink transmission line and connecting the project to the existing San Diego Gas and Electric Imperial Valley Substation to the southeast. Phase II would require San Diego Gas and Electric to build a new 500-kV line from the connected Imperial Valley Substation and running parallel to the existing 500-kV line. This Phase II-related line would be under the jurisdiction of the California Public Utilities Commission and the Bureau of Land Management. Therefore, this staff analysis is for the Phase I-related 230-kV line. Since the Phases I and II lines would be located in the San Diego Gas and Electric service area, each would be constructed, operated, and maintained according to San Diego Gas and Electric's guidelines for line safety and field management which conform to applicable laws, ordinances, regulations and standards. Each line would traverse undisturbed desert land with no nearby residents, thereby eliminating the potential for residential electric and magnetic field exposures. With the four proposed conditions of certification, any safety and nuisance impacts from the Phase I line the applicant proposes would be less than significant.

C.12.2 INTRODUCTION

The purpose of this staff assessment is to assess the proposed Stirling Energy Systems Solar Two (SES Solar Two) Project transmission line's design and operational plan to determine whether its related field and nonfield impacts would constitute a significant environmental hazard in the areas around the proposed route. SES Solar Two would be built in two phases each with its related power lines. This staff analysis is for the Phase I power line to be built by the applicant while the Phase II line would be built by San Diego Gas and Electric (SDG&E) under the jurisdiction of the California Public Utilities Commission (CPUC) and the Bureau of Land Management (BLM). All related health and safety laws, ordinances, regulations, and standards (LORS) are currently aimed at minimizing such hazards. Staff's analysis focuses on the following issues taking into account both the physical presence of the line and the physical interactions of its electric and magnetic fields:

- aviation safety;
- interference with radio-frequency communication;
- audible noise;
- fire hazards;
- hazardous shocks;

- nuisance shocks; and
- electric and magnetic field (EMF) exposure.

Section C.12.3 shows the federal, state, and local laws and policies that apply to the control of the field and nonfield impacts of electric power lines. Staff's analysis examines the project's compliance with these requirements.

C.12.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The potential magnitude of the line impacts of concern in this staff analysis depends on compliance with the listed design-related LORS and industry practices. These LORS and practices have been established to maintain impacts below levels of potential significance. Thus, if staff determines that the project would comply with applicable LORS, we would conclude that any transmission line-related safety and nuisance impacts would be less than significant. The nature of these individual impacts is discussed below together with the potential for compliance with the LORS that apply.

Laws, Ordinances, Regulations, and Standards

TRANSMISSION LINE SAFETY AND NUISANCE (TLSN) TABLE 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Aviation Safety	
Federal	
Title 14, Part 77 of the Code of Federal Regulations (CFR),"Objects Affecting the Navigable Air Space"	Describes the criteria used to determine the need for a Federal Aviation Administration (FAA) "Notice of Proposed Construction or Alteration" in cases of potential obstruction hazards.
FAA Advisory Circular No. 70/7460-1G, "Proposed Construction and/or Alteration of Objects that May Affect the Navigation Space"	Addresses the need to file the "Notice of Proposed Construction or Alteration" form (Form 7640) with the FAA in cases of potential for an obstruction hazard.
FAA Advisory Circular 70/460-1G, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting objects that may pose a navigation hazard as established using the criteria in Title 14, Part 77 of the CFR.
Interference with Radio Frequency Communication	
Federal	
Title 47, CFR, section 15.2524, Federal Communications Commission (FCC)	Prohibits operation of devices that can interfere with radio-frequency communication.
State	

Applicable LORS	Description
California Public Utilities Commission (CPUC) General Order 52 (GO-52)	Governs the construction and operation of power and communications lines to prevent or mitigate interference.
Audible Noise	
Local	
Imperial County General Plan, Noise Element	References the county's Ordinance Code for noise limits.
Imperial County Noise Ordinance	Establishes performance standards for planned residential or other noise-sensitive land uses.
Hazardous and Nuisance Shocks	
State	
CPUC GO-95, "Rules for Overhead Electric Line Construction"	Governs clearance requirements to prevent hazardous shocks, grounding techniques to minimize nuisance shocks, and maintenance and inspection requirements.
Title 8, California Code of Regulations (CCR) section 2700 et seq. "High Voltage Safety Orders"	Specifies requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment.
National Electrical Safety Code	Specifies grounding procedures to limit nuisance shocks. Also specifies minimum conductor ground clearances.
Industry Standards	
Institute of Electrical and Electronics Engineers (IEEE) 1119, "IEEE Guide for Fence Safety Clearances in Electric-Supply Stations"	Specifies the guidelines for grounding-related practices within the right-of-way and substations.
Electric and Magnetic Fields	
State	
GO-131-D, CPUC "Rules for Planning and Construction of Electric Generation Line and Substation Facilities in California"	Specifies application and noticing requirements for new line construction including EMF reduction.
CPUC Decision 93-11-013	Specifies CPUC requirements for reducing power frequency electric and magnetic fields.
Industry Standards	
American National Standards Institute (ANSI/IEEE) 644-1944 Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines	Specifies standard procedures for measuring electric and magnetic fields from an operating electric line.
Fire Hazards	
State	
14 CCR sections 1250-1258, "Fire Prevention Standards for Electric Utilities"	Provides specific exemptions from electric pole and tower firebreak and conductor clearance standards and specifies when and where standards apply.

C.12.4 PROPOSED PROJECT

C.12.4.1 SETTING AND EXISTING CONDITIONS

As discussed by the applicant, the total area required for the two phases of the proposed SES Solar Two would be 6,500 acres 6,140 of which would be federal land currently managed by the Bureau of Land Management (BLM) with 360 acres identified as privately owned. The community of Ocotillo is located approximately 4 miles to the west. As more fully discussed by the applicant, each phase of the proposed facility would consist of a solar field and related electric power generating equipment from which the generated power would be transmitted to San Diego Gas and Electric's (SDG&E's) power grid via a new on-site 230-kilovolt (kV) substation. The Phase I tie-in line the applicant is proposing would be an overhead 10.3-mile, double-circuit, 230-kV line extending from the project's on-site substation to SDG&E's Imperial Valley Substation to the southeast (SES 2008a pp.3-3 through 3-12). Since the Phase II-related 500-kV line would be a SDG&E line, it would be designed, built, and routed according to SDG&E guidelines in keeping with existing LORS.

The proposed project site is in an uninhabited open desert land traversed from the northwest to the southeast by the existing 230-kV SDG&E's Miguel Transmission Line. The route of the proposed 230-kV project line would extend over uninhabited desert land with the nearest residence approximately 2,500 feet northwest of the northwestern corner of the property line (SES 2008a pp. 3-3 through 3-7, and 5.16-2), meaning that there would not be the type of residential field exposure that has been of health concern in recent years.

C.12.4.2 PROJECT DESCRIPTION

The proposed Phase I, 230-kV tie-in line would consist of the following individual segments:

- A new, double-circuit 230-kV overhead transmission line extending 10.3 miles from the on-site project switchyard to SDG&E's Imperial Valley Substation; and

- The project's on-site 230-kV switchyard from which the conductors would extend to the SDG&E Imperial Valley Substation.

The on-site segment (of approximately 2.74 miles) would be located within a100-foot right-of-way as it extends from the on-site substation east and south to a point where the SDG&E Southwest Powerlink transmission line's right-of-way crosses the project's southern boundary line. The off-site segment (of approximately 7.56 miles) would be routed within a 100-foot right-of-way running parallel to the existing SDG&E 500-kV Southwest Powerlink transmission line until the third tower from the SDG&E Imperial Valley Substation where the line would cross under the 500-kV line. The proposed routing scheme was chosen to minimize the length of the required line and locate the line within existing line corridors to the extent possible. SDG&E's intended 500-kV transmission line would be part of its Sunrise Powerlink Project from the Imperial Valley Substation and would be routed parallel to the existing 500-kV line corridor as more fully discussed by the applicant. This second 500-kV line (which would be under CPUC and

BLM jurisdiction), would provide the capacity needed for the power from Phase II and other area power projects. As a SDG&E line, this second 500-kV line would be designed, built and operated (as would the project's Phase I-related 230-kV line) according to SDG&E guidelines that comply with existing health and safety LORS (SES 2008a pp. 3-26 through 3-33).

For Phase I, the proposed project's on-site substation would be built to a capacity of 300 megawatts (MW) while the Phase II expansion would have a capacity of 760 MW. The conductors for the Phase I line the applicant is proposing would be aluminum steel-reinforced cables supported on steel towers or steel poles as typical of similar SDG&E lines. The applicant provided the details of the proposed support structures as related to line safety, maintainability, and field reduction efficiency. Between 85 and 100 of these support structures would be required and would be spaced between 650 feet and 850 feet apart (SES 2008a, page 3-28, and Figures 3-6, 3-8 and 3-9).

C.12.4.3 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Direct Impacts and Mitigation Methods

Aviation Safety

Any potential hazard to area aircraft would relate to the potential for collision in the navigable airspace. The requirements listed on **TLSN Table 1** establish the standards for assessing the potential for obstruction hazards within the navigable space and establish the criteria for determining when to notify the FAA about such hazards. As noted by the applicant (SES 2008a, p. 3-19), these regulations require FAA notification in cases of structures over 200 feet from the ground. Notification is also required if the structure is to be below 200 feet in height but would be located within the restricted airspace in the approaches to public or military airports. For airports with runways longer than 3,200 feet, the restricted space is defined by the FAA as an area extending 20,000 feet from the runway. For airports with runways of 3,200 feet or less, the restricted airspace would be an area that extends 10,000 feet from this runway. For heliports, the restricted space is an area that extends 5,000 feet.

The closest airfield is the Naval Air facility, El Centro approximately 7 miles northeast of the project site and therefore too far away for the proposed line to pose an aviation hazard to utilizing aircraft. Also, the maximum height of between 70 and 100 feet for the proposed line support structures (SES 2008a p. 5.914, and Figure 3-39) would be much less than the 200 feet that triggers the concern over aviation hazard according to FAA requirements. Therefore, staff does not recommend any related condition of certification.

Interference with Radio-Frequency Communication

Transmission line-related radio-frequency interference is one of the indirect effects of line operation and is produced by the physical interactions of line electric fields. Such interference is due to the radio noise produced by the action of the electric fields on the surface of the energized conductor. The process involved is known as *corona* *discharge*, but is referred to as *spark gap electric discharge* when it occurs within gaps between the conductor and insulators or metal fittings. When generated, such noise manifests itself as perceivable interference with radio or television signal reception or interference with other forms of radio communication. Since the level of interference depends on factors such as line voltage, distance from the line to the receiving device, orientation of the antenna, signal level, line configuration and weather conditions, maximum interference levels are not specified as design criteria for modern transmission lines. The level of any such interference usually depends on the magnitude of the electric fields involved and the distance from the line. The potential for such impacts is therefore minimized by reducing the line electric fields and locating the line away from inhabited areas.

The proposed project line would be built and maintained in keeping with standard SDG&E practices that minimize surface irregularities and discontinuities. Moreover, the potential for such corona-related interference is usually of concern for lines of 345 kV and above, and not for 230-kV lines such as the proposed line. The line's proposed low-corona designs are used for all SDG&E lines of similar voltage rating to reduce surface-field strengths and the related potential for corona effects. Since the proposed line would traverse an uninhabited open space, staff does not expect any corona-related radio-frequency interference or related complaints and does not recommend any related condition of certification.

Audible Noise

The noise-reducing designs related to electric field intensity are not specifically mandated by federal or state regulations in terms of specific noise limits. As with radio noise, such noise is limited instead through design, construction, or maintenance practices established from industry research and experience as effective without significant impacts on line safety, efficiency, maintainability, and reliability. Audible noise usually results from the action of the electric field at the surface of the line conductor and could be perceived as a characteristic crackling, frying, or hissing sound or hum, especially in wet weather. Since the noise level depends on the strength of the line electric field, the potential for perception can be assessed from estimates of the field strengths expected during operation. Such noise is usually generated during rainfall, but mainly from overhead lines of 345 kV or higher. It is, therefore, not generally expected at significant levels from lines of less than 345 kV as proposed for SES Solar Two. Research by the Electric Power Research Institute (EPRI 1982) has validated this by showing the fair-weather audible noise from modern transmission lines to be generally indistinguishable from background noise at the edge of a right-of-way of 100 feet or more. Since the low-corona designs are also aimed at minimizing field strengths, staff does not expect the proposed line operation to add significantly to current background noise levels in the project area. For an assessment of the noise from the proposed line and related facilities, please refer to staff's analysis in the **Noise and Vibration** section.

Fire Hazards

The fire hazards addressed through the related LORS in **TLSN Table 1** are those that could be caused by sparks from conductors of overhead lines, or that could result from direct contact between the line and nearby trees and other combustible objects.

Standard fire prevention and suppression measures for similar SDG&E lines would be implemented for the proposed project lines (SES 2008a, p. 3-29). The applicant's intention to ensure compliance with the clearance-related aspects of GO-95 would be an important part of this mitigation approach. Condition of Certification **TLSN-3** is recommended to ensure compliance with important aspects of the fire prevention measures.

Hazardous Shocks

Hazardous shocks are those that could result from direct or indirect contact between an individual and the energized line, whether overhead or underground. Such shocks are capable of serious physiological harm or death and remain a driving force in the design and operation of transmission and other high-voltage lines.

No design-specific federal regulations have been established to prevent hazardous shocks from overhead power lines. Safety is assured within the industry from compliance with the requirements specifying the minimum national safe operating clearances applicable in areas where the line might be accessible to the public.

The applicant's stated intention to implement the GO-95-related measures against direct contact with the energized line (SES 2008a, p. 3-29) would serve to minimize the risk of hazardous shocks. Staff's recommended Condition of Certification **TLSN-1** would be adequate to ensure implementation of the necessary mitigation measures.

Nuisance Shocks

Nuisance shocks are caused by current flow at levels generally incapable of causing significant physiological harm. They result mostly from direct contact with metal objects electrically charged by fields from the energized line. Such electric charges are induced in different ways by the line's electric and magnetic fields.

There are no design-specific federal or state regulations to limit nuisance shocks in the transmission line environment. For modern overhead high-voltage lines, such shocks are effectively minimized through grounding procedures specified in the National Electrical Safety Code (NESC) and the joint guidelines of the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers (IEEE). For the proposed project line, the project owner will be responsible in all cases for ensuring compliance with these grounding-related practices within the right-of-way.

The potential for nuisance shocks around the proposed line would be minimized through standard industry grounding practices (SES 2008a, p. 3-31). Staff recommends Condition of Certification **TLSN-4** to ensure such grounding for SES Solar Two.

Electric and Magnetic Field Exposure

The possibility of deleterious health effects from EMF exposure has increased public concern in recent years about living near high-voltage lines. Both electric and magnetic fields occur together whenever electricity flows, and exposure to them together is generally referred to as *EMF exposure*. The available evidence as evaluated by the CPUC, other regulatory agencies, and staff has not established that such fields pose a significant health hazard to exposed humans. There are no health-based federal regulations or industry codes specifying environmental limits on the strengths of fields from power lines. Most regulatory agencies believe, as staff does, that health-based limits are inappropriate at this time. They also believe that the present knowledge of the issue does not justify any retrofit of existing lines.

Staff considers it important, as does the CPUC, to note that while such a hazard has not been established from the available evidence, the same evidence does not serve as proof of a definite lack of a hazard. Staff therefore considers it appropriate, in light of present uncertainty, to recommend feasible reduction of such fields without affecting safety, efficiency, reliability, and maintainability.

While there is considerable uncertainty about EMF health effects, the following facts have been established from the available information and have been used to establish existing policies:

- Any exposure-related health risk to the exposed individual will likely be small.
- The most biologically significant types of exposures have not been established.
- Most health concerns are about the magnetic field.
- There are measures that can be employed for field reduction, but they can affect line safety, reliability, efficiency, and maintainability, depending on the type and extent of such measures.

State's Approach to Regulating Field Exposures

In California, the CPUC (which regulates the installation and operation of many high-voltage lines owned and operated by investor-owned utilities) has determined that only no-cost or low-cost measures are presently justified in any effort to reduce power line fields beyond levels existing before the present health concern arose. The CPUC has further determined that such reduction should be made only in connection with new or modified lines. It requires each utility within its jurisdiction to establish EMF-reducing measures and incorporate such measures into the designs for all new or upgraded power lines and related facilities within their respective service areas. The CPUC further established specific limits on the resources to be used in each case for field reduction. Such limitations were intended by the CPUC to apply to the cost of any redesign to reduce field strength or relocation to reduce exposure. Publicly owned utilities, which are not within the jurisdiction of the CPUC, voluntarily comply with these CPUC requirements. This CPUC policy resulted from assessments made to implement CPUC Decision 93-11-013.

In keeping with this CPUC policy, staff requires a showing that each proposed overhead line would be designed according to the EMF-reducing design guidelines applicable to the utility service area involved. These field-reducing measures can impact line operation if applied without appropriate regard for environmental and other local factors bearing on safety, reliability, efficiency, and maintainability. Therefore, it is up to each applicant to ensure that such measures are applied in ways that prevent significant impacts on line operation and safety. The extent of such applications would be reflected by ground-level field strengths as measured during operation. When estimated or measured for lines of similar voltage and current-carrying capacity, such field strength values can be used by staff and other regulatory agencies to assess the effectiveness of the applied reduction measures. These field strengths can be estimated for any given design using established procedures. Estimates are specified for a height of one meter above the ground, in units of kilovolts per meter (kV/m), for the electric field, and milligauss (mG) for the companion magnetic field. Their magnitude depends on line voltage (in the case of electric fields), the geometry of the support structures, degree of cancellation from nearby conductors, distance between conductors, and, in the case of magnetic fields, amount of current in the line.

Since the CPUC currently requires that most new lines in California be designed according to the EMF-reducing guidelines of the electric utility in the service area involved, their fields are required under this CPUC policy to be similar to fields from similar lines in that service area. Designing the proposed project line according to existing SDG&E field strength-reducing guidelines would constitute compliance with the CPUC requirements for line field management.

The CPUC has recently revisited the EMF management issue to assess the need for policy changes to reflect the available information on possible health impacts. The findings did not point to a need for significant changes to existing field management policies. Since there are no residences in the immediate vicinity of the proposed project line, there would not be the long-term residential EMF exposures mostly responsible for the health concern of recent years. The only project-related EMF exposures of potential significance would be the short-term exposures of plant workers, regulatory inspectors, maintenance personnel, visitors, or individuals in the vicinity of the line. These types of exposures are short term and well understood as not significantly related to the health concern.

Industry's and Applicant's Approach to Reducing Field Exposures

The present focus is on the magnetic field because unlike electric fields, it can penetrate the soil, buildings, and other materials to produce the types of human exposures at the root of the health concern of recent years. The industry seeks to reduce exposure, not by setting specific exposure limits, but through design guidelines that minimize exposure in each given case. As one focuses on the strong magnetic fields from the more visible high-voltage power lines, staff considers it important, for perspective, to note that an individual in a home could be exposed to much stronger fields while using some common household appliances than from high-voltage lines (National Institute of Environmental Health Services and the U.S. Department of Energy, 1998). The difference between these types of field exposures is that the higher-level, appliance-related exposures are short term, while the exposures from power lines are lower level, but long term. Scientists have not established which of these types of exposures would be more biologically meaningful in the individual. Staff notes such exposure differences only to show that high-level magnetic field exposures regularly occur in areas other than around high-voltage power lines.

As with similar SDG&E lines, specific field strength-reducing measures would be incorporated into the proposed line's design to ensure the field strength minimization currently required by the CPUC in light of the concern over EMF exposure and health.

The field reduction measures to be applied include the following:

1. increasing the distance between the conductors and the ground to an optimal level;
2. reducing the spacing between the conductors to an optimal level;
3. minimizing the current in the line; and
4. arranging current flow to maximize the cancellation effects from interacting of conductor fields.

Since the routes of the proposed project lines would have no nearby residences, the long-term residential field exposures at the root of the health concern of recent years would not be a significant concern for either line. The field strengths of most significance in this regard would be as encountered at the edge of the line's 100-foot right-of-way. These field intensities would depend on the effectiveness of the applied field-reducing measures. The applicant (SES 2008a, p. 3-33 and Appendix I) calculated the maximum electric and magnetic field intensities expected along the proposed route of the Phase I line. The maximum electric field strength was calculated as 0.6 kV/m at the edge of the 100-foot right-of-way at a point of maximum interaction by fields from the proposed 230-kV line and the existing 500-kV Southwest Powerlink line. The maximum magnetic field intensity of approximately 60 mG at the edge of this right-of-way is similar to that of similar SDG&E lines (as required under current CPUC regulations) but is much less than the 200 mG currently specified by the few states with regulatory limits. The requirements in Condition of Certification **TLSN-2** for field strength measurements are intended to validate the applicant's assumed reduction efficiency.

Closure and Decommissioning Impacts and Mitigation

If the proposed SES Solar Two were to be closed, decommissioned and all related structures are removed as described in the **Project Description** section, the minimal area aviation risk and electric shocks and fire hazards from the physical presence of this tie-in line would be eliminated. Decommissioning and removal would also eliminate the line's field impacts assessed in this analysis in terms of nuisance shocks, radio-frequency impacts, audible noise, and electric and magnetic field exposure. Since the line would be designed and operated according existing SDG&E guidelines, these impacts would be as expected for SDG&E lines of the same voltage and current-carrying capacity and therefore, at levels reflecting compliance with existing health and safety LORS.

C.12.5 300 MEGAWATT ALTERNATIVE

The 300 MW alternative would essentially be the Phase I of the proposed 750 MW project (see Alternatives Figure 1), and would consist of 12,000 SunCatchers with a net generating capacity of approximately 300 MW occupying approximately 2,600 acres of land. This alternative would transmit power to the grid through the SDG&E Imperial Valley Substation and would require infrastructure similar to that for the proposed 750 MW project, including a water supply pipeline, transmission line, road access, operations facilities, substation, and hydrogen system (SES 2008a). Infrastructure associated with this alternative would require approximately 40 acres. This alternative would retain 40% of the SunCatchers and would affect 40% of the land for the proposed 750 MW project.

C.12.5.1 SETTING AND EXISTING CONDITIONS

The setting for this alternative would be approximately 2,600 acres or 40% of the lands affected by the proposed project. Lands affected by this alternative would be located on the western portion of the proposed project site, and would all be under the jurisdiction of the BLM. Please see the discussion existing conditions within affected BLM lands under Section C.8.4.1

C.12.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Since the line for the proposed 750 MW project and the 300 MW alternative would be designed and operated according to the applicable SDG&E guidelines, any differences in the magnitude of the field and nonfield impacts of concern in this analysis would be in direct proportion to the differences in generating capacities. These differences would manifest themselves regarding radio frequency communication, audible noise, hazardous and nuisance shocks, electric and magnetic field levels, fire hazards and aviation safety.

C. 12.5.3 CEQA LEVEL SIGNIFICANCE

Since staff finds these impacts to be less than significant for the proposed 750 project, staff also expects them to be less than significant for the smaller 300 MW alternative.

C.12.6 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives identified as necessary to reduce impacts on the waters of the U.S. would prohibit permanent impacts within the 10 primary drainage areas within the proposed project boundaries. This alternative is illustrated in **Alternatives Figure 1B**. This alternative would have the same outer project boundaries as the proposed project, but would prohibit installation of permanent structures within drainage areas, thereby reducing the available acreage for development to 4,690 acres, and reducing the number of SunCatchers from 30,000 under the proposed project to 25,290.

C.12.6.1 SETTING AND EXISTING CONDITIONS

The Drainage Avoidance #1 alternative would be located within the same footprint as the proposed project, so the setting is the same as that described in Section C.12.4.1.

C.12.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff's analysis focuses on the transmission line required to serve the generation facility, and addresses the following issues taking into account both the physical presence of the line and the physical interactions of its electric and magnetic fields:

- aviation safety;

- interference with radio-frequency communication;
- audible noise;
- fire hazards;
- hazardous shocks;
- nuisance shocks; and
- electric and magnetic field (EMF) exposure.

The transmission line for the Drainage Avoidance #1 alternative would follow the same route as that for the proposed project, within an existing designated transmission corridor. The line would (a) be constructed, operated, and maintained according to SDG&E's guidelines for line safety and field management which conform to applicable laws, ordinances, regulations and standards and (b) would traverse undisturbed desert land with no nearby residents, thereby eliminating the potential for residential electric and magnetic field exposures.

C.12.6.3 CEQA LEVEL OF SIGNIFICANCE

With the four conditions of certification recommended for the proposed project, any safety and nuisance impacts from the proposed line would be less than significant.

C.12.7 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative would eliminate both the eastern and westernmost portions of the proposed project, where the largest drainage complexes are located. This alternative is shown in **Alternatives Figure 1C**. It would reduce the overall size of the project site by 3,347 acres (from 6,500 acres to 3,153 acres) thus reduce the number of SunCatchers from 30,000 under the proposed project to 16,915. In this alternative, permanent structures would be allowed within all drainage areas inside the revised project boundaries.

C.12.7.1 SETTING AND EXISTING CONDITIONS

The Drainage Avoidance #2 alternative would cover a smaller area than the proposed project, but would still be located within the same footprint. The setting is the same as that described in Section C.12.4.1.

C.12.7.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

As described in Section C.12.6.2, this alternative would require new transmission lines within an existing designated corridor. Given the construction and maintenance requirements of SDG&E and the lack of nearby residences, no impacts on residences or other facilities were identified.

C.12.7.3 CEQA LEVEL OF SIGNIFICANCE

With the four conditions of certification recommended for the proposed project, any safety and nuisance impacts from the proposed line would be less than significant.

C.12.8 NO ACTION ALTERNATIVE

There are three No Project/No Action Alternatives evaluated in this section, as follows:

NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on SES Solar Two project application and on CDCA land use plan amendment

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

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site, including the associated transmission line. As a result, the transmission line-related safety and nuisance impacts caused by the SES Solar Two transmission line would not occur at the proposed site. However, the land on which the project is proposed would become available to other uses that are consistent with BLM’s land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.12.8.1 SETTING AND EXISTING CONDITIONS

The setting for the No Project/No Action Alternative would include lands that would contain the proposed project site and associated linear facilities. Subsection C.8.4.1 (above) describes in detail the lands that would be affected.

C.12.8.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

In the No Project / No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM’s framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan. For example, there are seven large solar projects proposed on BLM land within the area served by the BLM El Centro Field Office, and there are currently 70 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District.

Under the No Project/No Action alternative, the transmission line safety and nuisance impacts of the SES Solar Two project would not occur at the proposed site. This would help reduce the total human exposure to area field and non-field impacts from electric power lines in general.

C.12.8.3 CEQA LEVEL OF SIGNIFICANCE

Under the No Project/No Action alternative, the transmission line safety and nuisance impacts from the proposed project line would not occur thereby contributing to the general effort to reduce these impacts on humans. However, given the potentially low levels of these line impacts, such contribution to exposure reduction would be less than significant.

NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on SES Solar Two project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed SES Solar Two 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. The new solar project would need to interconnect with the California grid and would require a transmission line. It is expected that the transmission line-related safety and nuisance impacts caused by the construction and operation of a different solar technology transmission line would be similar to the related impacts from the proposed project. As such, this No Project/No Action Alternative could result in impacts to transmission line safety and nuisance similar to the impacts under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on SES Solar Two project application and amend the CDCA land use plan to make the area unavailable for future solar development

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

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no new transmission line. As a result, this No Project/No Action Alternative would not result in the transmission line-related safety and nuisance impacts under 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.12.9 CUMULATIVE IMPACTS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

When field intensities are measured or calculated for a specific location, they reflect the interactive, and therefore, cumulative effects of fields from all contributing conductors. This interaction could be additive or subtractive depending on prevailing conditions. Since the proposed project's transmission line would be designed, built, and operated according to applicable field-reducing SDG&E guidelines (as currently required by the CPUC for effective field management), any contribution to cumulative area exposures should be at levels expected for SDG&E lines of similar voltage and current-carrying capacity. It is this similarity in intensity that constitutes compliance with current CPUC requirements on EMF management. The actual field strengths and contribution levels for the proposed line design would be assessed from the results of the field strength measurements specified in Condition of Certification **TLSN-2**.

C.12.10 COMPLIANCE WITH LORS

As previously noted, current CPUC policy on safe EMF management requires that any high-voltage line within a given area be designed to incorporate the field strength-reducing guidelines of the main area utility lines to be interconnected. The utility in this case is SDG&E. Since the proposed project 230-kV line and related switchyards would be designed according to the respective requirements of the LORS listed in **TLSN Table 1**, and operated and maintained according to current SDG&E guidelines on line safety and field strength management, staff considers the proposed design and operational plan to be in compliance with the health and safety requirements of concern in this analysis. The actual contribution to the area's field exposure levels would be assessed from results of the field strength measurements required in Condition of Certification **TLSN-2**.

C.12.11 NOTEWORTHY PUBLIC BENEFITS

Since the proposed SES Solar Two tie-in line would pose specific, although insignificant risks of the field and nonfield effects of concern in this analysis, its building and operation would not yield any public benefits regarding the effort to minimize any human risks from these impacts.

C.12.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

TLSN-1 The project owner shall construct the proposed transmission line according to the requirements of California Public Utility Commission's GO-95, GO-52, GO-131-D, Title 8, and Group 2. High Voltage Electrical Safety Orders, sections 2700 through 2974 of the California Code of Regulations, and Sand Diego Gas and Electric's EMF reduction guidelines.

Verification: At least 30 days before starting the transmission line or related structures and facilities, the project owner shall submit to the Compliance Project Manager (CPM) a letter signed by a California registered electrical engineer affirming that the lines will be constructed according to the requirements stated in the condition.

TLSN-2 The project owner shall use a qualified individual to measure the strengths of the electric and magnetic fields from the line at the points of maximum intensity along the route for which the applicant provided specific estimates. The measurements shall be made before and after energization according to the American National Standard Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) standard procedures. These measurements shall be completed no later than 6 months after the start of operations.

Verification: The project owner shall file copies of the pre-and post-energization measurements with the CPM within 60 days after completion of the measurements.

TLSN-3 The project owner shall ensure that the rights-of-way of the proposed transmission line are kept free of combustible material, as required under the provisions of section 4292 of the Public Resources Code and section 1250 of Title 14 of the California Code of Regulations.

Verification: During the first 5 years of plant operation, the project owner shall provide a summary of inspection results and any fire prevention activities carried out along the right-of-way and provide such summaries in the Annual Compliance Report.

TLSN-4 The project owner shall ensure that all permanent metallic objects within the right-of-way of the project-related lines are grounded according to industry standards regardless of ownership.

Verification: At least 30 days before the lines are energized, the project owner shall transmit to the CPM a letter confirming compliance with this condition.

C.12.13 CONCLUSIONS

Since staff does not expect the proposed 230-kV transmission line to pose an aviation hazard according to current FAA criteria, we do not consider it necessary to recommend location changes on the basis of a potential hazard to area aviation.

The potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current SDG&E guidelines (reflecting standard industry practices). These field-reducing measures would maintain the generated fields within levels not associated with radio-frequency interference or audible noise.

The potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route.

Since electric or magnetic field health effects have neither been established nor ruled out for the proposed SES Solar Two and similar transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed line's design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information. The long-term, mostly residential magnetic exposure of health concern in recent years would be insignificant for the proposed line given the absence of residences along the proposed route. On-site worker or public exposure would be short term and at levels expected for SDG&E lines of similar design and current-carrying capacity. Such exposure is well understood and has not been established as posing a significant human health hazard.

Since the proposed project line would be operated to minimize the health, safety, and nuisance impacts of concern to staff and would be routed through an area with no nearby residences, staff considers the proposed design, maintenance, and construction plan as complying with the applicable LORS. With implementation of the four recommended conditions of certification, any such impacts would be less than significant.

C.12.14 REFERENCES

SES2008a (Stirling Energy Systems Two, LLC) – Application for certification of the Stirling Energy Systems (SES) Solar Two project, Volumes I and II (tn: 46819). Submitted to the California Energy Commission on June 30, 2008.

EPRI (Electric Power Research Institute) 1982 – Transmission Line Reference Book: 345 kV and Above.

National Institute of Environmental Health Services 1998 – *An Assessment of the Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields*. A Working Group Report, August 1998.

C.13 - VISUAL RESOURCES

Testimony of William Kanemoto

C.13.1 SUMMARY OF CONCLUSIONS

Bureau of Land Management and Energy Commission staff (hereafter jointly referred to as staff) have analyzed visual resource-related information pertaining to the proposed Stirling Energy Systems Solar Two Project and conclude that the proposed project would substantially degrade the existing visual character and quality of the site and its surroundings, including motorists on Interstate 8, recreational destinations within the Yuha Desert Area of Critical Environmental Concern and portions of the Juan Bautista Anza National Historic Trail, resulting in significant impacts. Because effective, feasible mitigation measures could not be identified by staff, these impacts are considered to be unavoidable.

Impacts of the 300 Megawatt Alternative would remain significant under CEQA to Interstate 8 and Yuha Desert Critical Environmental Concern viewers, and unavoidable. However, the degree and extent of those impacts would be substantially less than those of the proposed project.

Impacts of the Drainage Avoidance #1 Alternative would be substantially similar to the Proposed Project Alternative, and thus significant under CEQA and unavoidable.

Impacts of the Drainage Avoidance #2 Alternative would be less extensive than those of the Proposed Project Alternative, but would remain significant under CEQA and unavoidable.

The anticipated visual impacts of the Stirling Energy Systems Solar Two Project and the three alternatives analyzed in this section, in combination with past and foreseeable future local projects in the West Mesa/Yuha Desert region of southwestern Imperial County, and past and foreseeable future region-wide projects in the southern California desert are considered cumulatively considerable, potentially significant under CEQA, and unavoidable.

C.13.2 INTRODUCTION

The following analysis evaluates potential visual impacts of the Stirling Energy Systems Solar Two (SES Solar Two) Project; its consistency with applicable Laws, Ordinances, Regulations and Standards (LORS); and conformance with applicable guidelines of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

In order to provide a consistent framework for the analysis, a standard visual assessment methodology developed by California Energy Commission staff and applied to numerous siting cases in the past was employed in this study. A description of this methodology is provided in **Appendix VR-1.** The analysis was also based upon a visual resource inventory of the area conducted by the BLM and is consistent with that inventory.

As noted above, the project is evaluated for conformance with applicable LORS. Adopted expressions of local public policy pertaining to visual resources are also given great weight in determining levels of viewer concern. In accordance with staff's procedure, conditions of certification are proposed as needed to reduce potentially significant impacts under CEQA to less than significant levels, and to ensure LORS conformance, if feasible.

C.13.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Federal

Significance under NEPA is defined in terms of a) context and b) intensity. Context means that the significance of an action must be analyzed in several contexts, such as society, the affected region, affected interests, and locale. Intensity refers to the severity of impact, and includes a variety of factors to be considered (40 CFR 1508.27).

Some of the intensity factors potentially relevant to visual impacts include 'unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands . . . ,' degree of controversy, degree of uncertainty about possible effects, degree to which an action may establish a precedent for future actions, and potential for cumulatively significant impacts.

State

The CEQA *Guidelines* define a "significant effect" on the environment to mean a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including . . . objects of historic or aesthetic significance." (Cal. Code Regs., tit.14, § 15382.) Appendix G of the *Guidelines*, under Aesthetics, lists the following four questions to be addressed regarding whether the potential impacts of a project are significant:

1. Would the project have a substantial adverse effect on a scenic vista?
2. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?
3. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?
4. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

In addition, staff evaluates potential impacts in relation to standard criteria described in detail in Appendix VR-1. Staff evaluates both the existing visible physical environmental setting, and the anticipated visual change introduced by the proposed project to the view, from representative, fixed vantage points (called "Key Observation Points" (KOPs). KOPs are selected to be representative of the most characteristic and most critical viewing groups and locations from which the project would be seen. The likelihood of a visual impact exceeding Criterion C. of the CEQA Guidelines, above, is determined in this study by two fundamental factors: the susceptibility of the setting to impact as a result of its existing characteristics (reflected in its current level of visual quality, the potential visibility of the project, and the sensitivity to scenic values of its viewers); and the degree of visual change anticipated as a result of the project. These two factors are summarized respectively as *visual sensitivity* (of the setting and viewers), and *visual change* (due to the project) in the discussions below. Briefly, KOPs with high sensitivity (due to outstanding scenic quality, high levels of viewer concern, etc.), that experience high levels of visual change from a project, are more likely to experience adverse impacts.

The National Environmental Policy Act (NEPA) requires that the federal government use ‘all practicable means to ensure all Americans safe, healthful, productive, and *aesthetically* (emphasis added) and culturally pleasing surroundings (42 U.S. Code 4331[b][2]).’ In this study, staff utilized an in-depth visual resource inventory conducted for BLM as a part of the environmental baseline for this analysis, as described in greater detail in Section C.13.4.1, below (USDOI, 2008). In staff’s professional opinion, the assessment framework and impact thresholds utilized in this study are substantially consistent with those typically applied by BLM under its own procedures. Staff thus considers that the conclusions of this analysis are substantially equivalent to those that would be reached by applying BLM-specific methods of visual assessment.

Local

Staff also reviews federal, state, and local LORS and their policies or guidelines for aesthetics or preservation and protection of sensitive visual resources that may be applicable to the project site and surrounding area. These LORS include local government land use planning documents (e.g., General Plan, zoning ordinance).

Please refer to **Appendix VR-1** for a complete description of staff’s visual resources evaluation criteria.

C.13.4 PROPOSED PROJECT

C.13.4.1 SETTING AND EXISTING CONDITIONS

Regional Landscape

The proposed SES Solar Two site comprises approximately 6,500 acres (roughly 10 square miles) in the southwest portion of Imperial County, roughly 14 miles west of the town of El Centro. The project site is located in the western portion of the Salton Trough, a low-lying sedimentary basin once comprising a lakebed as recently as 300 years ago, which currently includes the Salton Sea, a man-made lake located approximately 23 miles to the northeast. As such, the landscape is characteristically relatively level, though becoming more highly dissected and topographically varied as one progresses farther southward into the Yuha Desert. The Salton Trough occupies the western edge of the vast Basin and Range physiographic province (Fenneman, 1946). The Salton Trough landscape is bounded to the west by the Jacumba and Coyote Mountains, each comprising BLM Wilderness Areas (WAs); and mountains of Anza-Borrego Desert State Park and the Fish Creek Mountains WA to the northwest. The Coyote Mountains rise a short distance to the west of the site to a height of 2,400 feet at Carrizo Mountain. Mount Signal in Mexico is prominently visible to the south of the Yuha Desert.

The Salton Trough marks the western limit of the Colorado Desert, a section of the larger Sonoran Desert that extends across the southwestern U.S. and northern Mexico. Native vegetation cover of the region consists of Sonoran creosote bush scrub, a low-growing desert land-cover type characteristic throughout the Sonoran Desert and typical of the Colorado Desert as a whole, characterized by sparse, low-growing green and tan colored scrub, often interspersed with the distinctive vertical forms of Ocotillo cacti. Throughout the region, large expanses of nearly vegetation-free desert pavement are also a characteristic element. Desert pavement consists of large areas of naturally-exposed small rock and gravel, darkly colored by weathering and exposure, forming a distinctive visual surface image typical of the region. The site is located less than two miles west of green, highly irrigated level farmlands of the Imperial Valley, which extend northward to the Salton Sea and south to the US-Mexico border, comprising a distinct landscape unit contrasting markedly with the project site's desert landscape.

The site also lies at the northern boundary of the Yuha Desert, a distinctive section of the Colorado Desert identified by the BLM as an Area of Critical Environmental Concern (ACEC) for its unique biological, historic, and archaeological characteristics. The boundary of the designated BLM ACEC lies immediately south of nearby US interstate 8 (I-8).

Project Site

VISUAL RESOURCES Figure 1, Views of the Project Site, depicts views of the SES Solar Two site and vicinity. The project site comprises approximately 6,140 acres of public land administered by the BLM, and approximately 360 acres of private land within Imperial County jurisdiction. The site is bounded to the north by Plaster City, a large US Gypsum Corporation wallboard manufacturing plant, the Evan Hewes (Imperial) Highway (County Road S80) and, to the north of the highway, the Plaster City Open OHV Area. To the south, it is bounded by US I-8 and, south of the freeway, the BLM Yuha Desert ACEC. Two private parcels of land, one owned by a recreational vehicle club and one by a private landowner, are surrounded by the proposed project and are not a part of the project.

The site occupies a band of relatively level, arid lowlands between the level irrigated farmlands of Imperial Valley two miles to the east, and the prominently visible Jacumba and Coyote Mountains that begin rising as little as two to three miles to the west. The site also comprises a portion of the Upper Yuha Desert, which is described further below. In broad terms the site represents a transitional area between the relatively featureless and highly disturbed West Mesa to the north, and the topographically varied, scenically rich Yuha Desert ACEC to the south.

The site is largely undeveloped public desert land. The site is currently managed by BLM as Multiple-Use Class (MUC) L (Limited Use) with limited OHV use (vehicular travel restricted to designated trails) and minimal evident surface disturbance. In contrast, the site adjoins the BLM-designated Plaster City Open OHV Area, located north of Evan Hewes Highway, a popular OHV recreation and camping area that experiences intensive OHV use, including OHV racing events and off-trail driving by high numbers of visitors. Though distinctly less disturbed than the Open Area, however, existing man-made visual intrusions within or adjoining the project site include the Plaster City wallboard factory, the Southwest Powerlink transmission line, and Highways I-8 and S80. These features, though very evident, remain visually subordinate to the vast open expanse of the site and surroundings. The Juan Bautista de Anza National Historic Trail, managed jointly by the BLM and National Park Service (NPS) bisects the western portion of both proposed phases of the project site. However, the portion of the trail located within the project site is not marked or open for travel, as it is within the Yuha Desert ACEC. Within the ACEC, travelers may follow the designated trail. North of the ACEC, travel on the historic trail is re-directed around the project site by BLM, where it re-connects with the designated historic alignment, paralleling an existing rail line in the Open Area north of Plaster City.

A number of small rural communities lie within the project viewshed, including the town of Ocotillo over 4 miles to the west; Coyote Wells, approximately 4 miles to the southwest; Seeley, approximately 7 miles to the east; and the Imperial Lakes residential development located approximately 1.5 miles northeast of the project on Evan Hewes Highway. Centinela State Prison is located approximately 2.5 miles northeast of the project site.

Project Visual Setting: Viewshed, Landscape Units, and KOPs

Project Viewshed

As illustrated in AFC Figure 5.13-1, which presents a computer-generated GIS viewshed map, the project would be visible to most of the area within a 5-mile radius, with the exception of some areas to the west and southwest. A feature of this desert landscape is the potential for large projects to be seen over great distances where even slightly elevated viewpoints exist, due to the large open areas of level topography and absence of intervening landscape features.

Landscape Units and KOPs: Visual Quality, Viewer Concern, and Viewer Exposure

VISUAL RESOURCES Figure 2, Existing Landscape Setting and Key Observation Points (KOPs), subdivides the project viewshed into broad landscape character units. It also depicts Key Observation Points (KOPs) used as the basis for this analysis. KOPs are used in the Energy Commission visual analysis method as the basis for evaluating potential project impacts, and represent the key sensitive viewer groups and viewing locations likely to be affected by the project. **VISUAL RESOURCES Figure 3,** Visual Setting Character Photos, depicts various typical image types and features within the project viewshed.

The landscape units represent contiguous areas with broadly consistent visual character, and are rated for their visual quality. In the CEC assessment approach, KOPs are then rated according to the visual quality of their setting, and an assessment of their level of viewer concern and viewer exposure. Those three primary attributes are summarized in a KOP's *overall visual sensitivity* rating, which reflects an assessment of the overall susceptibility to visual impact of the viewer group/receptors it represents. These sensitivity ratings serve as the environmental baseline against which potential project impacts, measured in terms of level of *visual change*, are evaluated. Because viewer concern and exposure may vary among different receptors within a landscape unit, overall sensitivity of particular KOPs within a unit may also vary.

The baseline mapping of landscape units in this assessment is derived from an in-depth visual resource inventory conducted by BLM, the Yuha Desert/West Mesa VRM Inventory (USDOI, 2008)(Map No. 1 – California Desert District – El Centro). In that inventory the landscape units were delineated, assessed and rated following the BLM's Visual Resource Management (VRM) system, as documented in that study. Landscape units are referred to in that study as Scenic Quality Rating Units (SQRUs), and identified by number. Following the VRM methodology, the inventory mapping and evaluation reflect an assessment of the landscape's *scenic quality*, *viewer sensitivity*, and *distance zone* of observers. These categories are generally analogous to the three primary components of overall visual sensitivity - visual quality, viewer concern, and viewer exposure - in the Energy Commission staff method. In the Yuha Desert study, inventory results were then assigned as Interim Visual Resource Management (IVRM) Classes. In this analysis, the Yuha Desert inventory and its IVRM Classes are referenced solely with respect to their in-depth field mapping of landscape units (visual character units), and to the scenic quality ratings that underlie them. The BLM inventory is thus regarded solely as descriptive of the existing environmental condition of the setting. No particular management prescriptions are assumed or implied by this analysis in relation to IVRM categories assigned in the Yuha Desert study. In **VISUAL RESOURCES Figure 2,** as well as the discussion below, landscape units are given descriptive names for context, followed by the identifying Scenic Quality Rating Unit (SQRU) number of the original BLM inventory in parentheses.

KOPs used in this study include those used in the project AFC, which were selected for the AFC in consultation with Energy Commission staff. Additional KOPs were added by staff for this analysis. For simplicity the numbering of viewpoints in the AFC have been retained in this analysis. (All figures referred to in the text may be found at the end of this section).

In the following discussion, distance zone terminology does not refer to the BLM VRM usage, but rather is used, in the context of the Energy Commission method, as follows: 'foreground' is used generically to refer to viewing distances under ½-mile; 'middle-ground' to distances between ½ and 5 miles; 'near middle-ground' refers to that portion of middle-ground under roughly one mile; and 'background' to distances over 5 miles.

Because KOP photos represent the existing views of project simulations, the reader is referred below to these 'before project' photos in the discussion that follows. The figure numbers referring to each KOP below thus appear out of sequence, but may be found along with all other figures, at the end of this section. In each case, the designation "**a**" after the figure number indicates the 'before' (existing) view of a KOP in the simulation pairs.

Plaster City Open Area/West Mesa (SQRU 9) - KOP 1

KOP 1 represents potential viewers of the project in the Plaster City Open OHV Area immediately north of the project site. **VISUAL RESOURCES Figure 7a** depicts the existing view from KOP 1. This is a BLM-designated and administered off-road recreational vehicle area that is a heavily-used destination for off-road racing and driving, as well as amateur rocket launching. It comprises the southern portion of West Mesa, a large, flat mesa within the western Salton Trough south of Superstition Mountain that includes portions of the Superstition Mountain Open OHV Area, the West Mesa ACEC, the US Naval Air Facility El Centro Desert Bombing and Training Ranges, and the Plaster City OHV Open Area. The landscape unit is relatively featureless, characterized by large expanses of flat topography, dissected by intermittent seasonal washes. Land cover is low-growing, nondescript Sonoran creosote bush scrub that is naturally very sparse in this area, but is generally visually dominated to an even greater degree by lighter-colored exposed sand and soil due to pervasive surface disturbance by intensive OHV use. The prevailing very light to white soil color forms contrasting patterns of disturbance where concentrated OHV activity has disturbed the scrub vegetation, reducing the scenic intactness of the landscape in many of the most-used portions of the Open Area. Extensive areas of OHV disturbance, an existing rail line, the U.S. Gypsum Plaster City plant, and the existing 500 kV Southwest Powerlink transmission line represent various visual disturbances that detract from the scenic integrity of the landscape within foreground and near-middle-ground distance of the project site and Evan Hewes (Imperial) Highway.

Visual Quality: Visual quality of this landscape unit varies between moderate and moderately low, depending upon the degree of existing visual impairment in the viewer’s foreground. As described, numerous visually compromising elements characterize the area, including the US Gypsum plant, transmission lines, a rail line, and extensive ground disturbance from open, off-road OHV use.

Viewer Concern: Viewer concern is considered moderately high; although the focus of many Open Area recreationists may be more upon racing and driving than scenery, numbers of visitors can be very high, and an elevated level of concern with scenic values is presumed by staff within the CDCA in general. The BLM El Centro Field Office estimated 32,457 users of the Open Area in 2007 (Applicant Data Response 43)(SES 2008f).

Viewer Exposure: Viewer exposure is moderately high. Views are inherently unobstructed within this open, level landscape, and may occur at foreground distance; viewer numbers, though low much of the year, may be very high during peak use periods.

Overall visual sensitivity was considered to be moderately high.

Upper Yuha Desert (SQRU 1) – KOPs 2, 3, 4, 5

The entire project site, and KOPs 2, 3, 4 and 5 are all located within the Upper Yuha Desert unit (SQRU 1). This unit is visually distinguished from the topographically similar West Mesa immediately to the north, in part due to the much lower degree of disturbance in contrast to the Open OHV Area to the north. As described above, this area south of the Evan Hewes Highway, including the project site, is a limited use area in which vehicular travel is restricted by BLM to designated trails. As a result surface disturbance, though present, is far less than within the Open Area to the north, and the image of intact scrub vegetation predominates. [239, 249, etc.) SQRU 1 is also distinguished from the adjoining Yuha Desert ACEC to the south by the intrusion of existing man-made disturbances including the Evan Hewes Highway, the Southwest Powerlink transmission line, a rail line, and Plaster City. In addition, the physiography of the Yuha Desert in SQRU 2 south of I-8 becomes increasingly varied and vivid, in contrast to the generally flat expanses of SQRU 1.

Visual Quality: While man-made intrusions and ground disturbance remain visually subordinate within the relatively intact natural landscape, landforms and vegetation of this unit lack exceptional vividness. Visual quality is enhanced by mountains in the background distance. It is also frequently impaired by haze and air pollution that obscure or filter distant views throughout much of the year. Visual quality of this landscape unit was characterized by BLM staff as scenic class C, and by CEC staff as moderate.

Nearest Residence East of Project (1.5 miles) – KOP 2

KOP 2 is a view from the nearest residence to the project, looking southwest into the project site from the Evan Hewes Highway at a distance of roughly 1.5 miles. **VISUAL RESOURCES Figure 8a** depicts the existing view from KOP 2.

It is thus also representative of viewers on that roadway as well. Other nearby residences include the Imperial Lakes development, but those homes are screened from views of the project site by dense landscape screening at the development boundary. Views of level open desert characterized by light tan colored soils and sparse scrub vegetation occupy the visual foreground and middle-ground. Ridges of the distant Coyote and Jacumba Mountains can be seen on the horizon at background distances of 20 miles or more. From this particular location, looking southwest into the project site, the US Gypsum plant and Southwest Powerlink transmission line are distant (three miles or more) and visually very subordinate.

As discussed above, visual quality of this unit is considered moderate.

Viewer Concern: Viewer concern of this KOP is considered moderately high – residences are generally considered to have high sensitivity, but the number of residences at this distance to the project is very low. Viewer concern of S80 motorists is considered moderate; viewer types range from workers, with low concern for scenery, to OHV recreationists with varying levels of concern for scenic values.

Viewer Exposure: Viewer exposure at this distance is moderate; views are open and unobstructed, but viewing distance diminishes visibility of the project. Viewer numbers, though low much of the time, can be high during OHV events and peak use periods.

Overall visual sensitivity is considered to be moderately high.

Nearest Residence to Proposed Transmission Line – KOP 3

KOP 3 is a view from the nearest residence to the proposed project transmission line, adjoining the Westside Main Canal at the western edge of the Imperial Valley agricultural area, and was selected to evaluate potential impacts of the project transmission line. **VISUAL RESOURCES Figure 9a** depicts the existing view from KOP 3.The project transmission line would parallel the existing Southwest Powerlink transmission line. The view from this portion of SQRU 1 is substantially similar to that from KOP 2. As at KOP 2, views of level, relatively featureless open desert characterized by light tan colored soils and sparse scrub vegetation occupy the visual foreground and middle-ground. Ridges of the distant Coyote and Jacumba Mountains can be seen on the horizon at background distances of 20 miles or more. The existing Southwest Powerlink transmission line is visible at a distance of as little as one mile, detracting from the intactness of the landscape setting, but remaining visually subordinate at this distance.

Viewer Concern: Viewer concern is moderate. The number of residential viewers represented in this view is very low, and their focus on scenic values in this agriculture-oriented context is considered moderately low.

Viewer Exposure: Views within this landscape type are oriented inward; that is, the canal levees bounding the area, along with occasional vegetation, tend to filter or block views outward toward the desert, directing attention toward fields and residences within the farmland landscape. Viewer exposure to the project transmission line is thus low.

Overall visual sensitivity of this KOP is thus considered to be moderately low.

View from Town of Ocotillo (5 miles) – KOP 4

KOP 4 is a view from the town of Ocotillo, roughly 5 miles west of the project site on I-8, and is representative of I-8 motorists at background distances from the project. **VISUAL RESOURCES Figure 10a** depicts the existing view from KOP 4. Viewing conditions of this panorama over the Yuha Desert landscape unit are quite different than from KOPs 2 and 3. A broad overview of the West Mesa and Yuha Desert area is visible in the distance due to the elevated position above the valley floor. The level, featureless character of the setting landscape and the relative absence of vivid features are evident in this view eastward.

Viewer Concern: Viewer concern is considered moderately high, due to an elevated level of concern with scenic values presumed within the CDCA in general, and a relatively high proportion of motorists on I-8 concerned with those scenic values.

Viewer Exposure: Viewer exposure is moderate. Views are open, unobstructed, and heightened by the panorama provided by the elevated viewing position; overall viewer numbers on I-8 are high; but viewing distance diminishes visibility of the project from this KOP, which is representative of background distance views.

Overall visual sensitivity of this KOP is thus considered to be moderately high.

View from Southeast Corner of Site, at Dunaway Road – KOP 5

KOP 5 is a view from the southeast corner of the site west of Dunaway Road, and is representative of foreground views from I-8, and indeed from Evan Hewes Highway as well. **VISUAL RESOURCES Figure 11a** depicts the existing view from KOP 5. The view is quite similar to that from KOPs 1 and 2, also facing westward. The visual foreground and middle-ground consists of relatively intact desert floor, characterized by light tan soils and sparse, nondescript tan to greenish scrub, grass and other low-growing vegetation. Hills and ridges of the Jacumba and Coyote Mountains, including Carrizo

Mountain to the northwest, are vivid features, strongly enhancing an otherwise fairly featureless landscape and elevating visual quality for westward travelers. Some low rolling topography characteristic of washes in the Yuha Desert are visible in this view. Transmission towers of the existing Southwest Powerlink transmission line are visible in this portion of the site, ranging from visually subordinate to dominant according to distance.

Viewer Concern: As from KOP 4, viewer concern is considered moderately high, due to an elevated level of concern with scenic values presumed within the CDCA in general, and a relatively high proportion of motorists on I-8 concerned with those scenic values.

Viewer Exposure: Viewer exposure is extremely high; views are predominantly open and unobstructed over a vast area, and the project is viewed at immediate foreground distance with terrain level or oriented toward the viewer.

Overall visual sensitivity of this KOP is thus considered to be moderately high.

Yuha Desert/Yuha Basin (SQRUs 2 and 3)– KOPs 6, 7, 8

No KOPs were addressed in the AFC within other adjoining landscape units such as the Jacumba Wilderness, Coyote Mountain Wilderness, Painted Gorge, or Yuha Basin. The first three areas mentioned are located largely at background distance and would thus appear similar in character to KOP 4; relatively high viewer concern and open, unobstructed viewer exposure would be greatly moderated by distance, which would inherently reduce the dominance of the project to visually subordinate levels.

Portions of the Yuha Basin landscape unit (SQRU 3), however, are much closer, with some portions a little over a mile from the site. This unit includes a designated travel route (Route 274) identified by BLM and the National Park Service (NPS) as a portion of the historic Juan Bautista de Anza Trail, and many of the most-visited destinations within the Yuha Desert ACEC, including the Yuha Geoglyphs, Yuha Shell Beds, Yuha Well, distinctive and scenic topography of the Yuha Basin and Buttes, and several designated campgrounds (USDOI, 2004). Because this portion of the ACEC is among the most popular destinations in the El Centro BLM Field Office area, is more scenic than any other portion of the Yuha Desert, and lies at points within near-middle-ground distance of the project site, additional KOPs were identified within this landscape unit for analysis. The principal sensitive viewpoint in the ACEC in relation to the project is Route 274, and the geoglyphs and campgrounds that are located along it. The route lies essentially at or near the boundary between SQRUs 2 and 3, with its overall visual quality determined predominantly by scenic attributes associated with SQRU 3. The view from Route 274 and other designated routes in the vicinity are characterized by great visual variety and interest, with a diversity of distinctive land forms including the Mud Hills, Yuha Buttes, highly dissected washes, and distinctive expanses of desert pavement, often virtually devoid of vegetation.

No simulations were prepared from this unit. However, the level of visibility of the project and site from this area is quite evident in field reconnaissance and photo-documentation and a setting and impact analysis was prepared based upon field reconnaissance.

KOP 6 is a view from the eastern segment of Route 274 near Dunaway Campground at a distance of ½-mile from the project site. **VISUAL RESOURCES Figure 12a** depicts the existing view from KOP 6.

KOP 7 is a view from Overlook Campground on Route 274 at a distance of roughly one mile. **VISUAL RESOURCES Figure 12b** depicts the existing view from KOP 7.

KOP 8 is a view from the vicinity of the Yuha Geoglyphs, also on Route 274 at a distance of roughly 3 miles. **VISUAL RESOURCES Figure 12c** depicts the existing view from KOP 8.

Visual Quality. Visual quality of these KOPs is thus considered to be moderately high, consistent with the BLM inventory rating of Scenic Class B given to SQRU 3.

Viewer Concern. Viewer concern is similarly considered to be high, due to the historic and scenic significance of both the route and surroundings, reflected in part in the area's ACEC status.

Viewer Exposure. Viewer exposure along Route 274 varies with topography and distance, but the project site is prominently visible from much of Route 274 and its associated attractions, at distances of as little as 1/2-mile, and is thus high.

Overall visual sensitivity of these KOPs is thus considered to be high.

Project Visual Description

Power Plant

VISUAL RESOURCES Figure 4 depicts the layout of the two proposed project phases. **VISUAL RESOURCES Figure 5** depicts architectural elevations of the SES Solar 2 power block, based upon the original AFC plan (SES 2008a). **VISUAL RESOURCES Figure 6** depicts elevations of the proposed mirror units.

The proposed project includes approximately 30,000, 38-foot solar dish Stirling systems (i.e., SunCatchers) and associated equipment and infrastructure within a fenced boundary, occupying approximately 6,500 acres (roughly 10 square miles) of undeveloped land. Associated proposed facilities include:

- an onsite, 24.27-acre Main Services Complex located generally in the center of the site for administration and maintenance activities, which would include buildings, parking and access roads;
- an onsite, 6-acre 750-MW Substation located generally in the center of the site, near the Main Services Complex.

Construction Staging Area

A 100-acre lay-down site is proposed east of the project site on Dunaway Road and north of I-8. (SES 2008a).

Site Grading

Site grading would potentially represent a substantial visual component of the proposed project during construction, affecting nearly the entire site. Surface disturbance of the proposed site, as in most desert landscapes of the region, can often result in high contrast between the disturbed area and surroundings, due to high contrast between the disturbed soil color and albedo, and the color and albedo of the existing undisturbed, vegetated surface. Furthermore, effectiveness of revegetation in this arid environment is difficult, of limited effectiveness, and capable of recovery only over a very long-term time frame.

Plant Night Lighting

According to the AFC, night lighting of the Main Services Complex would consist of 400-watt high-pressure sodium lights, with illumination falling to 0.0 foot-candles on the ground a short distance from the facility (AFC Figure 3-20, -21)(SES 2008a).

Parking and roadway lighting would consist of full cut-off luminaires to minimize night sky light pollution. Preliminary photometric studies provided in the AFC depict illumination from these fixtures falling to 0.0 foot-candles a short distance from each roadway intersection (AFC, Figure 3-23, SES 2008a).

Linear Facilities

Linear facilities associated with the proposed project would include:

- an off-site 12-mile, 6-inch water pipeline approximately 30 inches underground in the existing Evan Hewes Highway right-of-way (ROW), which would provide reclaimed water from the Seeley Waste Water Treatment Facility (SWWTF) located approximately 13 miles east of the proposed project site;
- a 10.3-mile 730-MW/230-kV transmission line intended to connect to the existing San Diego Gas & Electric (SDG&E) Imperial Valley Substation located southeast of the project site would parallel the existing Southwest Powerlink transmission line ROW; and
- approximately 27 miles of unpaved arterial roads, approximately 14 miles of unpaved perimeter roads, and approximately 234 miles of unpaved access roads (SES 2008a).

VISUAL IMPACT ASSESSMENT

Staff Discussion of AFC Analysis

Despite various differences in methodology and specific conclusions, staff is in general agreement with the overall conclusions of the AFC visual analysis. That is, the AFC concluded that potential project visual impacts from KOPs 1, 2, 4, and 5 are potentially significant under CEQA. However, the AFC did not address potential project impacts to visitors within the adjacent BLM Yuha Desert ACEC, particularly the Juan Bautista de Anza National Historic Trail. These impacts are addressed by staff under KOPs 6, 7, and 8, below.

Direct Project Impacts

Project Operation Impacts

Impacts of Structures on Key Observation Points

Plaster City Open Area/West Mesa (SQRU 9) - KOP 1

As described in Section C.13.4.1, above, overall visual sensitivity within this landscape unit is generally considered to be moderately high. Existing scenic quality of this landscape unit ranges from moderate to moderately low. However, viewer concern is considered moderately high due both to high numbers of recreational visitors in the area, and to the location of the setting within the CDCA in general. Viewer exposure is high due to proximity – many viewers would see the project at foreground distance from high-use parts of the Open Area; high due to high numbers of viewers, reaching several thousands during peak weekends; and high due to the generally unobstructed view conditions inherent in the level, open landscape.

*KOP 1 – View from Plaster City Open OHV Area, Looking South (roughly 1.5 miles from site). **VISUAL RESOURCES Figures 7A and 7B.***

Staff Comments on Applicant's Simulation

Figures 7A and 7B depict a view of the site from a middle-ground distance of roughly 1.5 miles. Staff considers this to be a reasonably representative viewpoint. The range of actual view conditions of visitors in the Open Area would extend from immediate foreground distance to background distance. It should be noted, however, that a substantial number of OHV Open Area users, including large groups attending organized races, could view the project from closer distances including, occasionally, foreground (0.5 mile or under) distance. At these nearer distances the project would appear much more prominent, dominating the view from foreground locations. From such viewpoints near the project site, views of the Plaster City facility and highway would also be more prominent, compromising the intactness of the landscape.

Project visual contrast within the Open Area would thus range from very strong to moderate, as a function of distance from the site boundaries. As represented in the simulation from KOP 1, at a distance of 1.5 miles, project contrast would be moderate. Color and texture contrast of the vast rows of SunCatchers with the existing landscape at this distance would be strong, lending a distinctly man-made, industrial character. Form and line contrast, however, would be relatively weak, matching the broad horizontal lines of the level terrain. From some viewpoints, the taller buildings of the Main Services Complex (up to 77 feet tall) could be visible in the middle of the site, exhibiting some vertical form and line contrast and attracting attention. However, these features would generally be dwarfed by the vast scale and dominance of the SunCatcher fields.

The project would exert strong horizontal scale and spatial dominance, occupying a vast expanse of the landscape. However, in overall visual scale, dominance would be moderate outside of the foreground zone. As depicted in the simulation, the overall proportion of the view occupied by the project would be small compared to the foreground terrain, background mountains, and sky, due to the level terrain and oblique viewing angle.

The project would not physically block scenic views of Signal Mountain or the Jacumba Mountains in the distance from viewpoints beyond immediate foreground distance within the OHV Open Area. The project would, however, block such views for viewers directly adjacent to the project on Evan Hewes Highway.

Overall visual change to viewers in the OHV Open Area is thus considered moderate. From most of the OHV Open Area beyond foreground distance of the project, the project would attract attention but would not dominate the existing landscape.

Impact Significance - In the context of moderately high overall visual sensitivity, the moderate level of visual change experienced by the majority of OHV Open Area viewers – those outside of foreground distance from the project – could be regarded as potentially substantial. However, considering the disturbed character of the OHV Open Area terrain and the activity-focused nature of much of the OHV recreation that takes place there, staff considers the moderate levels of visual change experienced outside of the foreground distance zone an adverse but less than significant impact under CEQA.

However, for those viewers within foreground distance of the project, including motorists on some adjacent segments of Evan Hewes Highway, project contrast would be strong, and scenic views of mountains to the south could be blocked. In the context of moderate overall visual sensitivity this could represent a substantial adverse impact. This impact to foreground viewers, particularly motorists on adjacent foreground segments of highway, will be discussed separately under KOP 5, below.

Mitigation – No mitigation measures are considered necessary outside of foreground distance within the Open Area. Measures to address sensitive foreground views are discussed under KOP 5, below.

Upper Yuha Desert (SQRU 1) – KOPs 2, 3, 4, 5

KOP 2 – View from Nearby Residence on Evan Hewes Highway, Looking Southwest (roughly 1.5 miles). ***VISUAL RESOURCES Figures 8A and 8B.***

KOP 2 represents the view of the nearest residence to the project site, located approximately 1.5 miles to the east on Evan Hewes Highway. As such it is also representative of views from the highway at middle-ground distance.

Project visual contrast from this KOP would be similar to that described under KOP 1, above, which is at a similar distance. As represented in the simulation from KOP 2, project contrast at this distance would be moderate. Color and texture contrast with the existing landscape at this distance would be strong, lending a conspicuous, distinctly man-made character to the view. Form and line contrast, however, would be relatively weak, blending with the broad horizontal lines of the level terrain, and occupying a relatively small proportion of the view due to the level terrain relationship to the viewer and resulting oblique viewing angle.

Similarly, at this distance the project would exert strong horizontal scale and spatial dominance, occupying a vast extent of the landscape. However, in overall visual scale, dominance would be moderate outside of the foreground zone, and lower as distance from the project increased. As depicted in the simulation, the overall proportion of the view occupied by the project would be small compared to the foreground terrain, background mountains, and sky.

The project would not block scenic views within this middle-ground distance zone.

Overall visual change from KOP 2 and similar middle-ground viewpoints is thus considered moderate. At this distance and under these level terrain relationships the project would attract attention but would not dominate the existing landscape.

Impact Significance - In the context of moderately high overall visual sensitivity, the moderate level of visual change experienced by these residents and motorists on Evan Hewes Highway at distances of over one mile would be somewhat adverse, but less than significant.

Mitigation – No mitigation measures are considered necessary at distances of over roughly one mile on or along Evan Hewes Highway.

As mentioned previously, impacts to foreground viewers, particularly motorists on adjacent foreground segments of highway, will be discussed separately under KOP 5, below.

KOP 3 – View from Residence to Proposed Project Transmission Line, Looking West (roughly one mile). ***VISUAL RESOURCES Figures 9A and 9B.***

KOP 3 represents views of the proposed project transmission line from the nearest residence, located at the western edge of the Imperial Valley agricultural area east of the Yuha Desert. The photograph actually appears to have been taken west of the irrigation canal marking the westernmost boundary of the irrigated farmlands in which the residence is located. Consequently, visual exposure to the transmission lines is actually greater than would typically be the case within the agricultural area. On roads and in fields of the irrigated area, views toward the transmission corridor tend to be filtered by the canal levees and occasional vegetation.

As illustrated in the simulation, at this distance the existing Southwest Powerlink transmission lines and towers are evident, though visually subordinate within the view. The line and tower intrude into the skyline of the Jacumba Mountain ridge in the background distance, compromising existing visual quality. The proposed project transmission line would parallel the existing line and add incrementally to its visual presence. In combination, vertical form contrast of the two lines would increase to a moderately high level, as would intrusion into the background mountain skyline. The contrast of the combined transmission lines could attract attention and begin to dominate the characteristic landscape.

Impact Significance - In the context of moderately low overall visual sensitivity from this and similar locations due to low visual exposure and low viewer numbers, the moderately high level of anticipated visual change of the combined powerlines is considered less than significant.

Mitigation – No mitigation measures are considered necessary from KOP 3 or similar viewpoints along the canal.

KOP 4 – View from Town of Ocotillo, Looking West (approximately 4-1/2 miles).
VISUAL RESOURCES Figures 10A** and **10B.

KOP 4 is taken from the town of Ocotillo, roughly 4.5 miles west of the project site on I-8, and is representative of I-8 motorists at background distances from the project. A broad overview of the West Mesa and Yuha Desert area is visible from this elevated position above the valley floor. However, as depicted in the simulated view, visibility and prominence of the project at background distances such as this is limited. Project contrast would be due primarily to color and texture contrast; at this distance the mirror reflections would often resemble the surface of a lake. The overall line and form contrast is very weak due to the oblique viewing angle and low overall visual magnitude within the field of view. Project contrast would be seen, but would not attract attention.

Impact Significance - Overall visual sensitivity from I-8 is considered moderately high. However the low level of overall visual change would represent a less than significant impact at this distance.

Mitigation – No mitigation measures are considered necessary from KOP 4 or similar viewpoints within the background distance zone.

KOP 5 – View from I-8 Near Dunaway Road, Looking Northwest (roughly 1/2 mile).
VISUAL RESOURCES Figures 11A and 11B.

Staff Comments on Applicant's Simulation

KOP 5 represents foreground views, particularly westward views, of the project by motorists on I-8. The precise distance from viewpoint to project is not described; however, it appears to be roughly ½ mile or near the outer limit of the foreground distance zone. In order to fully understand the visual effect of the project, however, it is important to recall that for roughly 5.6 miles of project frontage on I-8, the project would be viewed from much closer distances, and would thus appear much more prominently, with the nearest rows of 38-foot-tall SunCatchers often within a few feet of the edge of the highway.

Staff Analysis

The view from I-8 facing westward is highly scenic, consisting of relatively intact expanses of the Yuha Desert floor, with low rolling terrain of washes evident in portions of the project frontage, and striking views of the Jacumba and Coyote Mountains at the horizon. The existing Southwest Powerlink transmission line ranges from visually subordinate to dominant within the view according to distance, intruding into the view and compromising visual quality, especially at foreground distance. Nevertheless, as described in Section C.13.4.1 above, overall visual sensitivity from this viewpoint is moderately high.

As depicted in the simulated view, in near-middle-ground and foreground views from adjacent roadways, the project would be strongly dominant and exhibit a high level of visual contrast and overall visual change. This would include roughly 6.5 miles of Highway I-8, and roughly 6 miles of Evan Hewes Highway. The 38-foot-tall mirror arrays would present strong color, form and line contrast, and exhibit strong spatial dominance, extending for miles. Furthermore, the addition of project power lines along the highway would combine with the existing Powerlink line to dominate the foreground view of motorists, particularly for the roughly one mile where the new line would parallel the highway foreground before turning southward to parallel the existing transmission corridor. In combination with the existing transmission line, the project line would increase contrast and dominance of the transmission corridor as viewed from the highway in its vicinity. For a roughly 0.85-mile portion of highway frontage not included within the project, portions of the project, including the Main Services Complex, could be visible at times, but would often be obscured by high, irregular terrain of washes and low rises in the immediate highway foreground in this area, which have the effect of blocking all views beyond. These segments are limited in length, however. Overall the project would strongly demand attention, could not be overlooked, and would strongly dominate the landscape over more than 6 miles of highway frontage within foreground distance of the project features.

Views of mountains to the north and northwest, including the Coyote Mountains, Superstition Mountains, and Carrizo Mountain, would be largely obstructed to westbound motorists in the vicinity of the project.

Impact Significance - In the context of moderately high overall visual sensitivity from Highway I-8, this high level of overall visual change would represent a substantial impact. Other foreground views of the project, from Evan Hewes Highway and the Plaster City OHV Open Area are also considered to have moderately high sensitivity, and would experience similar effects, including strong visual dominance and visual change by the project; and obstruction of views of the mountains. Thus, all views within the foreground distance zone and indeed the near-middle-ground distance zone to at least one mile would experience strong project dominance and visual change, and a substantial visual impact.

Mitigation Measures

In order to reduce the contrast of proposed project security fencing and other non-mirror project features as seen from Highway I-8, Condition of Certification **VIS-1** is recommended. This measure would include:

- Coloring of security fencing with vinyl or other non-reflective coating; or with slats or similar semi-opaque, non-reflective material, to blend to the greatest feasible extent with the background soil.
- Surface color treatment of all non-mirror surfaces with non-reflective colors that minimize visual intrusion and contrast by blending with the existing tan and brown color of the surrounding landscape, do not create glare, and are consistent with local policies and ordinances.

In order to reduce the visual impact of the segment of new proposed transmission line paralleling I-8, Condition of Certification **VIS-3** is recommended. This measure would include:

- If feasible, re-alignment of the segment of the project transmission line paralleling I 8 to be set back from the roadway at least ½ mile

With this measure, the prominence and exposure of the proposed new transmission line to motorists would be substantially reduced.

In order to reduce the prominence of the project from Highway I-8, Condition of Certification **VIS-4** is recommended. This measure would include:

- Additional setback of the nearest SunCatcher units from the roadway to reduce their visual dominance and potential glare effects.

With these measures, visual contrast and dominance of the mirror units could be considerably reduced.

With these recommended conditions of certification, project impacts from the foreground of I-8 would be greatly reduced, but project contrast, dominance, and overall visual change would remain strong, and impacts, substantial.

Staff Discussion of Landscape Screening Measures.

In the AFC, the applicant has suggested possible landscape screening measures as a potential mitigation measure to address project visual impacts.

Staff has not recommended landscape screening measures, for the following reasons:

a) the amount of water that would be needed in this desert landscape to make such screening viable would be very substantial, and it is unclear that the resulting screening would represent a visual mitigation commensurate with its high social, monetary, and environmental cost.

b) any such screening would be nearly as out-of-character with the existing native landscape of the Yuha Desert as the project itself. Although many people may indeed prefer tree rows or other tall vegetation to the view of mechanical devices, the degree of visual change from the native landscape that would result from miles of non-native vegetation (no suitably tall, locally native species exist) would be nearly as high as the proposed project.

Yuha Desert/Yuha Basin (SQRUs 2 and 3) – KOPs 6, 7, 8

As discussed in Section C.13.4.1 above, KOPs 6, 7, and 8 were added to the analysis to portray the range of anticipated effects the project would have on sensitive recreational destinations within the Yuha Desert ACEC within the middle-ground distance zone, including extensive portions of the Juan Bautista de Anza National Historic Trail (Route 274). Simulations could not be prepared for these viewpoints due to fast-track time constraints, however, the anticipated level of project contrast and dominance from each of these viewpoints is very clear, particularly because the Plaster City facility, which appears in each view, is an ideal scale and location reference point, and also because the extent of the project site is very clear from each viewpoint.

KOP 6 is a view from the eastern segment of Route 274 (Juan Bautista de Anza National Historic Trail) near Dunaway Campground at a distance of ½-mile from the project site, or within foreground distance. **(VISUAL RESOURCES Figure 12).** From this viewpoint, the project would exhibit high contrast and dominance, becoming the most prominent feature within the view over a vast area. From this location, viewers would need to turn their heads in order to take in the entire project site. The project would not block views of mountains in the background, including the Superstition Mountains to the north. However, the project's pronounced contrast in color, texture, and at times, brightness; and its strong spatial dominance would represent a high level of visual change. The project would demand attention, could not be overlooked, and would be dominant in the landscape.

KOP 7 is a view from Overlook Campground on Route 274 (Juan Bautista de Anza National Historic Trail) at a distance of roughly one mile, or middle-ground distance. **(VISUAL RESOURCES Figure 13).** Similar to KOP 4, the project would exhibit strong color and texture contrast and strong spatial dominance, becoming the most dominant feature in views to the north. The project would demand attention, could not be overlooked, and would be dominant in the landscape.

Impact Significance - In the context of high overall viewer sensitivity in foreground and middle-ground viewpoints within the Yuha ACEC, impacts from KOPs 6, 7, and other portions of the Anza Trail (Route 274) at these distances would be substantial.

KOP 8 is a view from the vicinity of the Yuha Geoglyphs, also on Route 274 at a distance of roughly 3 miles, approaching background distance. **(VISUAL RESOURCES Figure 14).** At this distance, the project would be very evident but would exhibit a moderate degree of contrast. Color and texture contrast could be moderately high, but form and line contrast would be weak due to the level, oblique angle of view and the small portion of the field of view occupied by the project. Similarly, visual dominance of the project would be moderate in scale at this distance.

Impact Significance - In the context of high viewer sensitivity, impacts of the project at this distance would be adverse, but less than significant.

From other principal destinations within the Yuha Desert ACEC, such as Yuha Well, fossil shell beds, and portions of the Anza Trail south of the Yuha Geoglyphs, the project would not be visible due to intervening terrain of washes and low hills. Likewise the project would not be visible from Highway 98 and its surroundings.

Mitigation Measures

There are no feasible mitigation measures to eliminate or substantially reduce project impacts on these recreational sites, including the Anza Trail. Therefore, staff recommends Condition of Certification/Mitigation Measure VIS-5, requiring contribution of funds for off-site improvements to the Anza Trail, to off-set adverse effects on recreational users of the historic trail and Yuha Desert ACEC.

Glare Impacts

From each of the viewpoints discussed above, diffuse reflected light from the SunCatcher mirrors could potentially represent a substantial component of the project's overall appearance, visual contrast/change, and impact. The contribution of potential glare under most typical conditions was considered in the evaluation of overall project visual change in the impact analysis above. Under most conditions diffuse reflection would be seen by viewers and appear similar to the reflection of the sky on a lake surface, or at certain times, more intense shimmering glare from brighter diffuse reflection of the sun.

However, under certain circumstances, glare effects could be much more prominent, particularly in early morning hours as seen by westbound motorists; and in the late afternoon near sunset for eastbound motorists on I-8 and the Evan Hewes Highway. Glare from diffuse reflection is not considered to represent a hazard or substantial nuisance to aircraft due to distance and potential level of brightness.

Staff requested photometric data on anticipated brightness or luminance of the proposed project and SunCatcher units as these would affect motorists, but did not receive these data. In the absence of such actual photometric data, staff, on the basis of limited available information including review of the project AFC, believes that the 5% of the visible spectrum which is not redirected to the PCU has the potential to make the SunCatcher mirrors appear as very bright objects. In the absence of photometric data to the contrary, staff believes this reflection could be an intrusive and distracting nuisance to motorists under certain conditions.

Staff accepts the Applicant’s assertion that the SunCatcher mirror reflections would not produce retinal damage, but has no statements in photometric terms of the potential, or lack of potential, for highly distracting nuisance brightness produced from the mirrors by a combination of reflected sky luminance and diffuse reflections of sunlight.

Staff accepts Applicant’s assertion that the mirrors would screen each other. However all simulations provided by the Applicant show a first (outer) row of mirrors exposed to viewers on the highway. The same is true for the mirrors at the ends of the rows of SunCatchers. In the absence of data to the contrary, these vertical mirrors can be expected to be sources of distracting nuisance brightness in the early mornings or late afternoons. In addition, motorists traveling at freeway speeds east or west on Highway I-8 past the north-south-oriented rows of SunCatchers may be exposed to a “flicker” or stroboscopic effect from the repetitive bright mirrors at the row ends. The potential adverse impact of a flicker effect from fluorescent lamps or from some tunnel lighting installations on some individuals is a well-established phenomenon.

In order to mitigate the potential for highly distracting nuisance brightness from the project affecting nearby motorists, staff recommends Condition of Certification **VIS-6**, which calls for a combination of measures such as berms, slatted fencing, and set-backs at eastern and western boundaries; turning away of outer rows of mirrors during times of greatest potential nuisance glare; a Mirror Positioning Plan to describe how hazardous and nuisance glare is to be avoided. The latter measure is described in detail in Condition of Certification **TRANS-4**.

Nighttime light pollution as a result of the project is a concern. A large area around the project site is now largely dark at night, with the exception of the Plaster City facility which, however, is an isolated instance. The pristine, unlit night sky is an important part of the camping experience for many visitors to remote areas such as the campsites on the Anza Trail, some of which are located near the project site as described above. Unmitigated night lighting of the project could represent a substantial impact to the experience of campers at these sites.

According to the AFC, night lighting of the Main Services Complex would consist of 400-watt high-pressure sodium lights, with illumination falling to 0.0 foot-candles on the ground a short distance from the facility (AFC Figure 3-20, -21)(SES 2008a). Parking and roadway lighting would consist of full cut-off luminaires to minimize night sky light pollution. Preliminary photometric studies provided in the AFC depict illumination from these fixtures falling to 0.0 foot-candles a short distance from each roadway intersection (AFC, Figure 3-23)(SES 2008a).

However, to ensure these levels of performance, to address potential impacts from construction lighting, and to further minimize potential night lighting impacts to campers in the Yuha Desert ACEC and Anza Trail, staff recommends Condition of Certification **VIS-2**. This measure would require that all exterior lighting is designed such that lamps and reflectors are not visible from beyond the project site; lighting does not cause excessive reflected glare; direct lighting does not illuminate the nighttime sky, except for required FAA aircraft safety lighting; and illumination of the project and its immediate vicinity is minimized.

Project Construction Impacts

In addition to the proposed project site, a 100-acre lay-down site located east of the project site on Dunaway Road and north of I-8 is proposed.

The lay-down site would be of substantial scale, and would be visually very prominent within the foreground of Dunaway Road. Form, line and texture contrast of stored equipment, materials, and disturbed soil would be strong. While the number of viewers on this road is relatively low at most times, during the OHV Open Area’s periods of peak use, recreational viewer numbers would be high. The site would also adjoin and be prominently visible from I-8 at the northeastern quadrant of the Dunaway Road interchange. The sensitivity of both foreground recreational viewers on Dunaway Road and motorists on I-8 is considered moderately high. The strong contrast of the 100-acre site would thus be substantial for the period of construction, estimated to last 40 months; and could remain substantial for a long period of time after completion of construction without adequate post-construction mitigation of the disturbed vegetation and soil surface. Staff thus recommends Condition of Certification **VIS-7** (Construction Measures) to reduce temporary impacts of the lay-down site during the roughly 3 years of anticipated construction, and mitigate long-term impacts of ground disturbance at the lay-down site through increased set-back of the site from I-8, and re-grading and revegetation with locally native species following project construction.

Potential impacts of project grading and construction would be considerable and comparable to those of the project itself. Grading would result in strong color contrast from soil surface disturbance. Project construction would include a highly industrial scene of assembly and installation of the SunCatcher units. These impacts are considered substantial and unavoidable.

Indirect Impacts

By substantially lowering the prevailing visual quality of its local viewshed, the Yuha Desert/western Salton Trough, the project could have the indirect effect of encouraging additional subsequent development of similar character in the area. Because the relatively intact existing landscape would appear highly compromised after introduction of the SES Solar Two Project, the incremental additional impact of other future projects could appear to be less significant than if they were occurring in the current, intact landscape without the project.

Closure and Decommissioning Impacts and Mitigation

Permanent closures would require the applicant to submit to the Energy Commission a contingency plan or a decommissioning plan. A decommissioning plan would be implemented to ensure compliance with applicable LORS, removal of equipment and shutdown procedures, site restoration, potential decommissioning alternatives, and the costs and source of funds associated with decommissioning activities.

The removal of the existing facility would leave a very prominent visual impact over the entire site due to color contrast created between graded or disturbed soil areas and undisturbed areas in the region of the project site. This color contrast is due particularly to the dark color element contributed by normal scrub vegetation cove, and the typical dark desert pavement surface that characterizes large portions of the site and vicinity. After decommissioning, the site would resemble the most disturbed portions of the OHV Open Area to the north. At present, despite some evidence of surface disturbance from past OHV use on the site, the site does not resemble the OHV Open Area but retains a predominantly natural character. However, unlike the Open Area, the disturbed area would be highly visible to motorists traveling on I-8. Revegetation of areas in this desert region are difficult but have been implemented by the BLM El Centro Field Office with success over time. Thus, visual recovery from land disturbance after closure and decommissioning could take place, although only over a long period of time, with implementation of an active and comprehensive revegetation program for the site.

C.13.4.3 CEQA LEVEL OF SIGNIFICANCE

Appendix G of the CEQA Guidelines four significance criteria for evaluating aesthetic impacts, as follows.

A. Would the project have a substantial adverse effect on a scenic vista?

No specific designated scenic vista locations were identified in the project viewshed. However, as described above, a number of recreational destinations with high levels of viewer concern for scenic values would be strongly affected by the project, including portions of the Anza historic trail, and two designated campgrounds within the Yuha Desert ACEC. These impacts are discussed under Item C., below. In addition, views of the Coyote, Fish Creek, and Superstition Mountains to the north and northwest of Highway I-8 would be largely blocked by SunCatchers for westbound motorists wherever the project boundary abuts I-8. Since views of background mountains are the most scenic element of views from I-8 in the project area, and the project would obstruct roughly one-half of such existing views, this blockage of scenic vistas is considered a significant visual impact.

B. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?

The project is adjacent to Highway I-8, which is not listed as an eligible State Scenic Highway. No notable scenic features or resources are present on-site. The project would not directly damage any specific scenic resources located within the project site. Potential effects on scenic resources within the project viewshed in general are discussed under Item C, below.

C. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

As described in the analysis above, the project would substantially degrade the existing visual character and quality of the site and its surroundings. Under the proposed project an area of roughly 10 square miles, including over 5.6 miles of frontage on Highway I-8, would experience a dramatic visual transformation from a predominantly natural desert landscape to one of a highly industrial character. The character and quality of views from recreational destinations within the Yuha Desert ACEC would be strongly affected. In the context of moderately high-to-high level of viewer sensitivity of these affected viewpoints, project impacts are considered significant.

D. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Glare is a major issue of concern for the SES Solar Two Project, primarily for aesthetic reasons, but conceivably also for highway navigation and safety reasons due to the proximity of Highway I-8.

Potentially affected receptors would include motorists on I-8 and Evan Hewes Highway; and OHV motorists, hikers, climbers and other visitors in the Plaster City OHV Open Area and associated open trails under the Western Colorado Routes of Travel Designation Plan Amendment (WECO)(USDOI, 2003).

Staff conducted an independent review of potential glare impacts based on limited available project data. The results of this review are summarized in the discussion of Glare Impacts, above. With recommended Condition of Certification **VIS-6**, impacts could be reduced to less-than-significant levels.

According the AFC, night lighting of the Main Services Complex, parking, and roadway lighting would consist of full cut-off luminaires to minimize night sky light pollution. Preliminary photometric studies provided in the AFC depict illumination from these fixtures falling to 0.0 foot-candles a short distance from each roadway intersection.

However, to ensure these levels of performance, to address potential impacts from construction lighting, and to further minimize potential night lighting impacts to campers in the Yuha Desert ACEC and Anza Trail, staff recommends Condition of Certification **VIS-2**. This measure would require that all exterior lighting is designed such that lamps and reflectors are not visible from beyond the project site; lighting does not cause excessive reflected glare; direct lighting does not illuminate the nighttime sky, except for required FAA aircraft safety lighting; and illumination of the project and its immediate vicinity is minimized.

C.13.5 300 MEGAWATT ALTERNATIVE

The 300 MW Alternative would provide the same total number of SunCatchers and associated facilities as the 300 MW phase of the proposed 750 MW project (see Alternatives Figure 1), and would consist of 12,000 SunCatchers with a net generating capacity of approximately 300 MW occupying approximately 2,600 acres of land. This alternative would transmit power to the grid through the SDG&E Imperial Valley Substation and would require infrastructure similar to the proposed 750 MW project, including a water supply pipeline, transmission line, road access, operations facilities, substation, and hydrogen system (SES 2008a). Infrastructure associated with this alternative would require approximately 40 acres. This alternative would retain 40% of the SunCatchers and would affect 40% of the land of the proposed 750 MW project.

C.13.5.1 SETTING AND EXISTING CONDITIONS

The setting for this alternative would be approximately 2,600 acres (roughly 4 square miles) or 40% of the lands affected by the proposed project. Lands affected by this alternative would be located on the western portion of the proposed project site, and would all be under the jurisdiction of the BLM. This setting is as described for the site as a whole under the description of the proposed project, which differs only in extent, but not in visual character or quality.

C.13.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Direct Project Impacts

Project Operation Impacts

Impacts of Structures on Key Observation Points

Plaster City Open Area/West Mesa (SQRU 9) - KOP 1

As described in Section C.13.4.1, above, overall visual sensitivity within this landscape unit is generally considered to be moderately high. Existing scenic quality of this landscape unit ranges from moderate to moderately low. Viewer concern is considered moderately high due both to high numbers of recreational visitors in the area, and to the location of the setting within the CDCA in general. Unlike under the proposed project, however, viewer exposure would be moderate to low under the 300 MW alternative. The area of foreground and near-middle-ground-distance exposure to visitors in the OHV Open Area would be far less than under the proposed project, roughly two miles of the Evan Hewes Highway compared to roughly six.

KOP 1 – View from Plaster City OHV Open Area , Looking South (roughly 1.5 miles from site). **VISUAL RESOURCES Figures 6A** and **6B.**

In contrast to the view of the proposed project portrayed in **VISUAL RESOURCES Figures 6A** and **6B,** visibility of the project from the Plaster City OHV Open Area would be far less. Principal racing and gathering areas of the OHV Open Area would be over a mile farther from the nearest project features. At this distance, project contrast would range from moderate to weak depending upon the viewer's location within the OHV Open Area. Strong project contrast would still be experienced adjacent to the portions of the 300 MW alternative abutting Evan Hewes Highway. However, the area of this foreground and near-middle-ground-distance exposure would be far less than under the proposed project, roughly two miles compared to roughly six. Overall visual change for visitors of the open Area would at most be moderate.

Impact Significance - In the context of moderate overall viewer sensitivity, this would represent an adverse but less than significant impact.

Upper Yuha Desert (SQRU 1) – KOPs 2, 3, 4, 5

KOP 2 – View from Nearby Residence on Evan Hewes Highway, Looking Southwest (roughly 1.5 miles). KOP 2 discussed under the proposed project would not be applicable to the 300 MW alternative, due to the great distance to the project under this Alternative (over 4.5 miles). At virtually background distance, project contrast and impact would be minor. Under the 300 MW alternative, the nearest residences would be in Ocotillo, to the west. Similarly, at this distance (roughly 4 miles), project contrast and impact would be minor.

KOP 2 was also representative of viewers on Evan Hewes Highway. Such views would be somewhat similar to that portrayed in **VISUAL RESOURCES Figures 7A** and **7B** for a larger proportion of that highway, roughly from the vicinity of Plaster City eastward.

Impact Significance – As discussed above under KOP 1, strong project contrast would still be experienced by motorists adjacent to the portions of the 300 MW alternative abutting Evan Hewes Highway, and impacts in that segment would be substantial, with rows of SunCatchers prominent in the immediate visual foreground, strongly dominating the viewers' visual experience. However, the area of this foreground and near-middle-ground-distance exposure would be far less than under the proposed project, approximately two miles compared to roughly six. At distances of roughly 1-1/2 mile or more, as depicted in **VISUAL RESOURCES Figure 7B**, contrast and dominance would be reduced by distance to moderate levels, and impacts to motorists would be adverse but less than significant.

KOP 3 – View from Residence to Proposed Project Transmission Line,

Looking West (roughly – miles). **VISUAL RESOURCES Figures 8A** and **8B**.

KOP 3 represents views of the proposed project transmission line from the nearest residence, located at the western edge of the Imperial Valley agricultural area east of the Yuha Desert. The view under the 300 MW alternative would be the same as that described under the proposed project. As under the proposed project, this impact is considered adverse, but less than significant.

KOP 4 – View from Town of Ocotillo, Looking West (roughly 5 miles). **VISUAL RESOURCES Figures 9A** and **9B.**

KOP 4 is taken from the town of Ocotillo, roughly 5 miles west of the project site on I-8, and is representative of I-8 motorists at background distances from the project. Similar to conditions under the proposed project, the project viewed at this background distance would exhibit weak overall contrast, dominance and visual change. The overall change however would be less than half that of the proposed project. As under the proposed project, the low level of overall visual change would represent a less than significant impact at this distance.

KOP 5 – View from I-8 Near Dunaway Road, Looking Northwest. **VISUAL RESOURCES Figures 10A** and **10B.**

Staff Comments on Applicant's Simulation

KOP 5 represents foreground views, particularly westward views, of the project by motorists on I-8. The precise distance from viewpoint to project is not known; however, it appears to be roughly ½ mile or near the outer limit of the foreground distance zone. In order to fully understand the visual effect of the project, it is important to recall that for the entire project frontage on I-8, the project would be viewed from much closer distances, and would thus appear much more prominently, with the nearest rows of 38-foot-tall SunCatchers within a few feet of the edge of the highway.

The actual location of KOP 5, near Dunaway Road, makes that viewpoint not relevant to the 300 MW alternative since it is located at a distance of over 5 miles from the nearest project boundary. . However, the general condition represented in that view, that is, views of the project at foreground distance from the highway, is equally relevant to the 300 MW alternative. Similar viewpoints on I-8 at foreground distance under the 300 MW alternative would look much the same. As under the proposed project, a considerable distance of I-8 frontage would be characterized by SunCatchers in the immediate visual foreground of the highway. That frontage would be 3-1/4 miles rather than 5.6 miles under the proposed project. Thus, very strong project contrast viewed by motorists with moderately high sensitivity would represent a substantial adverse impact. That impact, however, would be comparatively less than under the proposed project because of its lesser extent and duration.

Impacts of the proposed project transmission line would be similar under the 300 MW alternative as under the proposed project, except that it would not be viewed in combination with the SunCatcher fields of Phase 2. The new transmission line would be highly prominent in the foreground of I-8 for nearly a mile, exhibiting high contrast and dominance. In the context of moderately high sensitivity of I-8 motorists, this would represent a substantial adverse impact.

To address potential impacts of the project transmission line along the highway, staff recommends Condition of Certification **VIS-3.**

Yuha Desert/Yuha Basin (SQRUs 2 and 3) – KOPs 6, 7, 8

KOP 6 represents the eastern segment of Route 274 near Dunaway Campground, located near Dunaway Road south of Highway I-8. Under the 300 Megawatt Alternative, Phase 2 of the project would not be built. As a result, views of the project from Dunaway Campground would be seen at distances of four miles or more, approaching the background distance zone. At this distance, the project would be evident but would exhibit a moderately low degree of contrast. Color and texture contrast could be moderate, but form and line contrast would be weak due to the level, oblique angle of view and the small portion of the field of view occupied by the project. Similarly, visual dominance of the project would be low in scale at this distance.

Impact Significance - In the context of high viewer sensitivity, impacts of the project at this distance would be less than significant.

KOP 7 is taken from Overlook Campground on Route 274 at a distance of roughly one mile from the project, or middle-ground distance. However, under the 300 MW Alternative, roughly half of the overall visual field (to the north and west) occupied by the proposed project would be affected. The 300 MW Alternative would still exhibit strong color and texture contrast and strong spatial dominance, becoming the most dominant feature in views to the northwest. The project would demand attention, could not be overlooked, and would be dominant in the landscape. However, the overall contrast and dominance of the 300 MW Alternative would be substantially less than under the proposed project.

Impact Significance - In the context of high overall viewer sensitivity in foreground and middle-ground viewpoints within the Yuha ACEC, impacts from KOP 7 and other portions of the Anza Trail (Route 274) in proximity to the 300 Megawatt Alternative footprint would remain substantial.

KOP 8 is taken from the vicinity of the Yuha Geoglyphs, also on Route 274 at a distance of roughly 3 miles, approaching background distance. Because viewer exposure to the project from this viewpoint is primarily to the western, Phase I portions of the project, impacts under the 300 MW Alternative would be very similar to those under the proposed project. At this distance, the project would be very evident but would exhibit a moderate degree of contrast. Color and texture contrast could be moderately high, but form and line contrast would be weak due to the level, oblique angle of view and the small portion of the field of view occupied by the project. Similarly, visual dominance of the project would be moderate in scale at this distance.

Impact Significance - In the context of high viewer sensitivity, impacts of the project at this distance would be adverse, but less than significant.

From other principal destinations within the Yuha Desert ACEC, such as Yuha Well, fossil shell beds , and portions of the Anza Trail south of the Yuha Geolyphs, the 300 Megawatt Alternative would not be visible due to intervening terrain of washes and low hills. Likewise the project would not be visible from Highway 98 and its surroundings.

Glare Impacts

As discussed under the proposed project alternative, above, staff concluded that in the absence of available photometric data, the project would have the potential to be a source of intrusive and distracting diffuse reflected light under certain conditions, particularly when an entire row of units could be visible in a near-vertical position to approaching motorists at hours near sunrise and sunset. This potential impact would also apply under the 300 Megawatt Alternative, and require similar mitigation. Potential distracting nuisance glare, and strobe or ‘flicker’ effect of bright reflection on passing motorists would be comparatively less than under the proposed project alternative due to the reduced overall highway frontage, and therefore shorter duration of exposure, but would still represent several miles of potential exposure under certain conditions. Though less than under the proposed project, these effects would remain substantial.

In order to reduce glare impacts from diffuse mirror reflection as seen from Highway I-8, Condition of Certification **VIS-6** is recommended.

According to the AFC, night lighting of the Main Services Complex, parking, and roadway lighting would consist of full cut-off luminaires to minimize night sky light pollution. Preliminary photometric studies provided in the AFC depict illumination from these fixtures falling to 0.0 foot-candles a short distance from each roadway intersection.

However, to ensure these levels of performance, to address potential impacts from construction lighting, and to further minimize potential night lighting impacts to campers in the Yuha Desert ACEC and Anza Trail, staff recommends Condition of Certification VIS-2. This measure would require that all exterior lighting is designed such that lamps and reflectors are not visible from beyond the project site; lighting does not cause excessive reflected glare; direct lighting does not illuminate the nighttime sky, except for required FAA aircraft safety lighting; and illumination of the project and its immediate vicinity is minimized.

Project Construction Impacts

Presumably the area needed for project laydown under the 300 MW alternative would be proportionately less than under the proposed project, both in extent, and in duration. However, if it were located in the same general location and adjoined the highway at Dunaway Road, it would still potentially have strong contrast and represent a substantial impact to viewers on I-8. If the lower overall area needed allowed greater setback from I-8, however, potential impacts to viewers on I-8 during construction could be reduced considerably, to less than significant levels. Potential long-term impacts would be similar to those described under the proposed project; ground disturbance could leave a long-term visual impact. To address that impact, and to establish sufficient setback from the highway, staff recommends Condition of Certification **VIS-7**.

As under the proposed project, potential impacts of project grading and construction would be considerable and comparable to those of the project itself. Grading would result in strong color contrast from soil surface disturbance. Project construction would include a highly industrial scene of assembly and installation of the SunCatcher units. These impacts are considered substantial and unavoidable.

C.13.5.3 CEQA LEVEL OF SIGNIFICANCE

Appendix G of the CEQA Guidelines has four significance criteria for evaluating aesthetic impacts, as follows:

A. Would the project have a substantial adverse effect on a scenic vista?

No specific designated scenic vista locations were identified in the project viewshed. However, recreational destinations with high levels of viewer concern for scenic values within the Yuha Desert ACEC would be affected under the 300 MW alternative. However the degree and extent of impact would be far less than under the proposed project. Foreground distance views from Dunaway Campground and eastern portions of Route 274 would not be substantially affected; impacts from Overlook Campground and some western portions of Route 274 would be much less due to the much smaller extent of the overall 300 MW alternative site. As under the proposed project, scenic views of mountains to the north and northwest from I-8 would be blocked along segments of project frontage. However, the overall affected distance of this impact would be far less, 3.25 miles of I-8 compared to 5.6 miles under the proposed project.

B. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?

The project is adjacent to Highway I-8, which is not listed as an eligible State Scenic Highway. No notable scenic features or resources are present on-site. The project would not directly damage any specific scenic resources located within the project site. Potential effects on scenic resources within the project viewshed in general are discussed under Item C, below.

C. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

As described in the main analysis of the 300 MW alternative above, the project would substantially degrade the existing visual character and quality of the site and its surroundings. An area of roughly 4 square miles, including over 3.1 miles of frontage on Highway I-8, would experience a dramatic visual transformation from a predominantly natural desert landscape to one of a highly industrial character. The character and quality of views from recreational destinations within the Yuha Desert ACEC would be strongly affected. Given the moderately high-to-high level of viewer sensitivity of these affected viewpoints, project impacts are considered significant. However as noted impacts would be substantially less than under the proposed project.

D. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Glare is a major issue of concern for the SES Solar Two Project, not only for aesthetic reasons, but potentially for highway navigation and safety reasons due to the proximity of Highway I-8.

Potentially affected receptors would include aircraft, motorists on I-8; and OHV motorists, hikers, and other visitors in the Plaster City OHV Open Area and associated open trails under the WECO.

Staff conducted an independent review of potential glare impacts based on limited available project data. The results of this review are summarized in the discussion of Glare Impacts, above. Briefly, distracting nuisance glare to motorists would be substantially less than under the proposed project due to reduced highway frontage and, thus, reduced exposure. Nevertheless, these impacts would remain significant. With recommended Condition of Certification **VIS-6**, these and other potential glare impacts could be reduced to less-than-significant levels.

C.13.6 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives developed to reduce impacts to the waters of the U.S. would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative is illustrated in **Alternatives Figure 1B**. This alternative would have the same outer project boundaries as the proposed project, but it would include prohibition of installing permanent structures within drainages, thereby reducing the available acreage for development to 4,690 acres, and reducing the number of SunCatchers from 750 MW under the proposed project to 632 MW (84% of the proposed generation capacity).

C.13.6.1 Setting and Existing Conditions

The regional setting of the Drainage Avoidance #1 alternative is the same as that of the proposed project. Like the proposed project, this alternative's site is bounded to the north by Plaster City, a large US Gypsum Corporation wallboard manufacturing plant, the Evan Hewes Highway and, to the north of the highway, the Plaster City OHV Open Area. To the south, it is bounded by US I-8 and, south of the freeway, the BLM Yuha Desert ACEC.

The alternative site is largely undeveloped public desert land. A number of small rural communities lie within the project viewshed, including the town of Ocotillo over 4 miles to the west; Coyote Wells, approximately 4 miles to the southwest;; and the Imperial Lakes residential development located approximately 1.5 miles northeast of the project on Evan Hewes Highway. Other nearby land uses includes Centinela State Prison, approximately 2.5 miles northeast of the project site.

C.13.6.2 Assessment of Impacts and Discussion of Mitigation

The Drainage Avoidance #1 alternative would be located within the same outer project boundaries as the proposed project, but it would be less densely developed because of avoidance of permanent structures in the major drainages. However, these differences would not be readily apparent to most viewers, and would make very little difference in terms of overall effect on all viewer groups within the viewshed. Like the proposed SES Solar Two Project, the Drainage Avoidance #1 alternative would substantially degrade the existing visual character and quality of the site and its surroundings, including motorists on Highway I-8, recreational destinations within the Yuha Desert ACEC, and portions of the Juan Bautista de Anza National Historic Trail, resulting in significant impacts. Overall, the level of impact would be similar to the proposed project alternative.

C.13.6.3 CEQA Level of Significance

As under the proposed project, no effective, feasible mitigation measures could be identified to mitigate the principal visual effects of the project, so the impacts of the Drainage Avoidance #1 are considered to be significant and unavoidable, and the same Conditions of Certification would be recommended.

C.13.7 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative would eliminate both the eastern and westernmost portions of the proposed project, where the largest drainage complexes are located. This alternative is shown in **Alternatives Figure 1C**. It would reduce the overall size of the project site by 3,315 acres (from 6,500 acres to 3,235 acres). It would also reduce the generation capacity from 750 MW to 423 MW (eliminating 44% of the proposed generating capacity). In this alternative, permanent structures would be allowed within all drainages inside the revised, smaller project boundaries.

C.13.7.1 Setting and Existing Conditions

The regional setting of the Drainage Avoidance #2 alternative is the same as that of the proposed project. Like the proposed project, this alternative's site is bounded to the north by Plaster City, a large US Gypsum Corporation wallboard manufacturing plant, the Evan Hewes Highway and, to the north of the highway, the Plaster City OHV Open Area. To the south, it is bounded by US I-8 and, south of the freeway, the BLM Yuha Desert ACEC. However, this alternative is smaller than the original project boundaries, and development would be concentrated within the middle area, eliminating any development on the eastern and western ends of the proposed project area.

C.13.7.2 Assessment of Impacts and Discussion of Mitigation

The Drainage Avoidance #2 alternative would be smaller in area than the proposed project, and it would result in similar impacts as the proposed project, but somewhat more concentrated. Impacts of this alternative would remain significant to I-8 and Yuha Desert ACEC viewers, and unavoidable. However, like the 300 MW alternative, the degree and extent of those impacts would be substantially less than those of the proposed project.

C.13.7.3 CEQA Level of Significance

As under the 300 MW alternative, the overall area and therefore impacts of the Drainage Avoidance #2 alternative would be substantially less than the proposed project and Drainage Avoidance #1 alternative. However, exposure to sensitive viewer groups would remain extensive, impacts of the Drainage Avoidance #1 would remain significant and unavoidable, and the same Conditions of Certification would be recommended.

C.13.8 NO ACTION ALTERNATIVE

There are three No Project/No Action Alternatives evaluated in this section, as follows:

NO PROJECT/NO ACTION ALTERNATIVES

NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on SES Solar Two project application and on CDCA land use plan amendment

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

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the views of the site are not expected to change noticeably from existing conditions under this alternative and, therefore, this No Project/No Action Alternative would not result in adverse visual, light, and glare impacts at this location. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations

NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on SES Solar Two project and amend the CDCA land use plan to make the area available for future solar development

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

Because the CDCA Plan would be amended, it is possible that the site will be developed with another solar technology. As a result, it is possible that views of the site could change substantially based on the required buildings and structures on the site for the different solar technologies. Different solar technologies would create different visual effects based on the technology components. It is expected that the views of the site could change substantially with a different solar technology, similar to the changes in views under the proposed project. Therefore, this No Project/No Action Alternative could result in adverse visual, light, and glare impacts similar to the impacts under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on SES Solar Two project application and amend the CDCA land use plan to make the area unavailable for future solar development

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

Because the CDCA Plan would be amended so no solar projects can be approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the views of the site are not expected to change noticeably from existing conditions under this alternative and, therefore, this No Project/No Action Alternative would not result in adverse visual, light, and glare impacts. However, in the absence of this project, other renewable energy projects may be constructed to meet

C.13.9 CUMULATIVE IMPACTS

Section B.3, Cumulative Scenario, provides detailed information on the potential cumulative solar and other development projects in the project area. Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis for the proposed project. In summary, these projects are:

- Renewable energy projects on BLM, State, and private lands, as shown on **Cumulative Figures 1 and 2** and in **Cumulative Tables 1A and 1B.** Although not all of those projects are expected to complete the environmental review processes, or be funded and constructed, the list is indicative of the large number of renewable projects currently proposed in California.
- Foreseeable future projects in the immediate Plaster City area, as shown on **Cumulative Impacts Figure 3, Plaster City Existing and Future/Foreseeable Projects, and Cumulative Tables 2 and 3**. Table 2 presents existing projects in this area and Table 3 presents future foreseeable projects in the Plaster City Area. Both tables indicate project name and project type, its location and its status.

These projects are defined within a geographic area that has been identified by the CEC and BLM as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all resource elements or environmental parameters. Most of these projects have, are, or will be required to undergo their own independent environmental review under CEQA and/or NEPA. Even if the cumulative projects described in Section B.3 have not yet completed the required environmental processes, they were considered in the cumulative impacts analyses in this SA/Draft EIS.

Geographic Scope of Analysis

Cumulative impacts could occur if implementation of the SES Solar Two Project would combine with those of other local or regional projects. The SES Solar Two Project is potentially associated with two types of cumulative impact:

1. cumulative impacts within the immediate project viewshed, essentially comprising foreseeable future projects in southwestern Imperial County within a distance of five miles or less of the proposed project;
2. cumulative impacts of foreseeable future projects within the southern California Colorado (Sonoran) Desert, or other broad basin of the project's *affected landscape type*, most notably including proposed solar and other renewable energy projects. The widest applicable basin of cumulative effect at this scale would include all of the southern California desert, or the Sonoran and Mojave Desert landscapes extending into neighboring states. The region-wide focus is justified because the affected landscape type, the southern California Desert, has been specifically identified as a resource of concern in the California Desert Conservation Area Plan of 1980, the California Desert Protection Act of 1994, and the proposed 2010 California Desert Protection Act. In each case, the scenic value of the desert landscape is cited as one primary reason for its conservation.

Local Projects (Project Viewshed)

Effects of Past and Present Projects

For this analysis, the following projects or developments are considered most relevant to effects on visual resources: the U.S. Gypsum Plaster City Plant, and existing recreational activities and related land disturbances in the Plaster City Open OHV Area.

Visual resources in the geographic area have been impacted by past and currently approved projects as follows: both of the named projects are within the immediate viewshed of the proposed SES 2 project, and would interact visually with it. The U.S. Gypsum Plant is the most visually prominent existing feature of the viewshed and detracts from its scenic intactness, presenting a prominent man-made, industrial feature into views within a radius of a few miles, encompassing the project site. The Plaster City Open Area would interact visually with the project in two ways: by providing a recreational viewer group into the visual foreground and middle ground that would be exposed to views of the proposed project; and by the general visual disturbance of the terrain within the OHV Open Area due to periodic heavy OHV use that accounts for its moderate to moderately low visual quality. Both these project would interact with the proposed project by contributing to the overall disturbed character of their local cumulative viewshed.

Effects of Reasonably Foreseeable Future Projects

Visual resources are also expected to be affected by the following reasonably foreseeable future projects as follows:

The GreenPath 230 kV Upgrade Project (Project B, Cumulative Figure 3); the Sunrise PowerLink Project (Project L, Cumulative Figure 3); the Ocotillo Express Wind Facility (Project M, Cumulative Figure 3); the West-wide Energy Corridor (Project P, Cumulative

Figure 3). Each of these would be situated within the immediate local viewshed of the proposed SES Solar Two Project.

Contribution of the SES Solar Two Project to Cumulative Impacts

Construction. The construction of the SES Solar Two Project is expected to result in short term adverse impacts related to construction activities. It is expected that some of the cumulative projects described above which are not yet built may be under construction the same time as the SES Solar Two Project. As a result, there may be substantial short-term impacts during construction of those cumulative projects related to visual resources.

The SES Solar Two Project could contribute substantially to these possible short-term cumulative impacts related to visual resources because the vast area of ground disturbance resulting from its construction would greatly increase the overall degree, extent, and intensity of visual construction effects occurring in the viewshed at the same time, likely becoming the single greatest contributor to the overall effect.

Operation. The operation of the SES Solar Two Project is expected to result in long-term adverse impacts during operation of the project related to visual resources. It is expected that some of the cumulative projects described above may be operational at the same time as the SES Solar Two Project. As a result, there may be substantial long-term impacts during operation of those cumulative projects as they relate to visual resources.

The SES Solar Two Project could contribute substantially to these possible-long term operational cumulative impacts related to visual resources due to its vast extent, and the high level of change to visual character and quality that it would contribute to the viewshed. It could essentially form a part of a very large corridor of wind and solar development reaching from the Imperial Valley substation to the border of Imperial County to the west.

Decommissioning. The decommissioning of the SES Solar Two Project is expected to result in adverse impacts related to visual resources similar to construction impacts. It is unlikely that the construction or decommissioning of any of the cumulative projects would occur concurrently with the decommissioning of this project, because the decommissioning is not expected to occur for approximately 40 years. The period of decommissioning impacts, however, is longer than 40 years because the period of full visual recovery of the highly disturbed landscape would not be expected to be complete for several more decades. It is not known when decommissioning of other cumulative projects, particularly adjacent wind projects would take place. However, due to the potentially very long period of decommissioning impacts, some overlap and therefore some cumulative impact, would be anticipated. As a result, there may be cumulative impacts related to visual resources as a result of decommissioning of the SES Solar Two Project in combination with effects of decommissioning of nearby cumulative projects.

Regional Solar/Renewable Development Projects

The following analysis addresses potential cumulative impacts of foreseeable future development within the southern California Desert, but focuses specifically on cumulative effects of solar and other renewable energy projects. This approach is justified because although other forms of foreseeable future development within the desert are not irrelevant to a regional visual analysis, all other categories of foreseeable development combined are dwarfed by orders of magnitude in their overall potential scale, extent, and effect. All other categories of foreseeable permissible development within the southern California Desert combined do not remotely approach the scale and potential impact of foreseeable renewable proposals, although they have the potential to add incrementally to the effects focused upon below.

Effects of Past and Present Projects

Many types of development have occurred in the past within the California desert. The three most land-extensive categories include towns, dedicated OHV recreation areas, preserves such as parks and wilderness areas, and military bases. Of these, the latter two account for comparable portions of a large proportion of the overall desert area, as indicated in Cumulative Impacts Figure 1.

The SES Solar Two Project is among the first of a large number of existing renewable project applications in the southern California desert. As such, past and present projects have had a negligible region-wide cumulative visual impact.

SES Solar Two and Foreseeable Future Projects

The analysis of cumulative impacts is not necessarily restricted to the immediate viewshed of a project, and the need for cumulative analysis over a broad geographic area may often be determined by the affected resource itself. In this case the affected resource is the unique and highly valued landscape type of which the project site forms a small part – the landscape of the southern California and Sonoran Desert. The Sonoran Desert and California Desert Conservation Area (CDCA) within which the SES Solar Two Project is located are a unique and highly valued scenic resource of national importance, as reflected by the presence of three national parks and numerous Wilderness Areas within the CDCA boundaries. Cumulative Impacts Table 1 identifies 72 solar projects and 61 wind project applications with a total overall area of over one million acres within the CDCA, which is indicative of the interest in public lands for renewable energy generation at a regional level. This figure does not include renewable projects within the Nevada and Arizona portions of the Sonoran and Mojave Deserts. Of the 61 wind applications in the California Desert District, only five of the applications are for wind development; the remaining proposals are for site testing and monitoring. BLM’s experience is that a small percentage of applications for site testing have resulted in wind development proposals. In regards to the solar applications filed with BLM in California, only approximately 10% of the proponents have prepared acceptable detailed Plans of Development required by BLM to begin a NEPA analysis.

Although it is not likely that all of the future solar and wind development projects proposed in the region would be constructed, it is reasonable to assume that some of them will. With this very high number of renewable energy applications currently filed with BLM, the potential for profound widespread cumulative impacts to scenic resources within the southern California desert is clear. These cumulative impacts could include a substantial decline in the overall number and extent of scenically intact, undisturbed desert landscapes, and a substantially more urbanized character in the overall southern California desert landscape. In particular, the number of current renewable applications before the BLM and Energy Commission that could potentially be prominently visible from the desert region's major highways appears high as a proportion of the total. In addition, the proportion of the length of those highways that could be affected also appears to be high. Many of these potentially affected highways are listed as eligible to become State Scenic Highways. Because these highways are the location from which the vast majority of viewers experience the California desert, this potential effect is of concern to staff. Viewed in the cumulative context of the Southern California desert region as a whole, potential visual impacts of renewable energy projects are thus considered to be cumulatively considerable and potentially significant under CEQA. To this, other forms of foreseeable future development within the desert, though far smaller in overall scale, could add incrementally to the cumulative effects just described.

Cumulative Impact Conclusion

The anticipated visual impacts of the SES Solar Two Project in combination with past and foreseeable future local projects in the West Mesa/Yuha Desert region, and past and foreseeable future region-wide projects in the southern California desert are thus considered cumulatively considerable, and potentially significant under CEQA.

C.13.10 COMPLIANCE WITH LORS

VISUAL RESOURCES Table 3
Project Compliance with Laws, Ordinances, Regulations, and Standards (LORS)

LORS		Consistency with Staff-Recommended Conditions of Certification (Project)
FEDERAL		
National Environmental Policy Act (NEPA)		Consistent. Staff determined that the visual analysis conducted with the Energy commission visual assessment methodology fulfills the requirements of both CEQA and NEPA for purposes of this FSA/DEIS.
Federal Land Policy and Management Act of 1976 (FLPMA)	Section 102 (a) of the Federal Land Policy and Management Act of 1976 (FLPMA) states that " . . . . the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values …. " Section 103 (c) identifies "scenic values" as one of the resources for which public land should be managed. Section 201 (a) states that "The Secretary shall prepare and maintain on a continuing basis an inventory of all public lands and their resources and other values (including ... scenic values) ...." Section 505 (a) requires that "Each right-of-way shall contain terms and conditions which will... minimize damage to the scenic and esthetic values...."	Refer to CDCA discussion, below.

LORS		Consistency with Staff-Recommended Conditions of Certification (Project)
California Desert Conservation Area Plan (CDCA Plan)	The CDCA Plan represents the Resource Management Plan (RMP) for the area required under FLPMA. The CDCA Plan did not contain VRM mapping as in most RMPs. VR Inventory mapping was prepared prior to this project by BLM. The SES Solar Two site is classified in the CDCA Plan as Multiple-Use Class (MUC) L (Limited Use). Multiple-Use Class L, the most restrictive under the plan, "protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower-intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished. Under the CDCA Plan Electrical Power Generation Facilities, including Wind/Solar facilities, may be allowed within MUC Class L if NEPA requirements are met.	Consistent. Solar electrical generation plants are specifically allowed for under the MUC Class L Guidelines if NEPA requirements are met. Disclosure of potential visual project effects under NEPA has been conducted through the analysis in this study.
National Historic Preservation Act (NHPA)	Under regulations of the NHPA, visual impacts to a listed or eligible National Register property that may diminish the integrity of the property's ". . . setting . . .(or) feeling . . . ." in a way that affects the property's eligibility for listing, may result in a potentially significant adverse effect. "Examples of adverse effects . . . include . . .: Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features . . . . " (36 CFR Part 800.5)	Designated and eligible pre-historic and historic sites were identified by Energy Commission staff within the viewshed of the SES Solar Two Project, and may potentially be affected by visual effects of the project. These potential impacts are partially addressed under Condition of Certification VIS-5. These potential impacts are further addressed in the **Cultural Resources** section of this SA/DEIS.
STATE		
State Scenic Highway Program (CA. Streets and Highways Code, Section 260 et seq.)	The State Scenic Highway Program promotes protection of designated State scenic highways through certification and adoption of local scenic corridor protection programs that conform with requirements of the State program.	Consistent. Highway I-8 within the project viewshed is not an eligible or designated State scenic highway.

LORS		Consistency with Staff-Recommended Conditions of Certification (Project)
LOCAL		
Imperial County General Plan (1993) Applicable Conservation Element Goals, Objectives, Programs	**Conservation and Open Space Element (1993)** **Preservation of Visual Resources** Goal 7: The aesthetic character of the region shall be protected and enhanced to provide a pleasing environment for residential, commercial, recreational, and tourist activity. Objective 7.1 Encourage the preservation and enhancement of the natural beauty of the desert and mountain landscape.	While the Goals and Objectives call for development of programs to institute preservation and enhancement of visual resources and open space, polices and implementation programs have not yet been developed.
	Preservation of Open Space Goal 10: Open space shall be maintained to protect the aesthetic character of the region, protect natural resources, provide recreational opportunities, and minimize hazards to human activity.	No specific policies have yet been developed to implement these goals and objectives. The project would not conform with this goal, but there is no specific policy non-conformance.
	Objective 10.9 Conserve desert lands, within the county's jurisdiction for wildlife protection, recreation, and aesthetic purposes.	The majority of the project site does not lie within county jurisdiction. Those portions that do would not conform with this objective. However, no policies have been developed for implementation of this objective so there is no specific policy non-conformance.
	Circulation-Scenic Highways Element (2006) **Scenic Highways** Objective 4.3 Protect areas of outstanding scenic beauty along any scenic highways and protect the aesthetics of those areas.	There are no designated state or county scenic highways within the project viewshed.
	Objective 4.5 Develop standards for aesthetically valuable sites. Design review may be required so that structures, facilities, and activities are properly merged with the surrounding environment.	No implementation programs or polices have been developed to date.
	IV. IMPLEMENTATION PROGRAMS AND POLICIES **5. Open Space Conservation Programs** Encourage the use of unobtrusive materials, structures, and color in power line transmission corridors. Vegetative screening is encouraged wherever possible.	Consistent with recommended conditions. Condition of Certification **VIS-1** calls for unobtrusive, non-reflective paint treatment of all non-mirror structural surfaces of the project to minimize visual contrast. Vegetative screening has not been recommended in this staff assessment.

LORS		Consistency with Staff-Recommended Conditions of Certification (Project)
Imperial County Code – Title 9, Land Use Ordinance. 90301.02 (K)	All exterior lighting shall be shielded and directed away from adjacent properties and away from or shielded from public roads.	Consistent with recommended conditions. Condition of Certification VIS-2 requires shielding of lighting to prevent all direct off-site illumination, and to otherwise minimize night lighting.
Imperial County Code – Title 9, Land Use Ordinance. 90301.03 (A,B,C,D,E,F)	Require that industrial uses provide design features such as landscaping, setbacks, and landscape boundaries as buffers from different zoned parcels	Consistent with recommended conditions. Setbacks of both transmission lines and mirror units have been recommended under Conditions of Certification **VIS-3, -4,** and **–7**. to reduce visual impacts of the project.

C.13.11 NOTEWORTHY PUBLIC BENEFITS

No noteworthy public benefits in the area of visual resources were identified.

C.13.12 CONCLUSIONS

The proposed project and development alternatives would all substantially degrade the existing visual character and quality of the site and its surroundings. Under the proposed project an area of roughly 10 square miles, including over 6.5 miles of frontage on Highway I-8, would experience a dramatic visual transformation from a predominantly natural desert landscape to one of a highly industrial character, strongly affecting motorists on Highway I-8. The character and quality of views from some recreational destinations within the Yuha Desert ACEC, including portions of the Anza National Historic Trail, would be strongly affected. Given the moderately high-to-high level of viewer sensitivity of these affected viewpoints, project impacts are considered significant. Because effective, feasible mitigation measures capable of reducing all impacts to less-than-significant levels under CEQA could not be identified by staff, these impacts are considered to be unavoidable. However, because they would substantially reduce or compensate for many of these impacts, staff recommends adoption of all Conditions of Certification if the project is approved.

Impacts of the 300 Megawatt Alternative would remain significant to I-8 and Yuha Desert ACEC viewers, and unavoidable. However, the degree and extent of those impacts would be substantially less than those of the proposed project.

Impacts of the Drainage Avoidance #1 Alternative would be substantially similar to the Proposed Project Alternative, and thus significant and unavoidable. Differences in the visual effects of the two alternatives would be minor and little noticed by the majority of the public.

Similar to impacts of the 300 Megawatt Alternative, impacts of the Drainage Avoidance #2 Alternative would be substantially less extensive than those of the Proposed Project Alternative, but would remain significant and unavoidable.

The anticipated visual impacts of the SES Solar Two Project and all development alternatives, in combination with past and foreseeable future local projects in the West Mesa/Yuha Desert region, and past and foreseeable future region-wide projects in the southern California desert are considered cumulatively considerable and potentially significant under CEQA.

In the absence of photometric data to the contrary, staff believes that diffuse reflection from the SunCatchers could be an intrusive and distracting nuisance to motorists under at least certain conditions, particularly when an entire row of units could be visible in a near-vertical position to approaching motorists at hours near sunrise and sunset. However, with staff-recommended Condition of Certification **VIS-6**, potential glare/reflection impacts could be reduced to less-than-significant levels.

With staff-recommended Condition of Certification **VIS-7**, construction impacts could be mitigated to less-than-significant levels.

C.13.13 PROPOSED CONDITIONS OF CERTIFICATION/APPROVAL

SURFACE TREATMENT OF PROJECT STRUCTURES AND BUILDINGS

VIS-1 The project owner shall treat all non-mirror surfaces of all project structures and buildings visible to the public such that a) their colors minimize visual intrusion and contrast by blending with the existing tan and brown color of the surrounding landscape; b) their colors and finishes do not create excessive glare; and c) their colors and finishes are consistent with local policies and ordinances. The transmission line conductors shall be non-specular and non-reflective, and the insulators shall be non-reflective and non-refractive. This measure shall include coloring of security fencing with vinyl or other non-reflective coating; or with slats or similar semi-opaque, non-reflective material, to blend to the greatest feasible extent with the background soil.

The project owner shall submit for CPM and BLM Authorized Officer review and approval, a specific Surface Treatment Plan that will satisfy these requirements. The treatment plan shall include:

A. A description of the overall rationale for the proposed surface treatment, including the selection of the proposed color(s) and finishes;

B. A list of each major project structure, building, tank, pipe, and wall; the transmission line towers and/or poles; and fencing, specifying the color(s) and finish proposed for each. Colors must be identified by vendor, name, and number; or according to a universal designation system;

C. One set of color brochures or color chips showing each proposed color and finish;

D. A specific schedule for completion of the treatment; and

E. A procedure to ensure proper treatment maintenance for the life of the project.

The project owner shall not specify to the vendors the treatment of any buildings or structures treated during manufacture, or perform the final treatment on any buildings or structures treated in the field, until the project owner receives notification of approval of the treatment plan by BLM's Authorized Officer and the CPM. Subsequent modifications to the treatment plan are prohibited without BLM's Authorized Officer and CPM approval.

Verification: At least 90 days prior to specifying to the vendor the colors and finishes of the first structures or buildings that are surface treated during manufacture, the project owner shall submit the proposed treatment plan to BLM's Authorized Officer (AO)and the CPM for review and approval and simultaneously to Imperial County for review and comment. The CPM and BLM AO shall make a field determination of an appropriate color from the BLM Environmental Color Chart and provide guidance t the proponent to maximize effectiveness of mitigation. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a plan with the specified revision(s) for review and approval by BLM's Authorized Officer and the CPM before any treatment is applied. Any modifications to the treatment plan must be submitted to BLM's Authorized Officer and the CPM for review and approval.

Prior to the start of commercial operation, the project owner shall notify BLM's Authorized Officer and the CPM that surface treatment of all listed structures and buildings has been completed and they are ready for inspection and shall submit to each one set of electronic color photographs from the same key observation points identified in (d) above. The project owner shall provide a status report regarding surface treatment maintenance in the Annual Compliance Report. The report shall specify a): the condition of the surfaces of all structures and buildings at the end of the reporting year; b) maintenance activities that occurred during the reporting year; and c) the schedule of maintenance activities for the next year.

TEMPORARY AND PERMANENT EXTERIOR LIGHTING

VIS-2 To the extent feasible, consistent with safety and security considerations, the project owner shall design and install all permanent exterior lighting and all temporary construction lighting such that a) lamps and reflectors are not visible from beyond the project site, including any off-site security buffer areas; b) lighting does not cause excessive reflected glare; c) direct lighting does not illuminate the nighttime sky, except for required FAA aircraft safety lighting; and shall employ on-demand lighting technology such as a radar-triggered audio-visual warning system; d) illumination of the project and its immediate vicinity is minimized, and e) the plan complies with local policies and ordinances. The project owner shall submit to BLM's Authorized Officer and the CPM for review and approval and simultaneously to Imperial County for review and comment a lighting mitigation plan that includes the following:

A. Location and direction of light fixtures shall take the lighting mitigation requirements into account;

B. Lighting design shall consider setbacks of project features from the site boundary to aid in satisfying the lighting mitigation requirements;

C. Lighting shall incorporate fixture hoods/shielding, with light directed downward or toward the area to be illuminated;

D. Light fixtures that are visible from beyond the project boundary shall have cutoff angles that are sufficient to prevent lamps and reflectors from being visible beyond the project boundary, except where necessary for security;

E. All lighting shall be of minimum necessary brightness consistent with operational safety and security; and

F. Lights in high illumination areas not occupied on a continuous basis (such as maintenance platforms) shall have (in addition to hoods) switches, timer switches, or motion detectors so that the lights operate only when the area is occupied.

Verification: At least 90 days prior to ordering any permanent exterior lighting or temporary construction lighting, the project owner shall contact BLM's Authorized Officer and the CPM to discuss the documentation required in the lighting mitigation plan. At least 60 days prior to ordering any permanent exterior lighting, the project owner shall submit to BLM's Authorized Officer and the CPM for review and approval and simultaneously to Imperial County for review and comment a lighting mitigation plan. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a revised plan for review and approval by BLM's Authorized Officer and the CPM.

The project owner shall not order any exterior lighting until receiving BLM Authorized Officer and CPM approval of the lighting mitigation plan.

Prior to commercial operation, the project owner shall notify BLM's Authorized Officer and the CPM that the lighting has been completed and is ready for inspection. If after inspection, BLM's Authorized Officer and the CPM notify the project owner that modifications to the lighting are needed, within 30 days of receiving that notification the project owner shall implement the modifications and notify BLM's Authorized Officer and the CPM that the modifications have been completed and are ready for inspection.

Within 48 hours of receiving a lighting complaint, the project owner shall provide BLM's Authorized Officer and the CPM with a complaint resolution form report as specified in the Compliance General Conditions including a proposal to resolve the complaint, and a schedule for implementation. The project owner shall notify BLM's Authorized Officer and the CPM within 48 hours after completing implementation of the proposal. A copy of the complaint resolution form report shall be submitted to BLM's Authorized Officer and the CPM within 30 days.

RE-ALIGNMENT OF PROPOSED TRANSMISSION INTERCONNECTION

VIS-3 To reduce the prominence of the proposed new segment of transmission line paralleling Highway I-8, the applicant shall set back the transmission line at least 1/2 mile from Highway I-8 within the project site. This measure applies only to that portion of the proposed transmission line paralleling Highway I-8 within the project site boundaries.

Verification: At least 90 days prior to start of construction, the project owner shall present to BLM's Authorized Officer and the CPM a revised plan depicting how the proposed transmission line will be set from the highway. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a revised plan for review and approval by BLM's Authorized Officer and the CPM.

The project owner shall not begin construction until receiving BLM Authorized Officer and CPM approval of the revised plan.

SETBACK OF SUNCATCHERS FROM HIGHWAY I-8

VIS-4 To reduce the visual dominance and glare effects of the SunCatchers to motorists on Highway I-8, the applicant shall employ a combination of measures as necessary, including set-backs of the nearest SunCatcher units to a distance of 500 feet from the adjoining roadway or as necessary to avoid excessive glare and reduce visual height and dominance of SunCatchers, slatted fencing as described under Condition of Certification VIS-6, and set-backs of SunCatcher units from project fencing.

Verification: At least 90 days prior to start of construction, the project owner shall present to BLM's Authorized Officer and the CPM a revised plan depicting how the proposed SunCatchers will be set back from the highway. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a revised plan for review and approval by BLM's Authorized Officer and the CPM.

The project owner shall not begin construction until receiving BLM Authorized Officer and CPM approval of the revised plan.

BENEFICIAL ASSESSMENT TO NPS/BLM FOR IMPACTS TO ANZA TRAIL

VIS-5 In order to off-set unavoidable adverse impacts to visitors on the Anza Trail and Yuha Desert ACEC, the project owner shall contribute funds to the National Park Service (NPS) and BLM, , specifically to provide improvements to benefit visitors on the Anza Trail. Such improvements could include, but not be limited to, interpretive displays or exhibits, improvements to use areas, mounted telescopes, or other improvements to be determined by the NPS and BLM.

Verification: The project owner shall coordinate closely with the BLM and, NPS, and contribute funds to mitigate for visual impacts to recreational users of the Anza Trail. The funds will be used by the agencies to improve the recreational experience for Anza Trail visitors through such means as interpretive signage, improvements to camping facilities, provision of view scopes at campsites or vista points, or other measures as appropriate. The amount and payment of funds will be determined by the two agencies commensurate with the loss scenic integrity of the Anza Trail experience. The project owner shall provide funds to the two agencies as approved by the Compliance Project Manager (CPM) within 180 days of the start of construction, and specify that the funds would be used for the area affected by the SES Solar Two Project. The project owner shall provide documentation to the CPM that the funds have been paid to the satisfaction of the BLM.

REFLECTIVE GLARE MITIGATION

VIS-6 The project owner shall develop and implement a glare mitigation plan that minimizes visibility of the SunCatcher mirrors to both east-and west-bound traffic on Highway I-8 utilizing one or more measures, which may include but is not limited to 20-foot tall slatted fencing, particularly at the eastern and western boundaries near the highway; earth berms, and/or an increase in the setbacks of the SunCatcher units from the roadway; and must include a SunCatcher Mirror Positioning Plan (MPP) describing how the outermost rows of SunCatchers could be positioned in order to avoid or minimize the most intensive potential glare incidents on motorists as called for under Condition of Certification TRANS-4. The plan shall include a glare complaint resolution form to be distributed to the CPM, BLM, NPS, and Imperial County as a means to identify glare issues.

Verification: At least 90 days prior to start of construction, the project owner shall present to BLM's Authorized Officer and the CPM a glare mitigation plan describing a proposed set of measures to reduce the most intensive potential glare events to motorists. If earth berms are proposed as part of the plan, the applicant shall submit a grading plan including contour grading, and a revegetation plan. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a revised plan for review and approval by BLM's Authorized Officer and the CPM.

The project owner shall not begin construction until receiving BLM Authorized Officer and CPM approval of the revised plan.

Within 48 hours of receiving a glare complaint, the project owner shall provide the BLM Authorized Officer and CPM with a complaint resolution form report as specified in the Compliance General Conditions including a proposal to resolve the complaint, and a schedule for implementation. The project owner shall notify the BLM Authorized Officer and CPM within 48 hours after completing implementation of the proposal. A copy of the complaint resolution form report shall be submitted to the BLM Authorized Officer and CPM within 30 days

SET-BACK AND RE-VEGETATION OF STAGING AREA

VIS-7 In order to minimize the visual prominence of the proposed staging area to motorists on I-8, the project owner shall provide a revised site plan for staging that includes a set-back of at least ¼-mile or more from the highway, and a description of measures to identify and address biological and cultural issues potentially connected to the plan. In addition, the project owner shall provide a re-vegetation plan describing how the staging site will be restored following construction. The plan shall call for beginning of restoration of the site within the shortest feasible time following completion of construction.

Verification: At least 90 days prior to start of construction, the project owner shall present to BLM's Authorized Officer and the CPM a revised staging area site plan including a set-back from I-8 of at least ¼-mile. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a revised plan for review and approval by BLM's Authorized Officer and the CPM. The project owner shall not begin construction until receiving BLM Authorized Officer and CPM approval of the revised plan.

At least 60 days prior to start of operation, the project owner shall present to BLM's Authorized Officer and the CPM a revegetation plan for the staging area. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a revised plan for review and approval by BLM's Authorized Officer and the CPM. The project owner shall not begin operation until receiving BLM Authorized Officer and CPM approval of the revised plan.

C.13.14 REFERENCES

Fennemen, Nevin. 1931 – Physiography of the Western United States.

Imperial County, 1993 – General Plan.

NPS 2004 – BLM Opens New Public Trail in the Yuha Desert, *Noticias de Anza*, No. 24, April 2004

SES (Stirling Energy Systems Solar Two, LLC) 2008a (tn: 46819) – Application for Certification for the Stirling Energy Systems (SES) Solar Two Project, Volumes 1 and 2. Submitted to the California Energy Commission, June 30, 2008

SES 2008f – Applicant's Response to BLM and Energy Commission Data Request Set 1, Part 1 (1-52) (tn: 49322), December 8, 2008.

USDOI 2004 – Exploring the Yuha Desert. http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pdfs/elcentro_pdfs.Par.0f9ac3ce.File.pdf/yuha_blm.pdf

USDOI 2003 – Western Colorado Routes of Travel Designation Plan Amendment.

USDOI; Michael Clayton Associates 2008 – Yuha Desert/West Mesa VRM Inventory.

APPENDIX VR-1

ENERGY COMMISSION VISUAL RESOURCE ANALYSIS EVALUATION CRITERIA

Energy Commission staff conducts a visual resource analysis according to Appendix G, “Environmental Checklist Form—Aesthetics,” California Environmental Quality Act (CEQA). The CEQA analysis requires that commission staff make a determination of impact ranging from “Adverse and Significant” to “Not Significant.”

Staff’s analysis is based on Key Observation Points or KOPs. KOPs are photographs of locations within the project area that are highly visible to the public — for example, travel routes; recreational and residential areas; and bodies of water as well as other scenic and historic resources.

Those photographs are taken to indicate existing conditions without the project and then modified to include a simulation of the project. Consequently, staff has a visual representation of the viewshed before and after a project is introduced and makes its analysis accordingly. Information about that analytical process follows.

Visual Resource Analysis Without Project

When analyzing KOPs of existing conditions without the project, staff considers the following conditions: visual quality, viewer concern, visibility, number of viewers, duration of view. Those conditions are then factored into an overall rating of viewer exposure and viewer sensitivity. Information about each condition and rating follows.

Visual Quality

An expression of the visual impression or appeal of a given landscape and the associated public value attributed to the resource. Visual quality is rated from *high* to *low*. A high rating is generally reserved for landscapes viewers might describe as picture-perfect.

Landscapes rated high generally are memorable because of the way the components combine in a visual pattern. In addition, those landscapes are free from encroaching elements, thus retaining their visual integrity. Finally, landscapes with high visual quality are visually coherent and harmonious when each element is considered as part of the whole. On the contrary, landscapes rated *low* are often dominated by visually discordant human alterations.

Viewer Concern

Viewer concern represents the reaction of a viewer to visible changes in the viewshed — an area of land visible from a fixed vantage point. For example, viewers have a high expectation for views formally designated as a scenic area or travel corridor as well as for recreational and residential areas. Viewers generally expect that those views will be preserved. Travelers on highways and roads, including those in agricultural areas, are generally considered to have moderate viewer concerns and expectations.

However, viewers tend to have low-to-moderate viewer concern when viewing commercial buildings. And industrial uses typically have the lowest viewer concern. Regardless, the level of concern could be lower if the existing landscape contains discordant elements. In addition, some areas of lower visual quality and degraded visual character may contain particular views of substantially higher visual quality or interest to the public.

Visibility

Visibility is a measure of how well an object can be seen. Visibility depends on the angle or direction of views; extent of visual screening; and topographical relationships between the object and existing homes, streets, or parks. In that sense, visibility is determined by considering any and all obstructions that may be in the sightline—trees and other vegetation; buildings; transmission poles or towers; general air quality conditions such as haze; and general weather conditions such as fog.

Number of Viewers

Number of viewers is a measure of the number of viewers per day who would have a view of the proposed project. *Number of viewers* is organized into the following categories: residential according to the number of residences; motorist according to the number of vehicles; and recreationists.

Duration of View

Duration of view is the amount of time to view the site. For example, a high or extended view of a project site is one reached across a distance in two minutes or longer. In contrast, a low or brief duration of view is reached in a short amount of time—generally less than ten seconds.

Viewer Exposure

Viewer exposure is a function of three elements previously listed, *visibility*, *number of viewers*, and *duration of view*. Viewer exposure can range from a *low* to *high*. A partially obscured and brief background view for a few motorists represents a low value; and unobstructed foreground view from a large number of residences represents a high value.

Visual Sensitivity

Visual sensitivity is comprised of three elements previously listed, *visual quality*, *viewer concern*, and *viewer exposure*. Viewer sensitivity tends to be higher for homeowners or people driving for pleasure or engaged in recreational activities and lower for people driving to and from work or as part of their work.

Visual Resource Analysis with Project

Visual resource analyses with photographic simulations of the project involve the elements of contrast, dominance, view blockage, and visual change. Information about each element follows.

Contrast

Contrast concerns the degree to which a project's visual characteristics or elements — form, line, color, and texture — differ from the same visual elements in the existing landscape. The degree of contrast can range from *low* to *high*. A landscape with forms, lines, colors, and textures similar to those of a proposed energy facility is more visually absorbent; that is, more capable of accepting those characteristics than a landscape in which those elements are absent.[1] Generally, visual absorption is inversely proportional to visual contrast.

Dominance

Dominance is a measure of (a) the proportion of the total field of view occupied by the field; (b) a feature's apparent size relative to other visible landscape features; and (c) the conspicuousness of the feature due to its location in the view.

A feature's level of dominance is lower in a panoramic setting than in an enclosed setting with a focus on the feature itself. A feature's level of dominance is higher if it is (1) near the center of the view; (2) elevated relative to the viewer; or (3) has the sky as a backdrop. As the distance between a viewer and a feature increases, its apparent size decreases; and consequently, its dominance decreases. The level of dominance ranges from *low* to *high*.

View Blockage

The extent to which any previously visible landscape features are blocked from view constitutes view disruption. The view is also disrupted when the continuity of the view is interrupted. When considering a project's features, higher quality landscape features can be disrupted by lower quality project features, thus resulting in adverse visual impacts. The degree of view disruption can range from *none* to *high*.

Visual Change

Visual change is a function of *contrast*, *dominance*, and *view disruption*. Generally, *contrast* and *dominance* contribute more to the degree of visual change than does *view disruption*.

[1] Typically, the Energy Commission does not consider texture in its visual analyses.

VISUAL RESOURCES - FIGURE 1
SES Solar Two - Views of the Project Site

Site, Looking Northwest Toward Plaster City, Carrizo Mountain

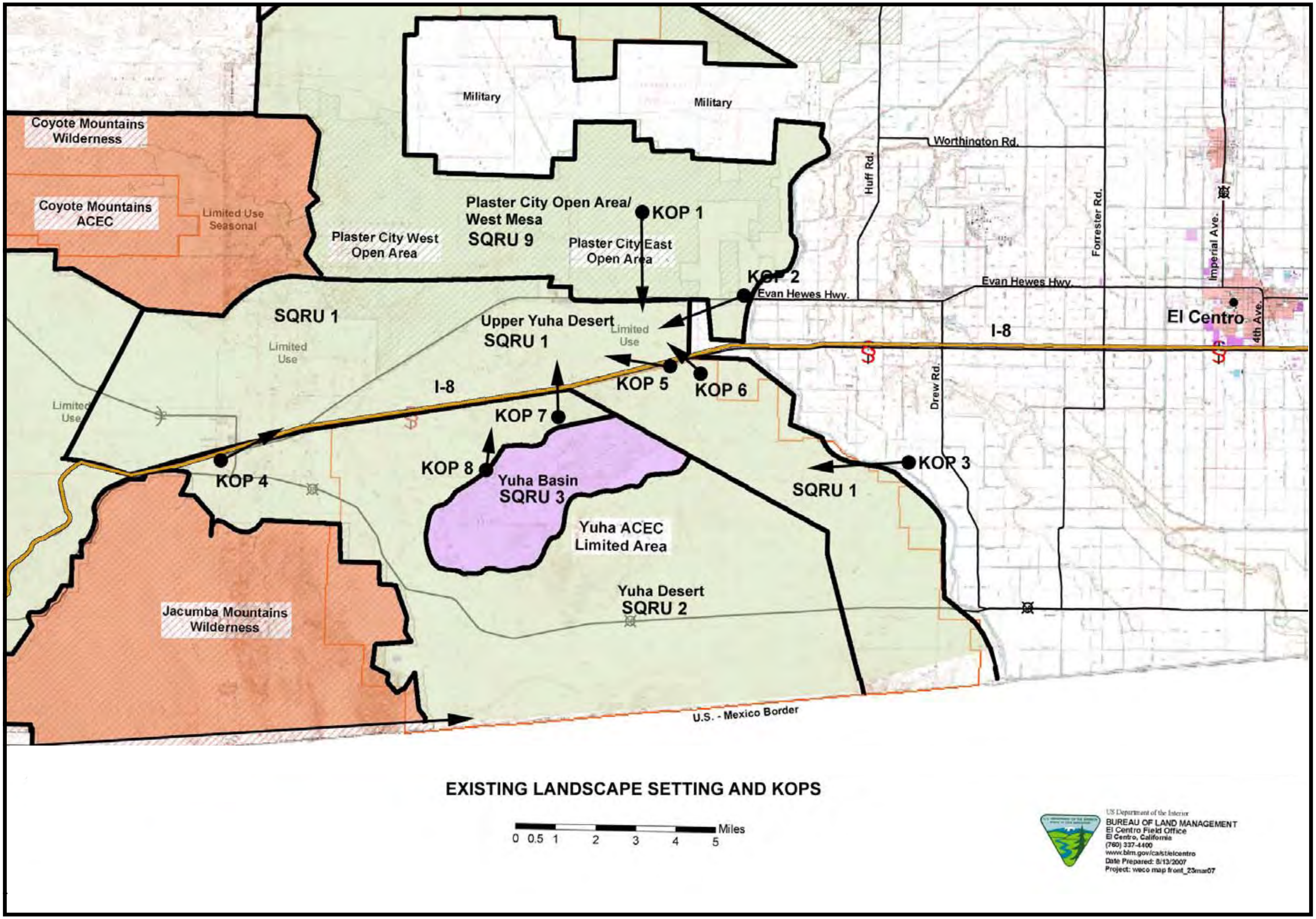
Site, Looking North Toward Plaster City, Superstition Mountains

Site, Looking Southwest Toward Existing Transmission Lines

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, FEBRUARY 2010
SOURCE: WK and Associates

VISUAL RESOURCES - FIGURE 2

SES Solar Two - Existing Landscape Setting and KOPS



SOURCE: BLM/Clayton Associates/WKA

VISUAL RESOURCES - FIGURE 3
SES Solar Two - Character Setting Photos

Plaster City from Middleground Distance

Creosote Scrub Vegetation

Plaster City

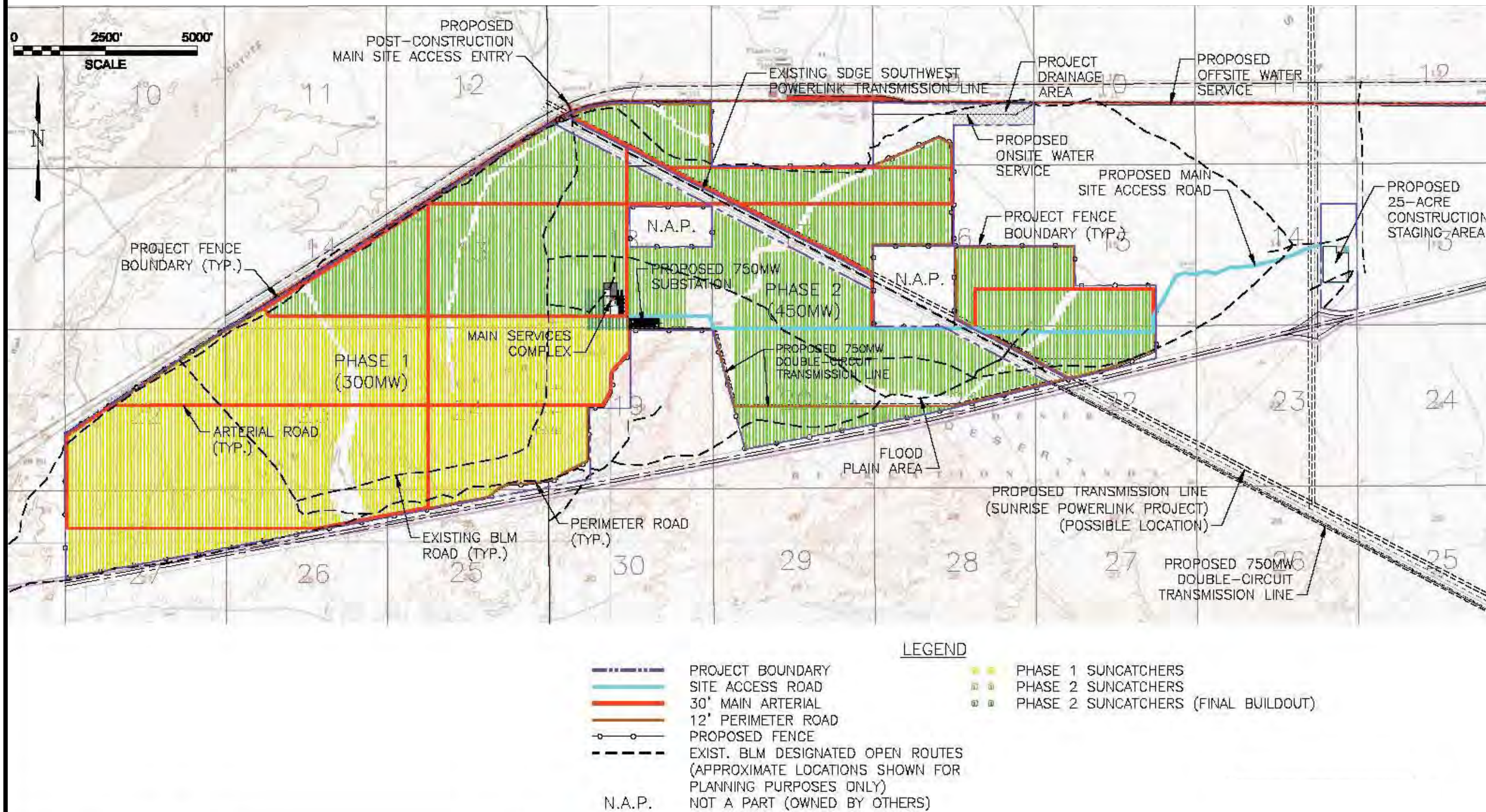
Desert Pavement

Plaster City Open Area

Southwest Powerlink

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, FEBRUARY 2010
SOURCE: WK and Associates

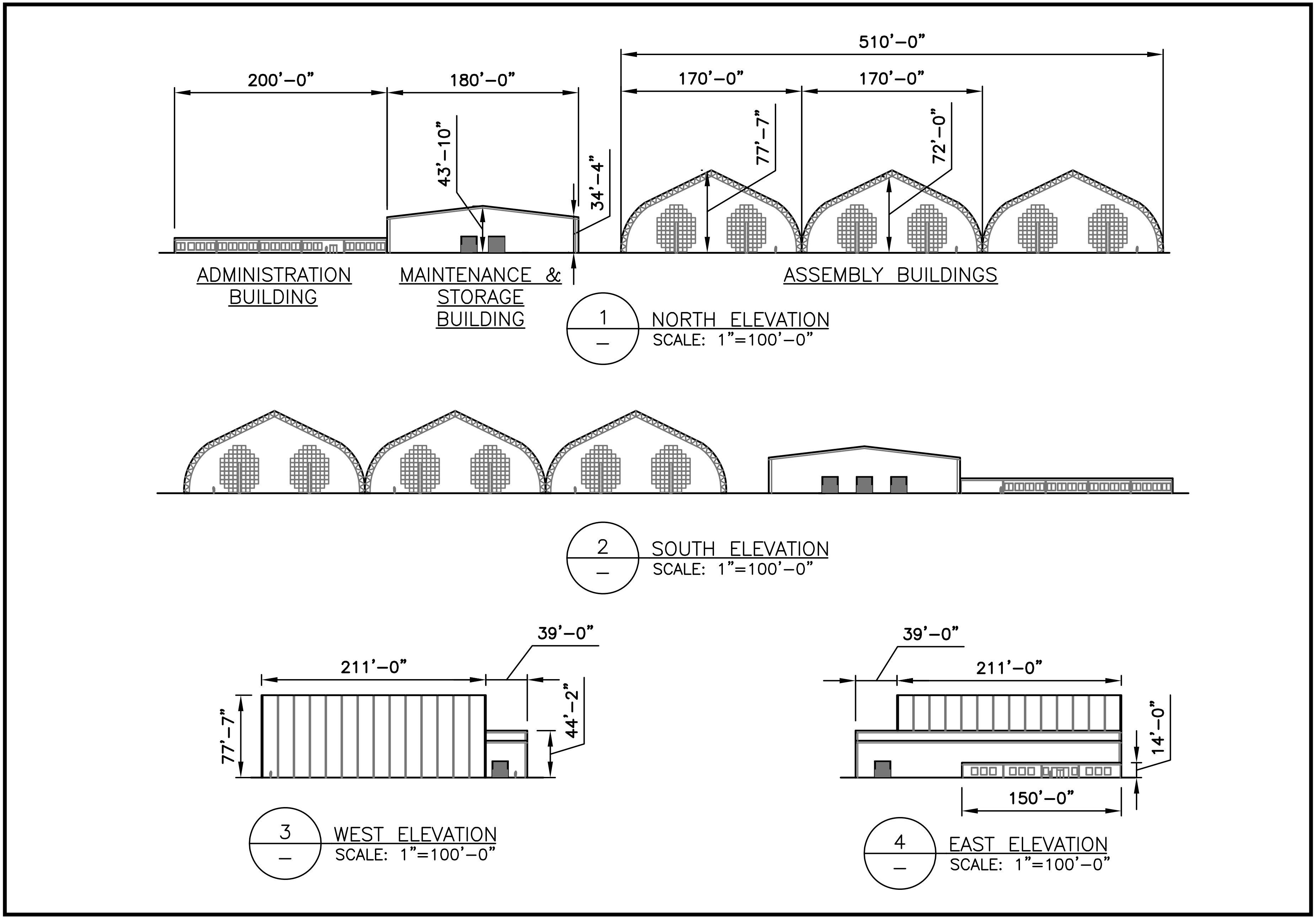
VISUAL RESOURCES - FIGURE 4
SES Solar Two - Project Layout



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, FEBRUARY 2010
SOURCE: AFC Figure 3-3

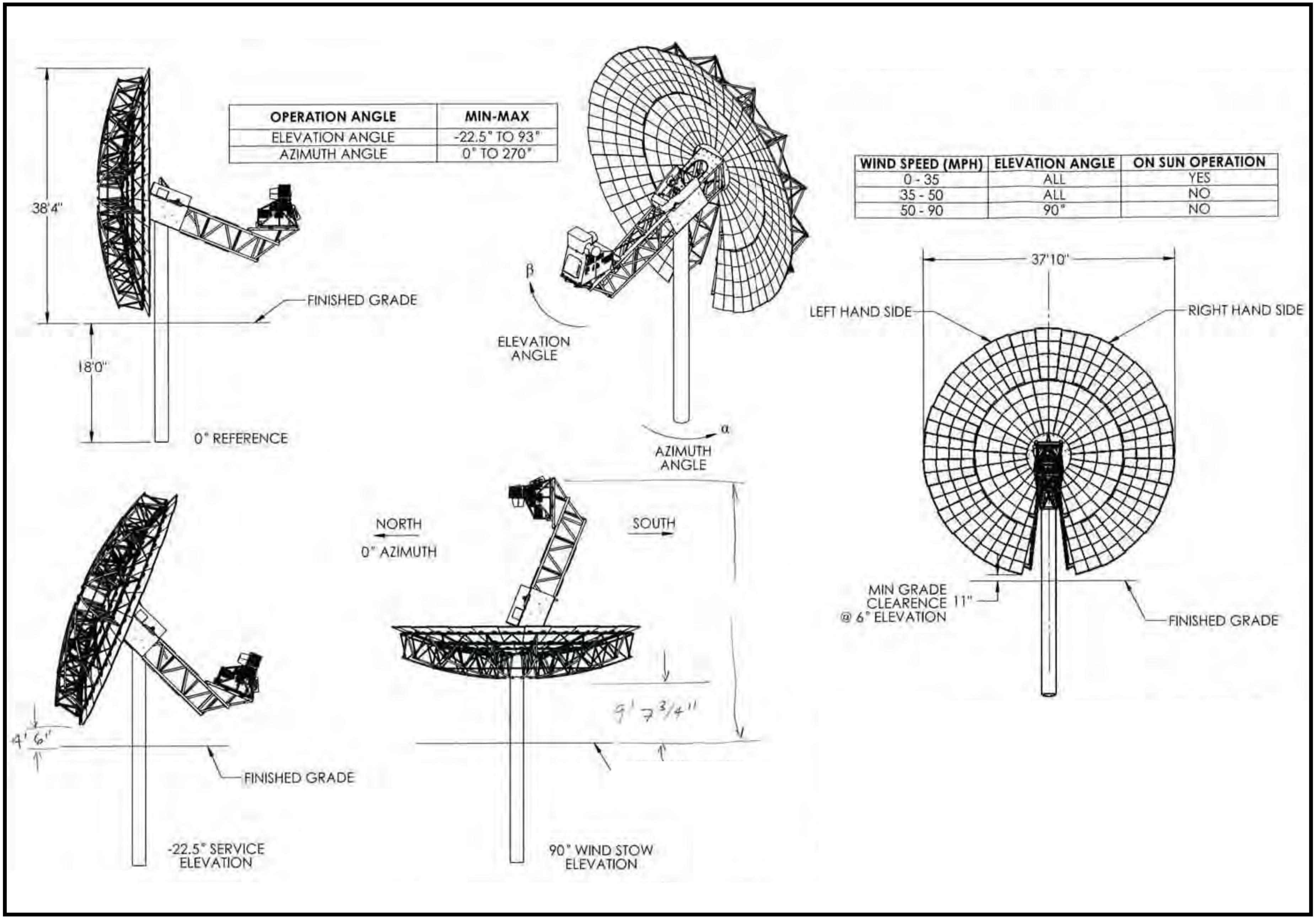
VISUAL RESOURCES - FIGURE 5

SES Solar Two - Architectural Elevations Of Power Block



SOURCE: AFC Figure 3-26

VISUAL RESOURCES - FIGURE 6
SES Solar Two - Architectural Elevations of SunCatchers



OPERATION ANGLE	MIN-MAX
ELEVATION ANGLE	-22.5° TO 93°
AZIMUTH ANGLE	0° TO 270°

WIND SPEED (MPH)	ELEVATION ANGLE	ON SUN OPERATION
0 - 35	ALL	YES
35 - 50	ALL	NO
50 - 90	90°	NO

SOURCE: SES Solar Systems

VISUAL RESOURCES - FIGURE 7a

SES Solar Two - KOP #1 - Existing View - View from Plaster City Open OHV Area

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

SOURCE: AFC Figure 5.13-17

VISUAL RESOURCES - FIGURE 7b

SES Solar Two - KOP #1 - Simulated View - View from Plaster City Open OHV Area

SOURCE: AFC Figure 5.13-22

VISUAL RESOURCES - FIGURE 8a

SES Solar Two - KOP #2 - Existing View - View from Nearby Residence on Evan Hewes Highway

SOURCE: AFC Figure 5.13-18

VISUAL RESOURCES - FIGURE 8b

SES Solar Two - KOP #2 - Simulated View - View from Nearby Residence on Evan Hewes Highway

SOURCE: AFC Figure 5.13-23

VISUAL RESOURCES - FIGURE 9a

SES Solar Two - KOP #3 - Existing View - View from Residence to Proposed Transmission Line

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

SOURCE: AFC Figure 5.13-19

VISUAL RESOURCES - FIGURE 9b

SES Solar Two - KOP #3 - Simulated View - View from Residence to Proposed Transmission Line

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SOURCE: AFC Figure 5.13-24

VISUAL RESOURCES - FIGURE 10a

SES Solar Two - KOP #4 - Existing View - View from Town of Ocotillo

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

SOURCE: AFC Figure 5.13-20

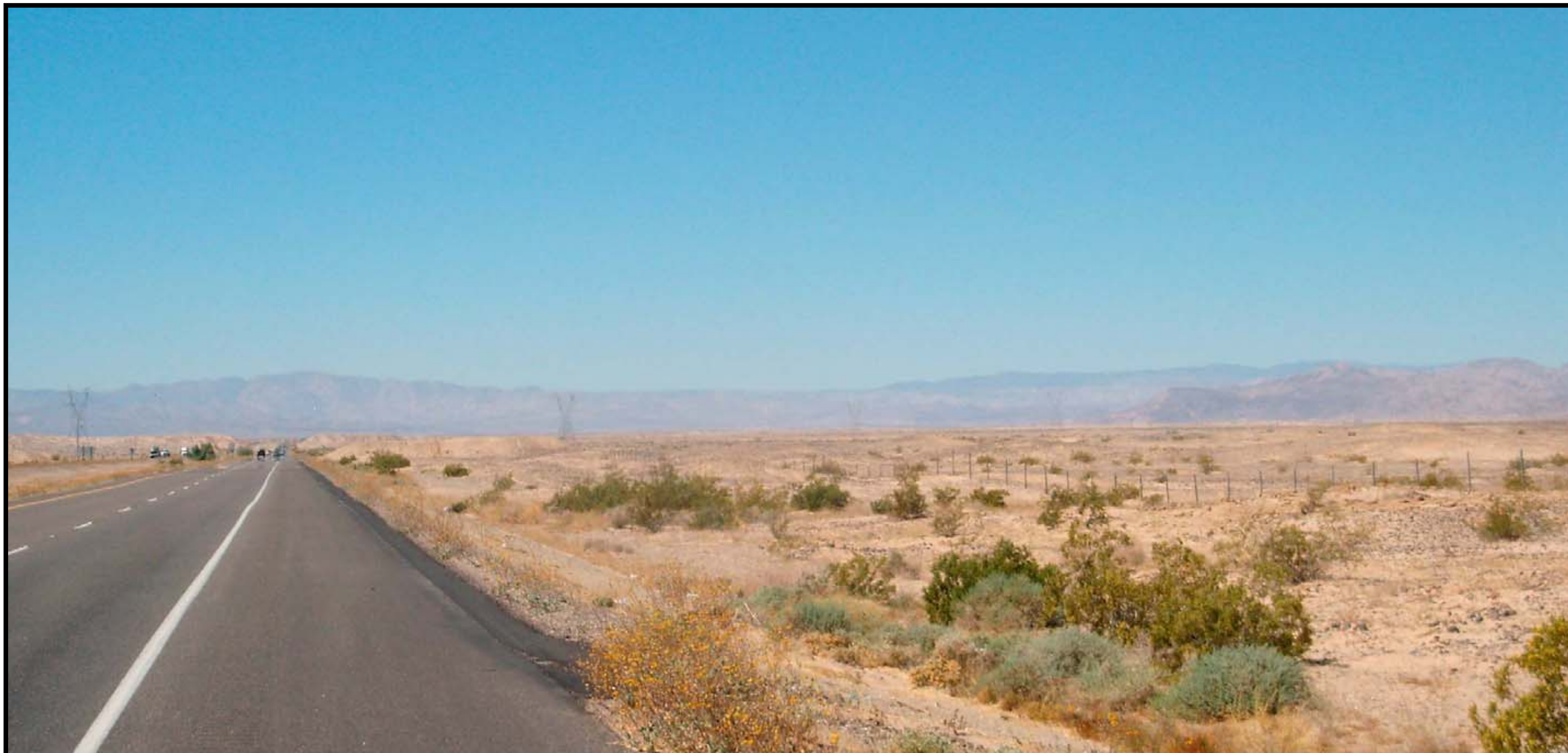
VISUAL RESOURCES - FIGURE 10b

SES Solar Two - KOP #4 - Simulated View - View from Town of Ocotillo

SOURCE: AFC Figure 5.13-25

VISUAL RESOURCES - FIGURE 11a

SES Solar Two - KOP #5 - Existing View - View from I-8 Near Dunaway Road



SOURCE: AFC Figure 5.13-21

FEBRUARY 2010

VISUAL RESOURCES - FIGURE 11b

SES Solar Two - KOP #5 - Simulated View -View from I-8 Near Dunaway Road

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

SOURCE: AFC Figure 5.13-

VISUAL RESOURCES - FIGURE 12

SES Solar Two - KOP 6, View from Route 274 (De Anza National Historic Trail) near Dunaway Campground

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

SOURCE: WK and Associates

VISUAL RESOURCES - FIGURE 13

SES Solar Two - KOP 7, View from Overlook Campground Route 274 (De Anza National Historic Trail)

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

SOURCE: WK and Associates

VISUAL RESOURCES - FIGURE 14
SES Solar Two - KOP 8, View from Vicinity of the Yuha Geoglyphs (De Anza National Historic Trail)

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, FEBRUARY 2010
SOURCE: WK and Associates

C.14 - WASTE MANAGEMENT

Testimony of Suzanne Phinney, D.Env.

C.14.1 SUMMARY OF CONCLUSIONS

Management of the waste generated during construction, operation and closure/decommissioning of the Stirling Energy Systems Solar Two Project would not generate a significant adverse impact under the California Environmental Quality Act guidelines. There is sufficient landfill capacity, and the project would be consistent with the applicable waste management laws, ordinances, regulations, and standards if the measures proposed in the Application for Certification and staff's proposed conditions of certification are implemented. Similar to the proposed project, staff considers project compliance with CEQA guidelines (Appendix G: Environmental Checklist Section XVI-Utilities and Service Systems); applicable waste management laws, ordinances, regulations, and standards; and staff's conditions of certification to be sufficient to ensure that no significant adverse impacts would occur as a result of waste management associated with the 300 MW alternative, Drainage Avoidance #1 alternative and Drainage Avoidance #2 alternative.

C.14.2 INTRODUCTION

This section presents an analysis of issues associated with wastes generated from the proposed construction, operation, and closure/decommissioning of the Stirling Energy Systems Solar Two (SES Solar Two) Project. The technical scope of this analysis encompasses solid and liquid wastes existing on site and wastes that would likely be generated during facility construction, operation and closure/decommissioning. Management and discharge of wastewater is addressed in the **SOIL AND WATER RESOURCES** section of this document. Additional information related to waste management may also be covered in the **WORKER SAFETY** and **HAZARDOUS MATERIALS MANAGEMENT** sections of this document.

The Bureau of Land Management (BLM) and California Energy Commission staff's (hereafter jointly referred to as staff) objectives in conducting this waste management analysis are to ensure that:

- the management of project wastes would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS). Compliance with LORS ensures that wastes generated during the construction, operation and closure/decommissioning of the proposed project would be managed in an environmentally safe manner.
- the disposal of project wastes would not adversely impact existing waste disposal facilities.
- the site is managed in such a way that project wastes and waste constituents would not pose a risk to humans or the environment.

C.14.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

In accordance with CEQA guidelines (Appendix G: Environmental Checklist Section XVI- Utilities and Service Systems), staff evaluated project wastes in terms of landfill capacity and LORS compliance. The federal, state, and local environmental LORS listed in **Waste Management Table 1** have been established to ensure the safe and proper management of both solid and hazardous wastes in order to protect human health and the environment.

WASTE MANAGEMENT Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

<table>
<tr><th>Applicable Law</th><th>Description</th></tr>
<tr><td>Federal</td><td></td></tr>
<tr><td>Title 42, United States Code (U.S.C.), §6901, et seq.

Solid Waste Disposal Act of 1965 (as amended and revised by the Resource Conservation and Recovery Act of 1976, et al.)</td><td>The Solid Waste Disposal Act, as amended and revised by the Resource Conservation and Recovery Act (RCRA) et al., establishes requirements for the management of solid wastes (including hazardous wastes), landfills, underground storage tanks, and certain medical wastes. The statute also addresses program administration, implementation and delegation to states, enforcement provisions, and responsibilities, as well as research, training, and grant funding provisions.

RCRA Subtitle C establishes provisions for the generation, storage, treatment, and disposal of hazardous waste, including requirements addressing:

• Generator record keeping practices that identify quantities of hazardous wastes generated and their disposition;
• Waste labeling practices and use of appropriate containers;
• Use of a manifest when transporting wastes;
• Submission of periodic reports to the United States Environmental Protection Agency (U.S. EPA) or other authorized agency; and
• Corrective action to remediate releases of hazardous waste and contamination associated with RCRA-regulated facilities.

RCRA Subtitle D establishes provisions for the design and operation of solid waste landfills.

RCRA is administered at the federal level by U.S. EPA and its 10 regional offices. The Pacific Southwest regional office (Region 9) implements U.S. EPA programs in California, Nevada, Arizona, and Hawaii.</td></tr>
</table>

Applicable Law	Description
Title 42, U.S.C., §9601, et seq. Comprehensive Environmental Response, Compensation and Liability Act	The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), also known as *Superfund*, establishes authority and funding mechanisms for cleanup of uncontrolled or abandoned hazardous waste sites, as well as cleanup of accidents, spills, or emergency releases of pollutants and contaminants into the environment. Among other things, the statute addresses: • Reporting requirements for releases of hazardous substances; • Requirements for remedial action at closed or abandoned hazardous waste sites, and brownfields; • Liability of persons responsible for releases of hazardous substances or waste; and • Requirements for property owners/potential buyers to conduct "all appropriate inquiries" into previous ownership and uses of the property to 1) determine if hazardous substances have been or may have been released at the site, and 2) establish that the owner/buyer did not cause or contribute to the release. A Phase I Environmental Site Assessment is commonly used to satisfy CERCLA "all appropriate inquiries" requirements.
Title 40, Code of Federal Regulations (CFR), Subchapter I – Solid Wastes	These regulations were established by U.S. EPA to implement the provisions of the Solid Waste Disposal Act and RCRA (described above). Among other things, the regulations establish the criteria for classification of solid waste disposal facilities (landfills), hazardous waste characteristic criteria and regulatory thresholds, hazardous waste generator requirements, and requirements for management of used oil and universal wastes. • Part 257 addresses the criteria for classification of solid waste disposal facilities and practices. • Part 258 addresses the criteria for municipal solid waste landfills. • Parts 260 through 279 address management of hazardous wastes, used oil, and universal wastes (i.e., batteries, mercury-containing equipment, and lamps). U.S. EPA implements the regulations at the federal level. However, California is an RCRA-authorized state, so most of the solid and hazardous waste regulations are implemented by state agencies and authorized local agencies in lieu of U.S. EPA.

Applicable Law	Description
Title 49, CFR, Parts 172 and 173. Hazardous Materials Regulations	These regulations address the United States Department of Transportation (DOT) established standards for transport of hazardous materials and hazardous wastes. The standards include requirements for labeling, packaging, and shipping of hazardous materials and hazardous wastes, as well as training requirements for personnel completing shipping papers and manifests. Section 172.205 specifically addresses use and preparation of hazardous waste manifests in accordance with Title 40, CFR, section 262.20.
Federal CWA, 33 USC § 1251 *et seq.*	The Clean Water Act controls discharge of wastewater to the surface waters of the U.S.
State	
California Health and Safety Code (HSC), Chapter 6.5, §25100, et seq. Hazardous Waste Control Act of 1972, as amended	This California law creates the framework under which hazardous wastes must be managed in California. The law provides for the development of a state hazardous waste program that administers and implements the provisions of the federal RCRA program. It also provides for the designation of California-only hazardous wastes and development of standards (regulations) that are equal to or, in some cases, more stringent than federal requirements. The California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC) administers and implements the provisions of the law at the state level. Certified Unified Program Agencies (CUPAs) implement some elements of the law at the local level.

Applicable Law	Description
Title 22, California Code of Regulations (CCR), Division 4.5. Environmental Health Standards for the Management of Hazardous Waste	These regulations establish requirements for the management and disposal of hazardous waste in accordance with the provisions of the California Hazardous Waste Control Act and federal RCRA. As with the federal requirements, waste generators must determine if their wastes are hazardous according to specified characteristics or lists of wastes. Hazardous waste generators must obtain identification numbers; prepare manifests before transporting the waste off site; and use only permitted treatment, storage, and disposal facilities. Generator standards also include requirements for record keeping, reporting, packaging, and labeling. Additionally, while not a federal requirement, California requires that hazardous waste be transported by registered hazardous waste transporters. The standards addressed by Title 22, CCR include: • Identification and Listing of Hazardous Waste (Chapter 11, §66261.1, et seq.). • Standards Applicable to Generator of Hazardous Waste (Chapter 12, §66262.10, et seq.). • Standards Applicable to Transporters of Hazardous Waste (Chapter 13, §66263.10, et seq.). • Standards for Universal Waste Management (Chapter 23, §66273.1, et seq.). • Standards for the Management of Used Oil (Chapter 29, §66279.1, et seq.). • Requirements for Units and Facilities Deemed to Have a Permit by Rule (Chapter 45, §67450.1, et seq.). The Title 22 regulations are established and enforced at the state level by DTSC. Some generator and waste treatment standards are also enforced at the local level by CUPAs.

<table>
<tr><th>Applicable Law</th><th>Description</th></tr>
<tr><td>HSC, Chapter 6.11
§§25404 – 25404.9

Unified Hazardous Waste and Hazardous Materials Management Regulatory Program
(Unified Program)</td><td>The Unified Program consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of the six environmental and emergency response programs listed below.

• Aboveground Petroleum Storage Act requirements for Spill Prevention, Control, and Countermeasure (SPCC) Plans.
• Hazardous Materials Release and Response Plans and Inventories (Business Plans).
• California Accidental Release Prevention (CalARP) Program.
• Hazardous Materials Management Plan / Hazardous Materials Inventory Statements.
• Hazardous Waste Generator / Tiered Permitting Program.
• Underground Storage Tank Program.

The state agencies responsible for these programs set the standards for their programs while local governments implement the standards. The local agencies implementing the Unified Program are known as CUPAs. The DTSC’s Calexico Field Office is the CUPA for the SES Solar Two project.

Note: The Waste Management analysis only considers application of the Hazardous Waste Generator/Tiered Permitting element of the Unified Program.</td></tr>
<tr><td>Title 27, CCR, Division 1, Sub-division 4, Chapter 1, §15100, et seq.

Unified Hazardous Waste and Hazardous Materials Management Regulatory Program</td><td>While these regulations primarily address certification and implementation of the program by the local CUPAs, the regulations do contain specific reporting requirements for businesses.

• Article 9 – Unified Program Standardized Forms and Formats (§§ 15400–15410).
• Article 10 – Business Reporting to CUPAs (§§15600–15620).</td></tr>
<tr><td>Public Resources Code, Division 30, §40000, et seq.

California Integrated Waste Management Act of 1989</td><td>The California Integrated Waste Management Act (CIWMA) establishes mandates and standards for management of solid waste in California. The law addresses solid waste landfill diversion requirements; establishes the preferred waste management hierarchy (source reduction first, then recycling and reuse, and treatment and disposal last); sets standards for design and construction of municipal landfills; and addresses programs for county waste management plans and local implementation of solid waste requirements.</td></tr>
</table>

Applicable Law	Description
Title 14, CCR, Division 7, §17200, et seq. California Integrated Waste Management Board	These regulations implement the provisions of the California Integrated Waste Management Act and set forth minimum standards for solid waste handling and disposal. The regulations include standards for solid waste management, as well as enforcement and program administration provisions. • Chapter 3 – Minimum Standards for Solid Waste Handling and Disposal. • Chapter 3.5 – Standards for Handling and Disposal of Asbestos Containing Waste. • Chapter 7 – Special Waste Standards. • Chapter 8 – Used Oil Recycling Program. • Chapter 8.2 – Electronic Waste Recovery and Recycling.
HSC, Division 20, Chapter 6.5, Article 11.9, §25244.12, et seq. Hazardous Waste Source Reduction and Management Review Act of 1989	This law was enacted to expand the state's hazardous waste source reduction activities. Among other things, it establishes hazardous waste source reduction review, planning, and reporting requirements for businesses that routinely generate more than 12,000 kilograms (approximately 26,400 pounds) of hazardous waste in a designated reporting year. The review and planning elements are required to be done on a four-year cycle, with a summary progress report due to DTSC every fourth year.
Title 22, CCR, §67100.1 et seq. Hazardous Waste Source Reduction and Management Review	These regulations further clarify and implement the provisions of the Hazardous Waste Source Reduction and Management Review Act of 1989 (noted above). The regulations establish the specific review elements and reporting requirements to be completed by generators subject to the act.
Title 23, CCR Division 3, Chapters 16 and 18	These regulations relate to hazardous material storage and petroleum UST cleanup, as well as hazardous waste generator permitting, handling, and storage. The DTSC Imperial County CUPA is responsible for local enforcement.
Local	
County of Imperial General Plan	The General Plan ensures all new development complies with applicable provisions of the County Integrated Solid Waste Management Plan.
Imperial County, Countywide Integrated Waste Management Plan	This document sets forth the county's goals, policies, and programs for reducing dependence on landfilling solid wastes and increasing source reduction, recycling, and reuse of products and waste, in compliance with the CIWMA. The plan also addresses the siting and development of recycling and disposal facilities and programs within the county.
Imperial County Municipal Code Chapter 8.20 Imperial County Uniform Fire Code	The Uniform Fire Code adopts the California Fire Code, 2001 Edition, together with the county amendments. It also sets forth provisions for violations/penalties, miscellaneous fees, and storage restrictions/prohibitions.

C.14.4 PROPOSED PROJECT

C.14.4.1 SETTING AND EXISTING CONDITIONS

Proposed Project

The proposed SES Solar Two site is approximately 6,500 acres and is located in the southwest region of Imperial County. The site consists of an estimated 6,140 acres of public land administered by the Bureau of Land Management (BLM), and approximately 360 acres of private land under the jurisdiction of Imperial County. The site is located four miles east of Ocotillo and 14 miles west of El Centro, on the eastern flank of the Coyote Mountains in the Yuha Desert. The alluvial plain drains to the northeast, and supports Sonoran creosote bush scrub. Site boundaries would be the Union Pacific Railroad to the north (which runs just south of Evan Hewes Highway); Interstate 8 to the south; the easterly section line of Township 16 South, Range 11 East, Section 14 to the east; and the westerly section line of Township 16 South, Range 10 East, Section 22 to the west. Plaster City (U.S. Gypsum Company facilities) and Imperial County Route S80 are adjacent to the site's northern border.

The proposed project would utilize SunCatchers—a 38-foot tall Stirling dish technology developed by the applicant—which track the sun and focus solar energy onto Power Conversion Units. The project would be developed in two phases. The 300-MW Phase I would begin construction in 2010 on the southwest side of the site. The 450-MW Phase II is contingent upon the development of the Sunrise Powerlink (or equivalent) transmission line. There would be two laydown areas. One is a 100-acre laydown site located east of the project site on Dunaway Road and north of Highway 8. The second laydown site is 11.04 acres located within the project site boundaries just south of the Main Services Complex (see description below). In addition to the proposed SES Solar Two site and construction areas, there are other features and facilities associated with the proposed project (the majority of which are located on the proposed project site or construction laydown area), including:

- Approximately 30,000, SunCatchers and associated equipment and infrastructure within a fenced boundary. A total of 12,000 SunCatcher dishes would be installed during Phase I, and 18,000 dishes would be installed during Phase II;
- A 12-mile, 6-inch water pipeline approximately 30 inches underground off-site in the existing Evan Hewes Highway right-of-way (ROW). The pipeline would provide reclaimed water from the Seeley Waste Water Treatment Facility (SWWTF) located approximately 13 miles east of the proposed project site. Upgrades to the SWWTF would be necessary;
- A hydrogen generation, storage and distribution system;
- An onsite, 24.27-acre Main Services Complex located generally in the center of the site for administration and maintenance activities. The complex would include buildings, parking and access roads;
- An onsite, 6-acre 750-MW Substation located generally in the center of the site, near the Main Services Complex;

- A 10.3-mile 730-MW/230-kV transmission line intended to connect to the existing San Diego Gas & Electric (SDG&E) Imperial Valley Substation located southeast of the project site. The proposed transmission line would parallel the existing Southwest Powerlink transmission line in the existing ROW; and
- Approximately 27 miles of unpaved arterial roads, approximately 14 miles of unpaved perimeter roads, and approximately 234 miles of unpaved access roads. (SES 2008a, Sections 1, 3, and 5.6)

Refer to **SECTION B.1** for a more detailed description of the proposed project and accompanying figures identifying project features and facilities.

C.14.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This waste management analysis addresses: a) existing project site conditions and the potential for contamination associated with prior activities on or near the SES Solar Two Project site, and b) the impacts from the generation and management of wastes during project construction, operation and closure/decommissioning.

<u>Existing Project Site Conditions and Potential for Contamination</u>

For any site in California proposed for the construction of a power plant, the applicant must provide documentation about the nature of any potential or existing releases of hazardous substances or contamination at the site. If potential or existing releases or contamination at the site are identified, CEQA significance of the release or contamination would be determined by site-specific factors, including, but not limited to: the amount and concentration of contaminants or contamination; the proposed use of the area where the contaminants/contamination is found; and any potential pathways for workers, the public, or sensitive species or environmental areas to be exposed to the contaminants. Any unmitigated contamination or releases of hazardous substances that pose a risk to human health or environmental receptors would be considered significant under CEQA by Energy Commission staff.

As a first step in documenting existing site conditions, the Energy Commission's power plant site certification regulations require that a Phase I Environmental Site Assessment (ESA) be prepared[1] and submitted as part of an AFC. The Phase I ESA is conducted to identify any conditions indicative of releases and threatened releases of hazardous substances at the site and to identify any areas known to be contaminated (or a source of contamination) on or near the site.

In general, the Phase I ESA uses a qualified environmental professional to conduct inquiries into past uses and ownership of the property, research hazardous substance releases and hazardous waste disposal at the site and within a certain distance of the site, and visually inspect the property, making observations about the potential for contamination and possible areas of concern. After conducting all necessary file reviews, interviews, and site observations, the environmental professional then provides

[1] Title 20, California Code of Regulations, section 1704(c) and Appendix B, section (g)(12)(A). Note that the Phase I ESA must be prepared according to American Society for Testing and Materials protocol or an equivalent method agreed upon by the applicant and the Energy Commission staff.

findings about the environmental conditions at the site. In addition, since the Phase I ESA does not include sampling or testing, the environmental professional may also give an opinion about the potential need for any additional investigation. Additional investigation may be needed, for example, if there were major gaps in the information available about the site, an ongoing release is suspected, or to confirm an existing environmental condition.

If additional investigation is needed to identify the extent of possible contamination, a Phase II ESA may be required. The Phase II ESA usually includes sampling and testing of potentially contaminated media to verify the level of contamination and the potential for remediation at the site.

In conducting its assessment of a proposed project, staff will review the project's Phase I ESA and work with the appropriate oversight agencies as necessary to determine if additional site characterization work is needed and if any mitigation is necessary at the site to ensure protection of human health and the environment from any hazardous substance releases or contamination identified.

A Phase I ESA, dated March 4, 2008, was prepared by URS in accordance with the American Society for Testing and Materials Standard Practice E 1527-05 for ESAs. The Phase I ESA addressed conditions on Township 16, Range 11 East and is included as Appendix T of the project's AFC. The ESA did not identify any Recognized Environmental Conditions (RECs) in connection with historic or current site operations. A REC is the presence or likely presence of any hazardous substances or petroleum products on a property under the conditions that indicated an existing release, past release, or a material threat of a release of any hazardous substance or petroleum products into structures on the property or in the ground, groundwater, or surface water of the property.

Impacts from Generation and Management of Wastes during Construction, Operation and Project Closure/Decommissioning

As mentioned previously, staff considers project waste management to result in no significant adverse impacts (as defined per CEQA guidelines in Checklist Section XVI) if there is available landfill capacity and the project complies with LORS. Staff thus reviewed the applicant's proposed solid and hazardous waste management methods during project construction, operation, and closure/decommissioning, and determined whether the methods proposed are consistent with the LORS identified for waste disposal and recycling. Staff also reviewed the capacity available at off-site treatment and disposal sites and determined whether or not the proposed power plant's waste would impact the available capacity.

The handling and management of waste generated by SES Solar Two would follow the hierarchical approach of source reduction, recycling, treatment, and disposal as specified in California Public Resources Code Sections 40051 and 40196. The first priority of the project owner is to use materials that reduce the waste that is generated. The next level of waste management would involve reusing or recycling wastes. For wastes that cannot be recycled, treatment will be used, if possible, to make the waste nonhazardous. Finally, waste that cannot be reused, recycled or treated would be transported off site to a permitted treatment, storage, or disposal facility.

The project's General Compliance Conditions of Certification, including Compliance Monitoring and Closure Plan (Compliance Plan) have been established as required by Public Resources Code section 25532. The plan provides a means for assuring that the facility is constructed, operated and closed in compliance with public health and safety, environmental and other applicable regulations, guidelines, and conditions adopted or established by the California Energy Commission. This Compliance Plan will include Conditions of Certification identified in the following sections.

C15.4.3 DIRECT/INDIRECT IMPACTS AND MITIGATION

Existing Site Conditions

The 6,500 acre site consists of approximately 6,140 acres of BLM land, and 360 acres of private land owned by Homer Oatman and Michael and Daniel Burke. Although a 500-kV transmission line and associated service roads traverse the site, electrical transformers and other equipment containing potential polychlorinated biphenyls (PCBs) were neither reported nor observed during the February 15, 2008 site reconnaissance conducted by URS as part of the Phase I ESA. Apart from the transmission line, photographs, maps, and other historic records indicate the site has been historically undeveloped and vacant. Off-road vehicle races were held at the property until 1999, and the site is currently only used for off-road vehicle recreation. Oil waste from vehicle oil changes or other wastes are therefore likely to have been disposed on site. However no specific citations are known to have been issued and no evidence of unauthorized dumping of hazardous wastes was observed during the site visit. In addition, the site is not listed on the Environmental Data Resources (EDR) Radius Map Report (SES 2008a, Appendix T).

While RECs were not identified onsite, the adjacent U.S. Gypsum (USG) property was identified as having the potential to create a REC to the site. Features of concern include USG's waste disposal ponds, storage tanks, and hazardous waste generation. The Phase I ESA recommends further research of the operation of the USG facility to evaluate potential impacts to soil or groundwater beneath a portion of the site (SES 2008a, App T). The applicant, however, does not intend to utilize groundwater, and plans to procure water from the SWWTF (SES 2009q, p. 1-5). Excavation activities would not encounter groundwater. As such, staff will not require investigation and remediation of soil and groundwater contamination prior to commencement of construction.

Since the water pipeline would fall entirely within the Evan Hewes Highway ROW and the 10.3-mile transmission interconnection would parallel the Southwest Powerlink line within the designated ROW, staff will not require a Phase I ESA for linear connections.

In the event that contamination is identified during any phase of construction, staff proposes Condition of Certification **WASTE-1**, which would require that an experienced and qualified Professional Engineer or Professional Geologist be available for consultation in the event contaminated soil is encountered. If contaminated soil is identified, **WASTE-2** would require that the Professional Engineer or Professional Geologist inspect the site, determine what is required to characterize the nature and extent of contamination, and provide a report to the Energy Commission Compliance

Project Manager (CPM), BLM Authorized Office (AO) and DTSC with findings and recommended actions.

Proposed Project

Proposed Project - Construction Impacts and Mitigation

Site preparation and construction of Phases I and II of the proposed SES Solar Two Project and its associated facilities would last approximately 40 months and generate both non-hazardous and hazardous wastes in solid and liquid forms. Before construction can begin, the project owner will be required to develop and implement a Construction Waste Management Plan per proposed Condition of Certification **WASTE-3** to ensure that the waste will be recycled when possible and properly landfilled when necessary.

Non-Hazardous Wastes

Construction activities (including construction of the substation and portable SunCatcher assembly buildings) would generate an estimated 80 cubic yards per week of non-hazardous solid wastes, consisting of scrap wood, steel, glass, plastic, and paper. Additional waste would be generated during construction of the water pipeline and upgrades to the waste water treatment facility, and during construction of the distributed hydrogen system (SES 2009q, p. 2.14-1 and 2.14-2). For all construction waste, recyclable materials would be separated and removed as needed to recycling facilities. Non-recyclable materials (insulation, other plastics, food waste, roofing materials, vinyl flooring and base, carpeting, packing materials, etc.) would be disposed at a Class III landfill; the Applicant expects emptying of a 40-cubic yard container of non-recyclable waste on a weekly basis during construction of the buildings, and once a month thereafter (SES 2008a p. 5.14-6 to 5.14-7). Construction of the substation would generate an estimated 1,050 cubic yards of waste (SES 2008f, Response to data request #49). The SunCatcher assembly buildings would be removed from the site after construction. Decommissioning and removal of the buildings would generate approximately 80 cubic yards of waste consisting of surplus packing materials, lumber, cardboard, lighting, gaskets, and wiring (SES 2008f, Response to data request #48). Concrete pads under the buildings would be removed and most likely recycled.

Non-hazardous liquid wastes would be generated during construction, and would include storm water runoff and sanitary waste. Storm water runoff would be managed in accordance with appropriate LORS. Sanitary wastes would be pumped to tanker trucks by licensed contractors for transport to a sanitary water treatment plant. Please see the **SOIL AND WATER RESOURCES** section of this document for more information on the management of project wastewater.

Hazardous Wastes

During construction, anticipated hazardous wastes include waste paint, spent construction solvents, waste cleaners, waste oil, oily rags, waste batteries, and spent welding materials. Estimated amounts are two cubic yards of empty containers (per week), 400 gallons of oils, solvents, and adhesives (every 90 days), and 40 batteries (per year). Empty hazardous material containers would be returned to the vendor or disposed at a hazardous waste facility; solvents, used oils, paint, oily rags, and adhesives would be recycled or disposed at a hazardous waste facility; and spent batteries would be disposed at a recycling facility (SES 2008a, pages 5.14-6 to 5.14-8).

The generation of hazardous waste requires a unique hazardous waste generator identification number. The hazardous waste generator number is determined based on site location and therefore, both the construction contractor and the SES Solar Two project owner/operator could be considered the generator of hazardous wastes at the site. The SES Solar Two project owner would be required to obtain a unique hazardous waste generator identification number for the site prior to starting construction, pursuant to proposed Condition of Certification **WASTE-4**. This would ensure compliance with California Code of Regulation Title 22, Division 4.5.

Hazardous waste would be collected in hazardous waste accumulation containers and stored in a laydown area, warehouse/shop area, or storage tank on equipment skids for less than 90 days. The accumulated wastes would then be properly manifested, transported, and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies. Staff reviewed the disposal methods and concluded that all wastes would be disposed of in accordance with all applicable LORS. Should any construction waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by the proposed Condition of Certification **WASTE-5** to notify the CPM and AO whenever the owner becomes aware of this action.

Staff has reviewed the proposed waste management methods described in AFC section 5.14.2.1, and in the responses to data requests, and concludes that project construction wastes would be managed in accordance with all applicable LORS.

In the event that construction excavation, grading, or trenching activities for the proposed project encounter potentially contaminated soils, specific waste handling, disposal, or other precautions may be necessary pursuant to hazardous waste management LORS. Staff finds that proposed Conditions of Certification **WASTE-1** and **WASTE-2** would be adequate to address any soil contamination contingency that may be encountered during construction of the project and would further support compliance with LORS.

Proposed Project - Construction and Demolition (C&D) Waste Diversion and Mitigation

The Integrated Waste Management Act of 1989 [Assembly Bill (AB) 939, Sher, Chapter 1095, Statutes of 1989] set landfill waste diversion goals of 50% (by 2000) for local jurisdictions. To meet this goal, many jurisdictions require applicants for construction and demolition projects to submit a reuse/recycling plan for at least 50% of C&D materials prior to the issuance of a building or demolition permit. While the SES Solar Two project is not responsible to a local jurisdiction (the Imperial Valley Resource Management Agency does not have a County Demolition Waste Diversion Program), staff will require the applicant to meet the 50% waste diversion rate. Adoption of Condition of Certification **WASTE-6** will ensure the applicant meets the waste diversion goals of the C&D program. Staff believes that compliance with proposed Condition of Certification **WASTE-6** would also help ensure that project wastes are managed properly and further reduce potential impacts to local landfills from project wastes.

Proposed Project - Operation Impacts and Mitigation

The proposed SES Solar Two Project would generate both non-hazardous and hazardous wastes in solid and liquid forms under normal operating conditions. Table 5.14-3 of the project Application for Certification (AFC) summarizes the anticipated operation waste streams, estimated waste volumes and generation frequency, and proposed management methods. This information is presented below in **Waste Management Table 2**. Before operations can begin, the project owner would be required to develop and implement an Operations Waste Management Plan as required in the proposed Condition of Certification **WASTE-7**. This would ensure that an accurate record is maintained of the project's waste storage, generation, and disposal, and compliance with waste regulations is maintained during operation.

Waste Management Table 2
Summary of Operation Waste Streams and Management Methods

Waste Stream and Classification	Origin and Composition	Estimated Amount	Estimated Frequency of Generation	On-site Treatment
Office and packaging materials from supplies deliveries – non-hazardous	Paper, wood, plastic, cardboard	10 cubic yards per week	Intermittent	Segregation into composition type, store for less than 30 days
Sanitary wastewater solids – non-hazardous	Rest rooms and sanitary waste	5,000 gallons per month	Intermittent	Septic system
Spent batteries – hazardous, recyclable	Lead acid, alkaline, gel cell, nickel cadmium	30 units per week	Intermittent	Store for less than 30 days
PCU oil and motor oil – hazardous, recyclable	PCU overhaul	18 gallons per month	Intermittent	Two 100 U.S.-gallon tanks for filtering and re-use in PCU
PCU coolant – ethylene glycol – hazardous	PCU overhaul	18 gallons per month	Intermittent	Store for less than 90 days
PCU hydrogen gas – non-hazardous, recyclable	Refill k-bottles in place	5,000 k-bottles per month	2 times per year per SunCatcher	Refill k-bottles on-site
Oily absorbent and spent oil filters – hazardous, recyclable	PCU and hydraulic equipment overhauls	One 55-gallon drum per month	Intermittent	Store for less than 90 days
Oily rags – non-hazardous	PCU and hydraulic equipment overhauls	One 55-gallon drum per month	Intermittent	Store for less than 90 days

Waste Stream and Classification	Origin and Composition	Estimated Amount	Estimated Frequency of Generation	On-site Treatment
Used hydraulic fluid, oils and grease – hazardous, recyclable	PCU and hydraulic equipment overhauls	Less than 11 gallons per month	Intermittent	Store for less than 90 days
De-mineralized water treatment wastewater salt cake – non-hazardous or designated waste	Zero discharge system; naturally occurring salt compounds	90,200 pounds per year	Intermittent	Evaporative pond containment

Non-Hazardous Solid Wastes

Non-hazardous solid wastes generated during project operations would consist of glass, paper, wood, plastic, cardboard, deactivated equipment and parts, defective or broken electrical materials, empty non-hazardous containers, and other miscellaneous solid wastes. The project would generate approximately 10 cubic yards of non-hazardous solid waste per week. Such wastes would be recycled to the greatest extent possible, and the remainder would be removed on a regular basis for disposal in a Class III landfill. Non-hazardous oily rags (one 55-gallon drum per month) would be laundered at an authorized recycle facility. Sanitary wastewater solids would be treated with an onsite septic system, and sludge would be delivered to an off-site disposal facility.

Non-Hazardous Liquid Wastes

Non-hazardous liquid wastes would be generated during facility operation and are discussed in the **SOIL AND WATER RESOURCES** section of this document.

Hazardous Wastes

The project owner/operator would be considered the generator of hazardous wastes at the site during facility operations. Therefore, the project owner's unique hazardous waste generator identification number, obtained prior to construction in accordance with proposed Condition of Certification **WASTE-4**, would be retained and used for hazardous waste generated during facility operation.

Hazardous wastes that may be generated during routine project operation include motor oil and coolant from the power conversion unit (PCU), batteries, oily absorbent and spent oil filters, and used hydraulic fluid (SES 2008a, p. 5.14-9). In addition, spills and unauthorized releases of hazardous materials or hazardous wastes may generate contaminated soils or cleanup materials that may also require management and disposal as hazardous waste. Proper hazardous material handling and good housekeeping practices would help keep spill wastes to a minimum. However, to ensure proper cleanup and management of any contaminated soils or waste materials generated from hazardous materials spills, staff proposes Condition of Certification **WASTE-8,** requiring the project owner/operator to document, clean up, and properly manage and dispose of wastes from any hazardous materials spills or releases in accordance with all applicable federal, state, and local requirements. More information on project hazardous materials management spill reporting, containment, and spill control and countermeasures plan provisions for the project are provided in the **HAZARDOUS MATERIALS MANAGEMENT** section of this document.

The amount of hazardous wastes generated during the operation of SES Solar Two project would be minor, with source reduction and recycling of wastes implemented whenever possible. The hazardous wastes would be temporarily stored on site, transported off site by licensed hazardous waste haulers, and recycled or disposed of at authorized disposal facilities in accordance with established standards applicable to generators of hazardous waste (Title 22, CCR, §66262.10 et seq.). Should any operations waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by proposed Condition of Certification **WASTE-5** to notify the CPM and AO when advised of any such action.

Proposed Project - Closure and Decommissioning Impacts and Mitigation

The closure or decommissioning of the SES Solar Two Project would produce both hazardous and non-hazardous solid and liquid waste. Required elements of a facility's closure would be outlined in a facility closure plan as specified in Conditions of Certification **COMPLIANCE 11, 12, and 13** (see Section E.1). To ensure adequate review of a planned project closure, the SES Solar Two project owner shall submit a proposed facility closure plan to the Energy Commission and BLM for review and approval at least 12 months (or other period of time agreed to by the CPM and the AO) prior to commencement of closure activities. The facility closure plan will document non-hazardous and hazardous waste management practices including: the inventory, management, and disposal of hazardous materials and wastes, and permanent disposal of permitted hazardous materials and waste storage units.

Staff expects that there will be adequate landfill capacity available to dispose of both non-hazardous and hazardous waste from the closure or decommissioning of the proposed project. Conditions of Certification **WASTE-3 through -8** would continue to apply to SES Solar Two during closure or decommissioning of the project.

Proposed Project - Impact on Existing Waste Disposal Facilities

Non-Hazardous Solid Wastes

Construction and operation of the proposed project would respectively generate 80 cubic yards and 10 cubic yards per week of nonhazardous solid waste (wood, paper/cardboard, glass, plastic, insulation, and concrete), respectively. The waste would be stored onsite for less than 30 days, and then recycled or disposed of in a Class III landfill.

Table 5.14-1 of the project AFC identifies four waste disposal facilities in Imperial County that could potentially take the non-hazardous construction, operation and closure/decommissioning wastes generated by the SES Solar Two Project. The remaining combined capacity of the three landfill facilities that are currently operating is over 3.78 million cubic yards. The Mesquite Regional Landfill, scheduled to be fully operational in 2011/2012, will have a capacity of 600 million tons (Mesquite Regional Landfill 2010). The non-hazardous solid waste generated from project construction is estimated to be 13,900 cubic yards (80 cubic yards per week for 40 months), and the total amount from lifetime operations is estimated to be 20,800 cubic yards (10 cubic yards per week for 40 years). These quantities include both recyclable and non-recyclable wastes. Additional non-recyclable sanitary sludge (the non-liquid portion of 5,000 gallons of wastewater per month during operation) and saltcake (90,200 pounds per year of operation) would also be disposed off-site. The total non-recyclable solid waste would contribute less than 1% of the available landfill capacity. Staff finds that disposal of the solid wastes generated by the SES Solar Two Project can occur without impacting the capacity or remaining life of any of these facilities.

Hazardous Wastes

AFC Table 5.14-1 lists landfills and recycling facilities that could be used to manage project wastes. Two hazardous waste (Class I) disposal facilities are currently accepting waste and could be used to manage SES Solar Two wastes: the Clean Harbors Buttonwillow Landfill in Kern County and the Chemical Waste Management Kettleman Hills Landfill in Kings County. The Kettleman Hills facility also accepts Class II and Class III wastes. In total, there is a combined excess of 16 million cubic yards of remaining hazardous waste disposal capacity at these landfills, with at least 30 years remaining in their operating lifetimes (EEC2006a, Section 8.14.3.5.2). In addition, the Kettleman Hills facility is in the process of permitting an additional 4.6 to 4.9 million cubic yards of disposal capacity (Waste Management 2009), and the Buttonwillow facility has 40 years to reach its capacity at its current disposal rate (CEC2008aa).

Hazardous wastes generated during construction, operation and closure/decommissioning would be recycled to the extent possible and practical. Those wastes that cannot be recycled would be transported off site to a permitted treatment, storage, or disposal facility. From waste streams presented in AFC Tables 5.14-2 and 5.14-3 (SES2008a), staff calculated that approximately 375 cubic yards of recyclable and non-recyclable hazardous waste would be generated over the 40 week construction period. Approximately 50 cubic yards of hazardous non-recyclable waste would be generated over the 40-year operating lifetime. Thus the quantity of hazardous wastes from the SES Solar Two Project requiring off-site disposal would not impact the remaining capacity of either Class 1 waste facility.

C.14.4.4 CEQA LEVEL OF SIGNIFICANCE

Absent any unusual circumstances, staff considers project compliance with LORS and staff’s conditions of certification to be sufficient to ensure that no significant adverse impacts (per guidelines in CEQA Appendix G: Environmental Checklist Section XVI-Utilities and Service Systems) would occur as a result of project waste management.

C.14.5 300 MW ALTERNATIVE

The 300 MW alternative would essentially be Phase 1 of the proposed 750 MW project. This alternative is shown in **Alternatives Figure 1**. The 300 MW alternative would retain 40% of the SunCatchers and would affect 40% of the land of the proposed 750 MW project. The linear routes would remain the same, although the 750-MW substation would be reduced to 300-MW capacity.

C.14.5.1 SETTING AND EXISTING CONDITIONS

The general setting and existing conditions would remain as described in C.14.4.1 although the land requirements would be proportionately reduced to reflect the smaller project size. Locations of laydown areas may also vary.

C.14.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The 300 MW alternative would generate similar types of hazardous and non-hazardous wastes from construction, demolition of manufacturing buildings, operation and closure/decommissioning of the project. However, the quantities of waste would be reduced by 60%. The amount of non-hazardous and hazardous solid wastes generated under a 300 MW alternative that would require landfill/treatment over the life of the project would be approximately 8,320 and 20 cubic yards, respectively. Similar to the proposed project, wastes requiring off-site disposal would not impact the remaining capacity of off-site disposal facilities. The location of the 300 MW alternative further away from the USG facility in Plaster City would reduce the potential for any RECs from operation of the facility. Similar to the proposed project, staff will not require investigation and remediation of soil and groundwater contamination. Disposal methods would remain the same as for the proposed project and the same Conditions of Certification (**WASTE-1 through -8** and **COMPLIANCE-11 through -13)** would apply.

C.14.5.3 CEQA LEVEL OF SIGNIFICANCE

Similar to the proposed project, staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant adverse impacts would occur as a result of waste management associated with the 300 MW alternative.

C.14.6 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives developed to reduce impacts to the waters of the U.S. would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative is illustrated in **Alternatives Figure 1B**. This alternative would have the same outer project boundaries as the proposed project, but it would include prohibition of installing permanent structures within drainages, thereby reducing the available acreage for development to 4,690 acres, and reducing the number of SunCatchers from 30,000 under the proposed project to 25,290.

C.14.6.1 SETTING AND EXISTING CONDITIONS

The setting of the Drainage Avoidance #1 alternative is the same as that for the proposed project, as described in Section C.14.4.1. This alternative has the same boundaries as the proposed project.

C.14.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Drainage Avoidance #1 alternative would generate similar types of hazardous and non-hazardous wastes from construction, demolition and operation of the project.

However, the quantities of waste would be reduced due to the reduced use of the site required by avoiding the primary drainages and the reduced number of SunCatchers. The amount of non-hazardous and hazardous solid wastes generated under this alternative that would require landfill/treatment would be reduced in comparison to the proposed project. Similar to the proposed project, wastes requiring off-site disposal would not impact the remaining capacity of off-site disposal facilities. The boundaries of this alternative are the same as those of the proposed project, so there would exist similar potential for operations at the USG facility in Plaster City to create RECs. Similar to the proposed project, staff will not require investigation and remediation of soil and groundwater contamination. Disposal methods would remain the same as for the proposed project and the same Conditions of Certification (**WASTE-1 through -8** and **COMPLIANCE-11 through -13)** would apply to this alternative.

C.14.6.3 CEQA LEVEL OF SIGNIFICANCE

Similar to the proposed project, staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant adverse impacts would occur as a result of waste management associated with the Drainage Avoidance #1 alternative.

C.14.7 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative would eliminate both the eastern and westernmost portions of the proposed project, where the largest drainage complexes are located. This alternative is shown in **Alternatives Figure 1C**. It would reduce the overall size of the project site by 3,347 acres (from 6,500 acres to 3,153 acres). It would also reduce the number of SunCatchers from 30,000 under the proposed project to 16,915. In this alternative, permanent structures would be allowed within all drainages inside the revised project boundaries.

C.14.7.1 SETTING AND EXISTING CONDITIONS

The setting of the Drainage Avoidance #2 alternative is the same as that for the proposed project, as described in Section C.14.4.1. This alternative is located entirely within the boundaries of the proposed project.

C.14.7.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Drainage Avoidance #2 alternative would generate similar types of hazardous and non-hazardous wastes from construction, demolition and operation of the project. However, the quantities of waste would be substantially reduced due to the reduced use of the site required by avoiding the major drainages at the east and west ends of the property. The amount of non-hazardous and hazardous solid wastes generated under this alternative that would require landfill/treatment would be substantially reduced in comparison to the proposed project. Similar to the proposed project, wastes requiring off-site disposal would not impact the remaining capacity of off-site disposal facilities. The boundaries of this alternative are smaller than those of the proposed project, but still in close proximity to Plaster City operations, so there would exist similar potential for operations at the USG facility in Plaster City to create RECs. Similar to the proposed project, staff will not require investigation and remediation of soil and groundwater contamination. Disposal methods would remain the same as for the proposed project and the same Conditions of Certification (**WASTE-1 through -8** and **COMPLIANCE-11 through -13)** would apply to this alternative.

C.14.7.3 CEQA LEVEL OF SIGNIFICANCE

Similar to the proposed project, staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant adverse impacts would occur as a result of waste management associated with the Drainage Avoidance #2 alternative.

C.14.8 NO PROJECT/NO ACTION ALTERNATIVES

C.14.8.1 NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on SES Solar Two project application and on CDCA land use plan amendment

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

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, no new wastes would be generated. This No Project/No Action Alternative would not result in impacts to waste management at this location. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations

C.14.8.3 NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on SES Solar Two project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed SES Solar Two Project would not be approved by the Energy Commission and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.
Because the CDCA Plan would be amended, it is possible that the site will be developed with another solar technology. Different solar technologies would create different amounts and types of wastes based on the technology components and requirements; however, it is expected that the construction of all solar technologies at the site would generate waste. As such, impacts to waste management from the solar

project would likely be similar to impacts to waste management from the proposed project. Therefore, this No Project/No Action Alternative could result in waste management impacts similar to the impacts under the proposed project.

C.14.8.4 NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on SES Solar Two project application and amend the CDCA land use plan to make the area unavailable for future solar development

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

Because the CDCA Plan would be amended so no solar projects can be approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, no wastes would be generated from the construction or operation of the proposed project under this alternative. Therefore, this No Project/No Action Alternative would not result in impacts to waste management. 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.14.9 CUMULATIVE IMPACTS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

There is the potential for substantial future development in the Imperial Valley area and throughout the southern California desert region. Analysis of cumulative impacts is based on data provided in the following maps and tables (see **Section G.4, Cumulative Scenario**):

- Cumulative Impacts Figure 1, Regional Renewable Applications;
- Cumulative Impacts Figure 2, Imperial County Renewable Applications on BLM Land;
- Cumulative Impacts Figure 3, Plaster City - Existing and Future/Foreseeable Projects;
- Cumulative Impacts Table 1A, Renewable Energy Projects in the California Desert District
- Cumulative Impacts Table 1B, Energy Projects on State and Private Lands

- Cumulative Impacts Table 2, Existing Projects in the Plaster City Area; and
- Cumulative Impacts Table 3, Future Foreseeable Projects in the Plaster City Area.

Existing projects/future foreseeable projects figures and tables include both energy and non-energy projects.

The analysis in this section first defines the geographic area over which cumulative impacts related to waste management could occur. The cumulative impact analysis itself describes the potential for cumulative impacts to occur as a result of implementation of the SES Solar Two project along with the listed local and regional projects.

C15.9.1 GEOGRAPHIC EXTENT

Cumulative impacts can occur within the Imperial Valley if implementation of the SES Solar Two Project could combine with those of other local or regional projects. Cumulative impacts could also occur as a result of development of some of the many proposed solar and wind development projects that have been or are expected to be under consideration by the BLM and the Energy Commission in the near future. Many of these projects are located within the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona.

The geographic extent for the analysis of the cumulative impacts associated with the SES Solar Two Project includes Imperial County. This geographic scope is appropriate because waste disposal facilities in Imperial County are the ones most likely to be used for disposal of waste generated by the SES Solar Two Project considering regulatory acceptability and transport costs.

C15.9.2 CUMULATIVE IMPACT ANALYSIS

Local Projects

The SES Solar Two Project would generate non-hazardous solid waste that would add to the total waste generated in Imperial County. Non-hazardous solid waste generated by all of the past, present, and reasonably foreseeable projects presented in **Cumulative Impacts Table 2** and **Cumulative Impacts Table 3** would also be disposed of within Imperial County. However, project wastes would be generated in modest quantities, waste recycling would be employed wherever practical, and sufficient capacity is available at several treatment and disposal facilities to handle the volumes of wastes that would be generated by the project. Most of the reasonably foreseeable projects identified in **Cumulative Impacts Table 3** would generate smaller volumes of non-hazardous waste than the SES Solar Two Project. The total amount of available solid waste landfill capacity in Imperial County expected once the Mesquite Regional Landfill reaches its full operating capacity exceeds 600 million tons. The Mesquite Landfill alone has an operating life of 100 years (Mesquite Regional Landfill 2010). Therefore, even if all 16 of these reasonably foreseeable projects were constructed, staff concludes that the non-hazardous waste generated by the SES Solar Two Project would not result in significant adverse cumulative waste management impacts under CEQA.

As stated above, the non-recyclable component of the 355 cubic yards of total hazardous construction waste and the less than 50 cubic yards of non-recyclable lifetime operations waste from the SES Solar Two Project would be far less than staff's threshold of significance and would not impact the capacity or remaining life of the Class I waste facilities. The very small quantities of project hazardous waste and the similarly small quantities of hazardous waste that would potentially be generated by the reasonably foreseeable projects would not result in significant adverse cumulative waste management impacts under CEQA.

Regional Projects

Implementation of the multiple solar and wind projects proposed to be developed in the Mojave Desert, and other planned non-energy projects, would result in an increase in generation of hazardous and non-hazardous solid and liquid waste and would add to the total quantity of waste generated in Imperial County. However, project wastes would be generated in modest quantities, waste recycling would be employed wherever practical, and sufficient capacity is available at several treatment and disposal facilities to handle the volumes of wastes that would be generated by the project. Therefore, impacts of the SES Solar Two Project, when combined with impacts of the future solar and wind development projects currently proposed within southeastern California, southern Nevada, and western Arizona, would not result in significant adverse and unavoidable cumulative impacts, under CEQA, with regard to waste management.

Cumulative Impact Conclusion

Impacts of the SES Solar Two Project would combine with impacts of past, present, and reasonably foreseeable projects to result in a contribution to local and regional cumulative impacts related to waste management.

The amount of non-hazardous and hazardous wastes generated during construction, operation and closure/decommissioning of the SES Solar Two Project would add to the total quantity of hazardous and non-hazardous waste generated in Imperial County. However, project wastes would be generated in modest quantities, waste recycling would be employed wherever practical, and sufficient capacity is available at several treatment and disposal facilities to handle the volumes of wastes that would be generated by the project. Therefore, staff concludes that the waste generated by the SES Solar Two Project would not result in significant adverse cumulative waste management impacts, under CEQA, either locally or regionally.

C.14.10 COMPLIANCE WITH LORS

Energy Commission staff concludes that the proposed SES Solar Two Project would comply with all applicable LORS regulating the management of hazardous and non-hazardous wastes during both facility construction, operation and closure/decommissioning. The applicant is required to recycle and/or dispose hazardous and non-hazardous wastes at facilities licensed or otherwise approved to accept the wastes. Because hazardous wastes would be produced during both project construction, operation and closure/decommissioning, the SES Solar Two project owner would be required to obtain a hazardous waste generator identification number from U.S. EPA. The SES Solar Two Project would also be required to properly store, package, and label all hazardous waste; use only approved transporters; prepare hazardous waste manifests; keep detailed records; and appropriately train employees, in accordance with state and federal hazardous waste management requirements.

C.14.11 NOTEWORTHY PUBLIC BENEFITS

Staff has not identified any noteworthy public benefits associated with Waste Management.

C.14.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

WASTE-1 The SES Solar Two project owner (project owner) shall provide the resume of an experienced and qualified professional engineer or professional geologist, who shall be available for during site characterization (if needed), demolition, excavation, and grading activities, to the CPM and AO for review and approval. The resume shall show experience in remedial investigation and feasibility studies.

The professional engineer or professional geologist shall be given authority by the project owner to oversee any earth moving activities that have the potential to disturb contaminated soil and impact public health, safety and the environment.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit the resume to the CPM and AO for review and approval.

WASTE-2 If potentially contaminated soil is identified during site characterization, demolition, excavation or grading at either the proposed site or linear facilities, as evidenced by discoloration, odor, detection by handheld instruments, or other signs, the professional engineer or professional geologist shall inspect the site, determine the need for sampling to confirm the nature and extent of contamination, and provide a written report to the project owner, representatives of Department of Toxic Substances Control or Regional Water Quality Control Board, and the CPM and AO stating the recommended course of action.

Depending on the nature and extent of contamination, the professional engineer or professional geologist shall have the authority to temporarily suspend construction activity at that location for the protection of workers or the public. If in the opinion of the professional engineer or professional geologist, significant remediation may be required, the project owner shall contact the CPM and AO and representatives of the Department of Toxic Substances Control or Regional Water Quality Control Board, for guidance and possible oversight.

Verification: The project owner shall submit any reports filed by the professional engineer or professional geologist to the CPM and AO within five days of their receipt.

The project owner shall notify the CPM and AO within 24 hours of any orders issued to halt construction.

WASTE-3 The project owner shall prepare a Construction Waste Management Plan for all wastes generated during construction of the facility and shall submit the plan to the CPM and AO for review and approval prior to the start of construction. The plan shall contain, at a minimum, the following:

- A description of all construction waste streams, including projections of frequency, amounts generated, and hazard classifications; and
- Management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans.

Verification: The project owner shall submit the Construction Waste Management Plan to the CPM and AO for approval no less than 30 days prior to the initiation of construction activities at the site.

WASTE-4 The project owner shall obtain a hazardous waste generator identification number from the United States Environmental Protection Agency (USEPA) prior to generating any hazardous waste during project construction and operations.

Verification: The project owner shall keep a copy of the identification number on file at the project site and provide documentation of the hazardous waste generation and notification and receipt of the number to the CPM and AO in the next scheduled Monthly Compliance Report after receipt of the number. Submittal of the notification and issued number documentation to the CPM and AO is only needed once unless there is a change in ownership, operation, waste generation, or waste characteristics that requires a new notification to USEPA. Documentation of any new or revised hazardous waste generation notifications or changes in identification number shall be provided to the CPM and AO in the next scheduled compliance report.

WASTE-5 Upon notification of any impending waste management-related enforcement action by any local, state, or federal authority, the project owner shall notify the CPM and AO of any such action taken or proposed against the project itself, or against any waste hauler or disposal facility or treatment operator with which the owner contracts, and describe how the violation will be corrected.

Verification: The project owner shall notify the CPM and AO in writing within 10 days of becoming aware of an impending enforcement action. The CPM shall notify the project owner of any changes that will be required in the way project-related wastes are managed.

WASTE-6 The project owner shall provide a reuse/recycling plan for at least 50% of construction and demolition materials prior to any building or demolition, including closure/decommissioning. The project owner shall ensure compliance and shall provide proof of compliance documentation to the CPM and AO, including a recycling and reuse summary report, receipts, and records of measurement. Project mobilization and construction shall not proceed until the CPM and AO issue an approval document.

Verification: At least 60 days prior to the start of any construction or demolition activities, the project owner shall submit a reuse recycling plan to the CPM and AO for review and approval. The project owner shall ensure that project activities are consistent with the approved reuse/recycling plan and provide adequate documentation of the types and volumes of wastes generated, how the wastes were managed, and volumes of wastes diverted. Project mobilization and construction shall not proceed until the CPM and AO issue an approval document. Not later than 60 days after completion of project construction, the project owner shall submit documentation of compliance with the diversion program requirements to the CPM and AO. The required documentation shall include a recycling and reuse summary report along with all necessary receipts and records of measurement from entities receiving project wastes.

WASTE-7 The project owner shall prepare an Operation Waste Management Plan for all wastes generated during operation of the SES Solar Two facility and shall submit the plan to the CPM and AO for review and approval. The plan shall contain, at a minimum, the following:

- A detailed description of all operation and maintenance waste streams, including projections of amounts to be generated, frequency of generation, and waste hazard classifications;
- Management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans;
- Information and summary records of conversations with the local Certified Unified Program Agency and the Department of Toxic Substances Control regarding any waste management requirements necessary for project activities. Copies of all required waste management permits, notices, and/or authorizations shall be included in the plan and updated as necessary;
- A detailed description of how facility wastes will be managed, and any contingency plans to be employed, in the event of an unplanned closure or planned temporary facility closure; and
- A detailed description of how facility wastes will be managed and disposed of upon closure of the facility.

Verification: The project owner shall submit the Operation Waste Management Plan to the CPM and AO for approval no less than 30 days prior to the start of project operation. The project owner shall submit any required revisions to the CPM and AO within 20 days of notification from the CPM and AO that revisions are necessary.

The project owner shall also document in each Annual Compliance Report the actual volume of wastes generated and the waste management methods used during the year; provide a comparison of the actual waste generation and management methods used to those proposed in the original Operation Waste Management Plan; and update the Operation Waste Management Plan as necessary to address current waste generation and management practices.

WASTE-8 The project owner shall ensure that all spills or releases of hazardous substances, hazardous materials, or hazardous waste are documented and cleaned up and that wastes generated from the release/spill are properly managed and disposed of, in accordance with all applicable federal, state, and local requirements.

Verification: The project owner shall document management of all unauthorized releases and spills of hazardous substances, hazardous materials, or hazardous wastes that occur on the project property or related linear facilities. The documentation shall include, at a minimum, the following information: location of release; date and time of release; reason for release; volume released; how release was managed and material cleaned up; amount of contaminated soil and/or cleanup wastes generated; if the release was reported; to whom the release was reported; release corrective action and cleanup requirements placed by regulating agencies; level of cleanup achieved and actions taken to prevent a similar release or spill; and disposition of any hazardous wastes and/or contaminated soils and materials that may have been generated by the release. A copy of the unauthorized release/spill documentation shall be provided to the CPM and AO within 30 days of the date the release was discovered.

C.14.13 CONCLUSIONS

Consistent with the three main objectives for staff's waste management analysis (as noted in the Introduction section of this analysis), staff provides the following conclusions:

After review of the applicant's proposed waste management procedures, staff concludes that project wastes would be managed in compliance with all applicable waste management LORS. Staff notes that construction, demolition, and operation wastes would be characterized and managed as either hazardous or non-hazardous waste. All non-hazardous wastes would be recycled to the extent feasible, and nonrecyclable wastes would be collected by a licensed hauler and disposed of at a permitted solid waste disposal facility. Hazardous wastes would be accumulated onsite in accordance with accumulation time, and then properly manifested, transported to, and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies.

However, to help ensure and facilitate ongoing project compliance with LORS, staff proposes Conditions of Certification **WASTE-1 through** -**8**. These conditions would require the project owner to do all of the following:

- Ensure the project site is investigated and any contamination identified is remediated as necessary, with appropriate professional and regulatory agency oversight (**WASTE-1 and -2).**
- Prepare Construction Waste Management and Operation Waste Management Plans detailing the types and volumes of wastes to be generated and how wastes will be managed, recycled, and/or disposed of after generation (**WASTE-3 and -7**).
- Obtain a hazardous waste generator identification number (**WASTE-4**).
- Ensure that all spills or releases of hazardous substances are reported and cleaned-up in accordance with all applicable federal, state, and local requirements (**WASTE-8**).
- Comply with waste recycling and diversion requirements (**WASTE-6**).
- Report any waste management-related LORS enforcement actions and how violations will be corrected (**WASTE-5**).

The existing available capacity for the Class III landfills that may be used to manage nonhazardous project wastes exceeds 3.73 million cubic yards, with another 600 million cubic yards of capacity expected in the future with full operation of the Mesquite Regional Landfill. The total amount of non-hazardous wastes generated from construction, demolition and operation of the SES Solar Two project would contribute much less than 1% of the projected landfill capacity. Therefore, disposal of project generated non-hazardous wastes would not impact Class III landfill capacity.

In addition, the two Class I disposal facilities that could be used for hazardous wastes generated by the construction and operation of SES Solar Two have a combined remaining capacity in excess of 16 million cubic yards, with another 4.6 to 4.9 million cubic yards of proposed capacity. The total amount of hazardous wastes (405 cubic yards) generated by the SES Solar Two project would not impact remaining permitted capacity at Class I landfills.

Staff concludes that management of the waste generated during construction, operation and closure/decommissioning of the SES Solar Two project would not result in any significant adverse impacts under CEQA, and would comply with applicable LORS, if the waste management practices and mitigation measures proposed in the SES Solar Two project AFC and staff's proposed conditions of certification are implemented. Similar to the proposed project, staff considers project compliance with applicable waste management laws, ordinances, regulations, and standards and staff's conditions of certification to be sufficient to ensure that no significant adverse impacts under CEQA would occur as a result of waste management associated with the 300 MW alternative, Drainage Avoidance #1 alternative and Drainage Avoidance #2 alternative.

C.14.14 REFERENCES

CCR 2008 – California Environmental Quality Act (CEQA) Guidelines. Title 14, California Code of Regulations, section 15000 and the following (Cal. Code Regs., tit. 14, §15000 et seq,).

California Integrated Waste Management Board (CIWMB) 2008. Jurisdictions with Construction & Demolition (C&D) Ordinances. http:/|/|www.ciwmb.ca.gov/LGCentral/Summaries/13/JurisCnD.htm, Accessed March 18, 2009

EEC 2006a – Eastshore Energy Center, LLC/ G. Trewitt (tn: 37923) Application for Certification for the Eastshore Energy Center. 09/15/2006 Rec'd 09/22/2006

Mesquite Regional Landfill – 2010. http://mrlf.org/index.php?pid=5 Accessed January 28, 2010

SES (Stirling Energy Systems Solar Two, LLC) 2008a (tn: 46819) – Application for Certification for the Stirling Energy Systems (SES) Solar Two Project, Volumes 1 and 2. Submitted to the California Energy Commission, June 30, 2008.

SES 2008f – Applicant's Response to BLM and Energy Commission Data Request Set 1, Part 1 (1-52) (tn: 49322), December 8, 2008.

SES 2009q – Supplement to the Application for Certification for the SES Solar Two Project (tn: 51973). Submitted to the California Energy Commission, June 12, 2009.

Waste Management 2009 – Kettleman Hills Facility Project Update. http://www.kettlemanhillsfacts.com/project_update.html, Accessed March 18, 2009.

C.15 - WORKER SAFETY AND FIRE PROTECTION

Testimony of Rick Tyler

C.15.1 SUMMARY OF CONCLUSIONS

BLM and Energy Commission Staff (hereafter referred to as staff) conclude that if the applicant for the proposed Stirling Energy Systems Solar Two project (SES Solar Two) provides project construction safety and health and project operations and maintenance safety and health programs, as required by conditions of certification **WORKER SAFETY -1, -2, -3, -4, -5,** and **-6**, the project would incorporate sufficient measures to both ensure adequate levels of industrial safety and comply with applicable laws, ordinances, regulations, and standards (LORS). These proposed conditions of certification ensure that these programs, proposed by the applicant, will be reviewed by the appropriate agencies before they are implemented. The conditions also require verification that the proposed plans adequately ensure worker safety and fire protection and comply with applicable LORS.

Staff also conclude that the proposed project would not have significant impacts (pursuant CEQA) on local fire protection services. The fire risks at the proposed facility do not pose significant added demands on local fire protection services. Staff also concludes that the El Centro Fire Department (EFD) is adequately equipped and staffed to respond to hazardous materials incidents at the proposed facility with an adequate response time, given the remote location of this project

C.15.2 INTRODUCTION

Worker safety and fire protection are regulated through federal, state, and local LORS. Industrial workers at the facility both operate equipment and handle hazardous materials daily, and could face hazards resulting in accidents and serious injury. Protection measures are employed to eliminate or reduce these hazards or minimize their risk through special training, protective equipment, and procedural controls.

The purpose of this **WORKER SAFETY AND FIRE PROTECTION** section of this Staff Assessment/Draft Environmental Impact Statement (SA/DEIS) is to assess the worker safety and fire protection measures proposed by the SES Solar Two applicant and determine whether the applicant has proposed adequate measures to:

- Comply with applicable safety LORS;
- Protect workers during the construction and operation of the facility;
- Protect against fire; and
- Provide adequate emergency response procedures.

C.15.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

C.15.3.1 LAWS, ORDINANCES, REGULATION, AND STANDARDS

Worker Safety and Fire Protection Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
29 U.S. Code sections 651 et seq (Occupational Safety and Health Act of 1970)	This Act mandates safety requirements in the workplace, with the purpose of "[assuring] so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources" (29 USC § 651).
29 CFR sections 1910.1 to 1910.1500 (Occupational Safety and Health Administration Safety and Health Regulations)	These sections define the procedures for promulgating regulations and conducting inspections to implement and enforce safety and health procedures to protect workers, particularly in the industrial sector.
29 CFR sections 1952.170 to 1952.175	These sections provide federal approval of California's plan for enforcement of its own safety and health requirements, in lieu of most of the federal requirements found in 29 CFR §1910.1 to 1910.1500.
State	
2007 Edition of California Fire Code and all applicable NFPA standards (24 CCR Part 9)	NFPA standards are incorporated into the California State Fire Code. The fire code contains general provisions for fire safety, including road and building access, water supplies, fire protection and life safety systems, fire-resistive construction, storage of combustible materials, exits and emergency escapes, and fire alarm systems.
Title 24, California Code of Regulations (24 CCR § 3, et seq.)	The California Building Code is comprised of 11 parts containing building design and construction requirements as they relate to fire, life, and structural safety. It incorporates current editions of the International Building Code, including the electrical, mechanical, energy, and fire codes applicable to the project.

Applicable Law	Description
8 CCR all applicable sections (Cal/OSHA regulations)	Requires that all employers follow these regulations as they pertain to the work involved. This includes regulations pertaining to safety matters during the construction, commissioning, and operation of power plants, as well as safety around electrical components, fire safety, and hazardous materials usage, storage, and handling.
24 CCR section 3, et seq.	Incorporates the current edition of the International Building Code.
Health and Safety Code sections 25500 to 25541	Requires a Hazardous Materials Business plan detailing emergency response plans for hazardous materials emergencies at a facility.
Local (or locally enforced)	
County of Imperial Codified Ordinances Section 820.0100	The County Imperial has adopted the 2007 California Fire Code in Section 820.0100 of the County Codified Ordinance does not have additional LORS that apply to Hazardous Materials Handling, but administers the State of California programs as the CUPA.

C.15.4 PROPOSED PROJECT

C.15.4.1 SETTING

Fire support services to the Solar 2 faculty will be provided by the El Centro Fire Department (EFD) located at 900 South Dogwood in El Centro. The response time to the Solar 2 facility from the EFD is about 30 minutes. The EFD will also respond to hazardous materials incidents at the Solar 2 facility. The response time and firefighting capabilities are acceptable in the remote location of the Solar 2 facility.

C.15.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

<u>**Method and Threshold for Determining Significance**</u>

Two issues are assessed in **WORKER SAFETY AND FIRE PROTECTION**:

1. The potential for impacts on the safety of workers during demolition, construction, operations, and closure and decommissioning activities; and
2. Fire prevention/protection, emergency medical response, and hazardous materials spill response during demolition, construction, operations, and closure and decommissioning activities.

Worker safety is essentially a LORS compliance matter and if all LORS are followed, workers will be adequately protected. Thus, the standard for staff's review and determination of significant impacts on worker health is whether the applicant has demonstrated adequate knowledge of and commitment to implementation of all pertinent and relevant Cal-OSHA standards.

Staff reviews and evaluates the on-site fire-fighting systems proposed by the applicant, as well as the time needed for off-site local fire departments to respond to a fire, medical, or hazardous material emergency at the SES Solar Two site. If on-site systems do not follow established codes and industry standards, staff recommends additional measures. Staff reviews local fire department capabilities and response times. If Staff determines that the presence of the power plant would cause a significant impact on a local fire department. Staff will recommend that the applicant mitigate this impact.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Proposed Project Worker Safety

Industrial environments are potentially dangerous during both construction and operation. Workers at the proposed project will be exposed to loud noises, moving equipment, trenches, and confined space entry and egress. Workers may sustain falls, trips, burns, lacerations, and other injuries. They may be exposed to falling equipment or structures, chemical spills, hazardous waste, fires, explosions, and electrical sparks or electrocution. It is important that SES Solar Two has well-defined policies and procedures, training, and hazard recognition and control to minimize these hazards and protect workers. If the facility complies with all LORS, workers will be adequately protected from health and safety hazards.

A Safety and Health Program will be prepared by the applicant to minimize worker hazards during construction and operation of the project. “Safety and Health Program,” for staff, refers to measures that will be taken to ensure compliance with the applicable LORS during the construction and operation of the project.

Construction Safety and Health Program

The SES Solar Two project includes the construction and operation of a Stirling cycle solar power plant. The project will present construction risks and operational risks to workers typical of other power plants. In addition the facility will pose risks associated with use of hydrogen as a working fluid. The risk to workers is minimized through onsite generation (which reduces storage of hydrogen) and through rigorous safety management practices required by applicable LORS.

Construction safety orders are published at Title 8 of the California Code of Regulations, section 1502 et seq. These requirements are promulgated by Cal/OSHA and apply to the construction phase of the project. The construction safety and health program will include the following:

- Construction injury and illness prevention program (8 CCR § 1509);
- Construction fire prevention plan (8 CCR § 1920);
- Personal protective equipment program (8 CCR §§ 1514 - 1522); and

- Emergency action program and plan.

Additional programs under General Industry Safety Orders (8 CCR §§ 3200 to 6184), Electrical Safety Orders (8 CCR §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (8 CCR §§ 450 to 544) will include:

- Electrical safety program;
- Motor vehicle and heavy equipment safety program;
- Forklift operation program;
- Excavation/trenching program;
- Fall protection program;
- Scaffolding/ladder safety program;
- Articulating boom platforms program;
- Crane and material handling program;
- Housekeeping and material handling and storage program;
- Respiratory protection program;
- Employee exposure monitoring program;
- Hand and portable power tool safety program;
- Hearing conservation program;
- Back injury prevention program;
- Hazard communication program;
- Heat and cold stress monitoring and control program;
- Pressure vessel and pipeline safety program;
- Hazardous waste program;
- Hot work safety program;
- Permit-required confined space entry program; and
- Demolition procedure (if applicable).

The AFC includes adequate outlines for each of the above programs (SES 2008a). Prior to the project's start of construction, detailed programs and plans will be provided pursuant to Condition of Certification **WORKER SAFETY-1**.

Operations and Maintenance Safety and Health Program

Prior to the start-up of SES Solar Two, an operations and maintenance safety and health program will be prepared. This program will include the following programs and plans:

- Injury and illness prevention program (8 CCR § 3203);
- Fire prevention program (8 CCR § 3221);
- Personal protective equipment program (8 CCR §§ 3401 to 3411); and
- Emergency action plan (8 CCR § 3220).

In addition, the requirements under General Industry Safety Orders (8 CCR §§ 3200 to 6184), Electrical Safety Orders (8 CCR §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (8 CCR §§ 450 to 544) will apply to this project. Written safety programs for SES Solar Two, which the applicant will develop, will ensure compliance with those requirements.

The AFC includes adequate outlines for an injury and illness prevention program, an emergency action plan, a fire prevention program, and a personal protective equipment program (SES 2008a). Prior to operation of SES Solar Two, all detailed programs and plans will be provided pursuant to Condition of Certification **WORKER SAFETY-2**.

Safety and Health Program Elements

As mentioned above, the applicant provided the proposed outlines for both a Construction Safety and Health Program and an Operations Safety and Health Program. The measures in these plans are derived from applicable sections of state and federal law. The major items required in both Safety and Health Programs are as follows:

Injury and Illness Prevention Program (IIPP)

The IIPP will include the following components (BSE2007a, section 5.16.4.4):

- Identify persons with the authority and responsibility for implementing the program;
- Establish the safety and health policy of the plan;
- Define work rules and safe work practices for construction activities;
- Establish a system for ensuring that employees comply with safe and healthy work practices;
- Establish a system to facilitate employer-employee communication;
- Develop procedures for identifying and evaluating workplace hazards and establish necessary program(s);
- Establish methods for correcting unhealthy/unsafe conditions in a timely manner;

- Determine and establish training and instruction requirements and programs;
- Specify safety procedures; and
- Provide training and instruction.

Fire Prevention Plan

The California Code of Regulations requires an operations fire prevention plan (8 CCR § 3221). The AFC outlines a proposed fire prevention plan that is acceptable to staff (SOLAR 2007a, section 6.18.3.1). The plan will include the following:

- Determine general program requirements;
- Determine fire hazard inventory, including ignition sources and mitigation;
- Develop good housekeeping practices and proper materials storage;
- Establish employee alarms and/or communication system(s);
- Provide portable fire extinguishers at appropriate site locations;
- Locate fixed firefighting equipment in suitable areas;
- Specify fire control requirements and procedures;
- Establish proper flammable and combustible liquid storage facilities;
- Identify the location and use of flammable and combustible liquids;
- Provide proper dispensing and determine disposal requirements for flammable liquids;
- Establish and determine training and instruction requirements and programs; and
- Identify contacts for information on plan contents.

Staff proposes that the applicant submit a final fire prevention plan to the California Energy Commission compliance project manager (CPM) for review and approval and to the EFD for review and comment to satisfy proposed conditions of certification **WORKER SAFETY-1** and **WORKER SAFETY-2**.

Personal Protective Equipment Program

California regulations require personal protective equipment (PPE) and first aid supplies whenever hazards in the environment, or from chemicals or mechanical irritants, could cause injury or impair bodily function through absorption, inhalation, or physical contact (8 CCR sections 3380 to 3400). The SES Solar Two operational environment will require PPE.

All safety equipment must meet National Institute of Safety and Health (NIOSH) or American National Standards Institute (ANSI) standards and will carry markings, numbers, or certificates of approval. Respirators must meet NIOSH and Cal/OSHA standards. Each employee must be provided with the following information about protective clothing and equipment:

- Proper use, maintenance, and storage;
- When protective clothing and equipment are used;
- Benefits and limitations; and
- When and how protective clothing and equipment are replaced.

The PPE program ensures that employers comply with applicable requirements for PPE and provides employees with the information and training necessary to protect them from potential hazards in the workplace, and will be required as per proposed Conditions of Certification **WORKER SAFETY-1 and -2**.

Emergency Action Plan

California regulations require an emergency action plan (8 CCR § 3220). The AFC contains a satisfactory outline for an emergency action plan (SES 2008a).

The outline lists the following features:

- Establishes emergency procedures for the protection of personnel, equipment, the environment, and materials;
- Identifies fire and emergency reporting procedures;
- Determines response actions for accidents involving personnel and/or property;
- Develops response and reporting requirements for bomb threats;
- Specifies site assembly and emergency evacuation route procedures;
- Defines natural disaster responses (for example, earthquakes, high winds, and flooding);
- Establishes reporting and notification procedures for emergencies (including on-site, off-site, local authorities, and/or state jurisdictions);
- Determines alarm and communication systems needed for specific operations;
- Includes a spill response, prevention, and countermeasure (SPCC) plan;
- Identifies emergency personnel (response team) responsibilities and notification roster;
- Specifies emergency response equipment and strategic locations; and

- Establishes and determines training and instruction requirements and programs.

An emergency action plan is required by applicable LORS and Staff's proposed Conditions of Certification **WORKER SAFETY-1 and -2**

Written Safety Program

In addition to the specific plans listed above, additional LORS called "safe work practices" apply to the project. Both the construction and operations safety programs will address safe work practices in a variety of programs. The components of these programs include, but are not limited to, the programs found under the heading "Construction Safety and Health Program" in this staff assessment.

In addition, the project owner would be required to provide personnel protective equipment and exposure monitoring for workers involved in activities where contaminated soil and/or contaminated groundwater exist, per staff's proposed Conditions of Certification **WORKER SAFETY-1** and**-2**.

These proposed conditions of certification ensure that workers are properly protected from any hazardous wastes at the site.

Safety Training Programs

Employees will be trained in the safe work practices described in the above-referenced safety programs.

Additional Safety Issues

This solar power plant will present a unique work environment that includes a solar field located in the high desert. The area under the solar arrays must be kept free from weeds and thus herbicides will be applied as necessary. Exposure to workers via inhalation and ingestion of dusts containing herbicides poses a health risk. Finally, workers will regularly inspect the solar array for broken or non-functioning mirrors by driving up and down dirt paths between the rows of mirrors and even under the mirrors. Cleaning and servicing the mirrors will also be conducted on a routine schedule. All these activities will take place year-round and especially during the summer months of peak solar power generation, when outside ambient temperatures routinely reach 115°F and above.

The applicant has indicated that workers will be adequately trained and protected, but has not included precautions against exposure to herbicides. Therefore, to ensure that workers are indeed protected, staff has proposed additional requirements found in Conditions of Certification **WORKER SAFETY-6**. This requirement consists of the following provisions:

- The development and implementation of Best Management Practices (BMP) for the storage and application of herbicides used to control weeds beneath and around the solar array.

A BMP requiring proper herbicide storage and application, as recommended in Condition of Certification **WORKER SAFETY-6,** will mitigate potential risks to workers from exposure to herbicides and reduce the chance that herbicides will contaminate either surface water or groundwater. Staff suggests that a BMP follow either the guidelines established by the U.S. EPA (EPA 1993), or more recent guidelines established by the State of California or U.S. EPA.

Additional Mitigation Measures

Protecting construction workers from injury and disease is one of the greatest challenges today in occupational safety and health. The following facts are reported by NIOSH:

- More than seven million persons work in the construction industry, representing 6% of the labor force. Approximately 1.5 million of these workers are self-employed;
- Of approximately 600,000 construction companies, 90% employ fewer than 20 workers. Few have formal safety and health programs;
- From 1980-1993, an average of 1,079 construction workers were killed on the job each year, with more fatal injuries than any other industry;
- Falls caused 3,859 construction worker fatalities, or 25.6% of the total, between 1980 and 1993;
- 15% of workers' compensation costs are spent on construction-related injuries;
- Ensuring safety and health in construction is a complex task involving short-term work sites, changing hazards, and multiple operations and crews working in close proximity to one another;
- In 1990, Congress directed NIOSH to conduct research and training to reduce diseases and injury among construction workers in the United States. Under this mandate, NIOSH funds both intramural and extramural research projects.

The hazards associated with the construction industry are well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex industrial projects like gas-fired power plants. In order to reduce and/or eliminate these hazards, it has become standard industry practice to hire a construction safety supervisor to ensure a safe and healthful environment for all workers. This has been evident in the audits of power plants recently conducted by the staff. The Federal Occupational Safety and Health Administration (OSHA) has also entered into strategic alliances with several professional and trade organizations to promote and recognize safety professionals trained as construction safety supervisors, construction health and safety officers, and other professional designations. The goal of these partnerships is to encourage construction subcontractors to improve their safety and health performance; to assist them in striving to eliminate the four major construction hazards (falls, electrical, caught in/between, and struck-by hazards) that account for the majority of fatalities and injuries in this industry and have been the focus of targeted OSHA inspections; to prevent serious accidents in the construction industry through implementation of enhanced safety and health programs and increased employee training; and to recognize subcontractors that have exemplary safety and health programs.

There are no OSHA or Cal-OSHA requirements that an employer hire or provide for a construction safety officer. OSHA and Cal-OSHA regulations do, however, require that safety be provided by an employer and the term “Competent Person” appears in many OSHA and Cal-OSHA standards, documents, and directives. A “Competent Person” is defined by OSHA as an individual who, by way of training and/or experience, is knowledgeable of standards, is capable of identifying workplace hazards relating to the specific operations, is designated by the employer, and has authority to take appropriate action. Therefore, in order to meet the intent of the OSHA standard to provide for a safe workplace during power plant construction, staff proposes Condition of Certification **WORKER SAFETY-3,** which would require the applicant/project owner to designate and provide for a project site construction safety supervisor.

As discussed above, the hazards associated with the construction industry are well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex industrial projects like power plants.

Accidents, fires, and a worker death have occurred at Energy Commission-certified power plants in the recent past because of both the failure to recognize and control safety hazards and the inability to adequately monitor compliance with occupational safety and health regulations. Safety problems have been documented by Energy Commission staff in safety audits, conducted in 2005, at several power plants under construction. The findings of the audit include, but are not limited to, safety oversights like:

- Lack of posted confined-space warning placards/signs;
- Confusing and/or inadequate electrical and machinery lockout/tagout permitting and procedures;
- Confusing and/or inappropriate procedures for handing over lockout/tagout and confined space permits from the construction team to the commissioning team, and then to operations;
- Dangerous placement of hydraulic elevated platforms under one another;
- Inappropriate placement of fire extinguishers near hotwork;
- Dangerous placement of numerous power cords in standing water on the site, increasing the risk of electrocution;
- Inappropriate and unsecure placement of above-ground natural gas pipelines inside the facility, but too close to the perimeter fence; and
- Lack of adequate employee or contractor written training programs that address the proper procedures to follow in the event of the discovery of suspicious packages or objects either onsite or offsite.

In order to reduce and/or eliminate these hazards, it is necessary for the Energy Commission to require a professional Safety Monitor on-site to track compliance with Cal-OSHA regulations and periodically audit safety compliance during construction, commissioning, and the hand-over to the operations staff. These requirements are outlined in Condition of Certification **WORKER SAFETY-4**. A Safety Monitor, hired by the project owner but reporting to the Chief Building Official (CBO) and the Compliance Project Manager (CPM), will serve as an extra set of eyes to ensure that safety procedures and practices are fully implemented during construction at all power plants certified by the Energy Commission. During audits conducted by staff, most site safety professionals welcomed the audit team and actively engaged them in questions about the team's findings and recommendations. These safety professionals recognized that safety requires continuous vigilance and that the presence of an independent audit team provides a "fresh perspective" of the site.

Proposed Project Fire Hazards

During construction and operation of the proposed SES Solar Two there is the potential for small fires, major structural fires and wild fires. Electrical sparks, combustion of fuel oil, natural gas, hydraulic fluid, mineral oil, insulating fluid at the project power plant switchyard or flammable liquids, explosions, and overheated equipment, may cause small fires. Major structural fires in areas without automatic fire detection and suppression systems are unlikely at power plants. Fires and explosions of natural gas or other flammable gasses or liquids are rare. Compliance with all LORS will be adequate to ensure protection from all fire hazards associated with the project. Wild fires that would use local vegetation as its fuel and could have potential effects on workers and project facilities are not expected to be caused by the project. If wild fires are external to the SES Solar Two project boundaries, they would not be the responsibility of the project owner to suppress. However, the applicant plans to remove all vegetation in the vicinity of the solar power towers, substation and administration areas, and to cut and maintain vegetation in the solar field. The access road along the perimeter fence lines will also serve as a fire break.

Staff reviewed the information provided in the AFC to determine if available fire protection services and equipment would adequately protect workers, and to further determine the project's impact on fire protection services in the area. The project will rely on both onsite fire protection systems and local fire protection services. The onsite fire protection system provides the first line of defense for small fires. In the event of a major fire, fire support services, including trained firefighters and equipment for a sustained response, would be provided by the EFD.

Construction

During construction, portable fire extinguishers will be located and maintained throughout the site; safety procedures and training will also be implemented (SES 2008a).

Operation

The information in the AFC indicates that the project intends to meet the fire protection and suppression requirements of the California Fire Code, all applicable recommended NFPA standards (including Standard 850, which addresses fire protection at electric generating plants), and all Cal-OSHA requirements. Fire suppression elements in the proposed plant will include both fixed and portable fire extinguishing systems.

The fire protection system would be designed to protect personnel and limit property loss and plant downtime in the event of a fire. The primary source of fire protection water would be stored in the 175,000 gallon demineralized water storage. A diesel fire water pump will increase the water pressure to the level required to serve all fire fighting systems. The applicant has proposed a number of protective measures that would help reduce the potential for harm to plant personnel and damage to facilities. These include removal of all vegetation in the vicinity of the solar power towers, substation and administration areas. The access road along the perimeter fence lines would also serve as a fire break.

In addition to the fixed fire protection system, smoke detectors, flame detectors, high-temperature detectors, appropriate class of service portable extinguishers, and fire hydrants must be located throughout the facility at code-approved intervals. These systems are standard requirements of the fire code, NFPA and staff has determined that they will ensure adequate fire protection.

The applicant would be required by conditions of certification **WORKER SAFETY-1** and**-2** to provide a final fire protection and prevention program to both staff and the EFD prior to the construction and operation of the project in order to confirm the adequacy of proposed fire protection measures.

Emergency Medical Services Response

A statewide survey was conducted by staff to determine the frequency of incidents requiring emergency medical services (EMS) and off-site fire-fighters for natural gas-fired power plants in California. The purpose of this analysis was to determine what impact, if any, power plants might have on local emergency services. Staff concludes that incidents at power plants requiring fire or EMS responses are infrequent and represent an insignificant impact on local fire departments. However, staff has determined that the potential for both work-related and non-work related heart attacks exists at power plants. In fact, staff's research on the frequency of EMS response to power plants shows that many of the responses for cardiac emergencies involved non-work related incidences, including visitors. The need for prompt response within a few minutes is well documented in the medical literature. Staff believes that the quickest medical intervention can only be achieved with the use of an on-site defibrillator often called an Automatic External Defibrillator or AED; the response from an off-site provider would take longer regardless of the provider location. This fact is also well documented and serves as the basis for many private and public locations including airports, factories, and government buildings, all of which maintain on-site cardiac defibrillation devices. Therefore, staff concludes that with the availability of modern cost-effective AED devices, it is proper in a power plant environment to maintain these devices on-site in order to treat cardiac arrythmias resulting from industrial accidents or other non-work related causes. Therefore, an additional condition of certification, **WORKER SAFETY-5**, is proposed so that a portable AED will be located on site, and workers trained in its use.

Facility Closure and Decommissioning

Upon final facility closure, no workers will remain at the site, except for those necessary to maintain security over any remaining hazardous materials until they are removed from the site. During decommissioning, worker safety would be ensured by the same CAL-OSHA and other regulations requiring safety plans and training for as were needed for construction and operations. A decommissioning **Illness and Injury Prevention Plan** would be included as part of the decommissioning plan.

Facility fire protection systems will remain functional while hazardous materials remain on site, and as long as feasible into the decommissioning process.

C.15.4.3 CEQA LEVEL OF SIGNIFICANCE

Cumulative impacts and mitigation

Staff reviewed the construction and operation of SES Solar Two could have on the fire and emergency service capabilities of the EFD. Staff agrees with the applicant that combined impacts would not be significant and that existing local services would adequately provide emergency services.

Noteworthy public benefits

Staff has not identified any noteworthy public benefits associated with the proposed project’s potential use of fire and emergency service capabilities of the EFD.

C.15.5 300 MW ALTERNATIVE

The 300 MW alternative would essentially be Phase 1 of the proposed 750 MW project. This alternative is shown in Alternatives Figure 1.

C.15.5.1 SETTING AND EXISTING CONDITIONS

The setting for this alternative would be the same as for the Phase 1 of proposed project. All land would all be under the jurisdiction of the BLM and the fire support services to the Drainage Avoidance #2 alternative would be provided by the EDF. Please see the discussion existing conditions within affected BLM lands under Section C.15.4.1

C.15.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The types of construction and operational impacts of the 300 MW alternative would be the same as those of the proposed project, as described in Section C.15.4.2. The proposed project impacts are found to be less than significant with the incorporation of conditions of certification, and impacts of this alternative would be even smaller due to the smaller extent of construction disturbance and the smaller number of SunCatchers of the alternative. Construction and operation risk to workers due to the use of hydrogen and use of herbicides will be reduced because of the reduced number of SunCatchers.

C.15.5.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, the construction and operation of the 300 MW alternative would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of worker safety and fire protection with the adoption of the proposed conditions of certification. The mitigation that would be proposed for the 300 MW alternative would be the same as that proposed for the proposed project (staff recommended conditions **WORKER SAFETY-1** to **WORKER SAFETY-6**).

C.15.6 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives developed to reduce impacts to the waters of the U.S. would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative is illustrated in **Alternatives Figure 1B**. This alternative would have the same outer project boundaries as the proposed project, but it would include prohibition of installing permanent structures within drainages, thereby reducing the available acreage for development from 6,500 to 4,690, and reducing the generation capacity from 750 MW under the proposed project to 632 MW (84% of the proposed generation capacity). Rather than the 30,000 SunCatchers included in the proposed project, there would be approximately 25,000 of them installed.

C.15.6.1 SETTING AND EXISTING CONDITIONS

The setting for this alternative would be the same as for the proposed project, including all the area within the proposed project boundaries. While the alternative boundaries would be the same as for the proposed project, development within the boundaries would be less dense due to avoidance of primary drainages. All land would all be under the jurisdiction of the BLM and the fire support services to the Drainage Avoidance #1 alternative would be provided by the EDF. Please see the discussion existing conditions within affected BLM lands under Section C.15.4.1

C.15.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The types of construction and operational impacts of the Drainage Avoidance #1 alternative would be the same as those of the proposed project, as described in Section C.15.4.2. The proposed project impacts are found to be less than significant with the incorporation of conditions of certification, and impacts of this alternative would be even smaller due to the smaller extent of construction disturbance and the smaller number of SunCatchers of the alternative. Construction and operation risk to workers due to the use of hydrogen and use of herbicides will be reduced because of the reduced number of SunCatchers.

C.15.6.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, the construction and operation of the Drainage Avoidance #1 alternative would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of worker safety and fire protection with the adoption of the proposed conditions of certification. The mitigation that would be proposed for the Drainage Avoidance #1 Alternative would be the same as that proposed for the proposed project (staff recommended conditions **WORKER SAFETY-1** to **WORKER SAFETY-6**).

C.15.7 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative would eliminate both the eastern and westernmost portions of the proposed project, where the largest drainage complexes are located. This alternative is shown in **Alternatives Figure 1C**. It would reduce the overall size of the project area by over 50% (from 6,500 acres to 3,153 acres). It would also reduce the generation capacity from 750 MW to 423 MW (retaining only about 32% of the proposed number of SunCatchers). In this alternative, permanent structures would be allowed within all drainages inside the revised, smaller project boundaries.

C.15.7.1 SETTING AND EXISTING CONDITIONS

The setting for this alternative would be the same as for the proposed project, including all the area within the proposed project boundaries. While the alternative boundaries would be the same as for the proposed project, development within the boundaries would be less dense due to avoidance of primary drainages. All land would all be under the jurisdiction of the BLM and the fire support services to the Drainage Avoidance #2 alternative would be provided by the EDF. Please see the discussion existing conditions within affected BLM lands under Section C.15.4.1

C.15.7.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The types of construction and operational impacts of the Drainage Avoidance #2 alternative would be the same as those of the proposed project, as described in Section C.15.4.2. The proposed project impacts are found to be less than significant with the incorporation of conditions of certification, and impacts of this alternative would be even smaller due to the smaller extent of construction disturbance and the smaller number of SunCatchers of the alternative. Construction and operation risk to workers due to the use of hydrogen and use of herbicides will be reduced because of the reduced number of SunCatchers.

C.15.7.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, the construction and operation of the Drainage Avoidance #1 alternative would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of worker safety and fire protection with the adoption of the proposed conditions of certification. The mitigation that would be proposed for the Drainage Avoidance #1 Alternative would be the same as that proposed for the proposed project (staff recommended conditions **WORKER SAFETY-1** to **WORKER SAFETY-6**).

C.15.8 NO PROJECT/NO ACTION ALTERNATIVE

As Staff concludes that the proposed project would not have significant impacts on local fire protection services, it would not cause a significant impact on the public. Thus Staff concludes that the No Project/No Action alternative would not avoid or lessen a significant impact compared to the proposed project.

Staff concludes that if the applicant for the proposed SES Solar Two project provides project construction safety and health and project operations and maintenance safety and health programs, as required by proposed **WORKER SAFETY** conditions of certification; SES Solar Two would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable LORS. As worker safety is a LORS-conformity requirement, the No Project/No Action alternative consideration is not applicable to the worker safety topic.

CONCLUSIONS

Staff concludes that if the applicant for the proposed SES Solar Two project provides project construction safety and health and project operations and maintenance safety and health programs, as required by conditions of certification **WORKER SAFETY -1**, and **-2**; and fulfills the requirements of conditions of certification **WORKER SAFETY-3** through **-6**, SES Solar Two would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable LORS. Staff also concludes that the proposed project would not have significant impacts on local fire protection services.

Staff further concludes that none of the project alternatives would materially or significantly change potential impacts form the project with regard to worker safety or fire protection. None of the alternatives would be preferred to the proposed project or reduce any otherwise significant impacts on worker safety or fire protection.

PROPOSED CONDITIONS OF CERTIFICATION

WORKER SAFETY-1 The project owner shall submit to BLM's authorized officer and the Compliance Project Manager (CPM) a copy of the Project Construction Safety and Health Program containing the following:

- A Construction Personal Protective Equipment Program;
- A Construction Exposure Monitoring Program;
- A Construction Injury and Illness Prevention Program;
- A Construction Emergency Action Plan; and
- A Construction Fire Prevention Plan.

The Personal Protective Equipment Program, the Exposure Monitoring Program, and the Injury and Illness Prevention Program shall be submitted to BLM's authorized officer and the CPM for review and approval concerning compliance of the program with all applicable Safety Orders. The Construction Emergency Action Plan and the Fire Prevention Plan shall be submitted to the El Centro Fire Department for review and comment prior to submittal to the BLM's authorized officer and CPM for approval.

Verification: At least thirty (30) days prior to the start of construction, the project owner shall submit to BLM's authorized officer and the CPM for review and approval a copy of the Project Construction Safety and Health Program. The project owner shall provide a copy of a letter to the BLM's authorized officer and CPM from the El Centro

Fire Department stating the Fire Department's comments on the Construction Fire Prevention Plan and Emergency Action Plan.

WORKER SAFETY-2 The project owner shall submit to BLM's authorized officer and the CPM a copy of the Project Operations and Maintenance Safety and Health Program containing the following:

- An Operation Injury and Illness Prevention Plan;
- An Emergency Action Plan;
- Hazardous Materials Management Program;
- Fire Prevention Program (8 CCR § 3221); and;
- Personal Protective Equipment Program (8 CCR §§ 3401-3411).

The Operation Injury and Illness Prevention Plan, Emergency Action Plan, and Personal Protective Equipment Program shall be submitted to BLM's authorized officer and the CPM for review and approval concerning compliance of the program with all applicable Safety Orders. The Operation Fire Prevention Plan and the Emergency Action Plan shall also be submitted to the El Centro Fire Department for review and comment.

Verification: At least thirty (30) days prior to the start of first-fire or commissioning, the project owner shall submit to BLM's authorized officer and the CPM for approval a copy of the Project Operations and Maintenance Safety and Health Program. The project owner shall provide a copy of a letter to BLM's authorized officer and the CPM from the El Centro Fire Department stating the Fire Department's comments on the Operations Fire Prevention Plan and Emergency Action Plan.

WORKER SAFETY-3 The project owner shall provide a site Construction Safety Supervisor (CSS) who, by way of training and/or experience, is knowledgeable of power plant construction activities and relevant laws, ordinances, regulations, and standards, is capable of identifying workplace hazards relating to the construction activities, and has authority to take appropriate action to assure compliance and mitigate hazards. The CSS shall:

- Have overall authority for coordination and implementation of all occupational safety and health practices, policies, and programs;
- Assure that the safety program for the project complies with Cal/OSHA and federal regulations related to power plant projects;
- Assure that all construction and commissioning workers and supervisors receive adequate safety training;
- Complete accident and safety-related incident investigations, emergency response reports for injuries, and inform the CPM of safety-related incidents; and
- Assure that all the plans identified in Worker Safety 1 and 2 are implemented.

Verification: At least thirty (30) days prior to the start of site mobilization, the project owner shall submit to BLM's authorized officer and the CPM the name and contact information for the Construction Safety Supervisor (CSS). The contact information of any replacement (CSS) shall be submitted to the CPM within one business day.

The CSS shall submit in the Annual Compliance Report documentation of monthly safety inspection reports to include:

- Record of all employees trained for that month (all records shall be kept on site for the duration of the project);
- Summary report of safety management actions and safety-related incidents that occurred during the month;
- Report of any continuing or unresolved situations and incidents that may pose danger to life or health; and
- Report of accidents and injuries that occurred during the month.

WORKER SAFETY-4 The project owner shall make payments to the Chief Building Official (CBO) for the services of a Safety Monitor based upon a reasonable fee schedule to be negotiated between the project owner and the CBO. Those services shall be in addition to other work performed by the CBO. The Safety Monitor shall be selected by and report directly to the CBO, and will be responsible for verifying that the Construction Safety Supervisor, as required in Worker Safety 3, implements all appropriate Cal/OSHA and Commission safety requirements. The Safety Monitor shall conduct on-site (including linear facilities) safety inspections at intervals necessary to fulfill those responsibilities.

Verification: At least thirty (30) days prior to the start of construction, the project owner shall provide proof of its agreement to fund the Safety Monitor services to BLM's authorized officer and the CPM for review and approval.

WORKER SAFETY-5 The project owner shall ensure that a portable automatic external defibrillator (AED) is located on site during construction and operations and shall implement a program to ensure that workers are properly trained in its use and that the equipment is properly maintained and functioning at all times. During construction and commissioning, the following persons shall be trained in its use and shall be on-site whenever the workers that they supervise are on-site: the Construction Project Manager or delegate, the Construction Safety Supervisor or delegate, and all shift foremen. During operations, all power plant employees shall be trained in its use. The training program shall be submitted to BLM's authorized officer and the CPM for review and approval.

Verification: At least thirty (30) days prior to the start of site mobilization the project owner shall submit to BLM's authorized officer and the CPM proof that a portable AED exists on site and a copy of the training and maintenance program for review and approval.

WORKER SAFETY-6 The project owner shall prepare and implement a Best Management Practices (BMPs) for the storage and application of herbicides used to control weeds beneath and around the solar array. These plans shall be submitted to BLM's authorized officer and the CPM for review and approval.

Verification: At least thirty (30) days prior to the start of site mobilization, the project owner shall submit to BLM's authorized officer and the CPM for review and approval a copy of the Best Management Practices (BMPs) for the storage and application of herbicides.

REFERENCES

SES 2008a – Solar Energy Solutions. Application for Certification, Volumes I and II, for the Stirling Energy Systems. (tn: 46819), Submitted to CEC/Docket Unit on 6/30/2008.

California Fire Code 2007 Title 24 Part 9 – Published by the International Code Council, Whittier, CA 90601-2256

International Fire Code 2006 – Published by the International Code Council, Whittier, CA 90601-2256

USOSHA (United States Occupational Safety and Health Administration) 1993 – *Process Safety Management / Process Safety Management Guidelines For Compliance*. U.S. Department of Labor, Washington, DC.

ENGINEERING ANALYSIS

D.1 - FACILITY DESIGN

Testimony of Shahab Khoshmashrab

D.1.1 SUMMARY OF CONCLUSIONS

The California Energy Commission staff concludes that the design, construction, and eventual closure of the project and its linear facilities would likely comply with applicable engineering laws, ordinances, regulations and standards. The proposed conditions of certification, below, would ensure compliance with these laws, ordinances, regulations and standards.

D.1.2 INTRODUCTION

Facility design encompasses the civil, structural, mechanical, and electrical engineering design of the Stirling Energy Systems Solar Two (SES Solar Two) Project and is not intended as a California Environmental Quality (CEQA) or National Environmental Policy Act (NEPA) analysis. The purpose of this analysis is solely to:

- Verify that the laws, ordinances, regulations and standards (LORS) that apply to the engineering design and construction of the project have been identified;
- Verify that both the project and its ancillary facilities are sufficiently described, including proposed design criteria and analysis methods, in order to provide reasonable assurance that the project will be designed and constructed in accordance with all applicable engineering LORS, in a manner that also ensures the public health and safety;
- Determine whether special design features should be considered during final design to address conditions unique to the site which could influence public health and safety; and
- Describe the design review and construction inspection process and establish the conditions of certification used to monitor and ensure compliance with the engineering LORS, in addition to any special design requirements.

Subjects discussed in this analysis include:

- Identification of the engineering LORS that apply to facility design;
- Evaluation of the applicant's proposed design criteria, including identification of criteria essential to public health and safety;
- Proposed modifications and additions to the application for certification (AFC) necessary for compliance with applicable engineering LORS; and
- Conditions of certification proposed by staff to ensure that the project will be designed and constructed to ensure public health and safety and comply with all applicable engineering LORS.

D.1.3 LAWS, ORDINANCES, REGULATIONS AND STANDARDS

Lists of LORS applicable to each engineering discipline (civil, structural, mechanical, and electrical) are described in the AFC (SES Solar Two 2008a, Appendices F, K, M, O, P, Q, R). Key LORS are listed in **Facility Design Table 1,** below:

Facility Design Table 1
Key Engineering Laws, Ordinances, Regulations and Standards (LORS)

Applicable LORS	Description
Federal	Title 29 Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health standards
State	2007 California Building Standards Code (CBSC) (also known as Title 24, California Code of Regulations)
Local	Imperial County regulations and ordinances
General	American National Standards Institute (ANSI) American Society of Mechanical Engineers (ASME) American Welding Society (AWS) American Society for Testing and Materials (ASTM)

D.1.4 PROPOSED PROJECT

D.1.4.1 SETTING AND EXISTING CONDITIONS

The SES Solar Two Project would be built on an approximately 6,500-acre site located in Imperial County, California. For more information on the site and its related project description, please see the **Project Description** section of this document. Additional engineering design details are contained in the AFC, Appendices F, K, M, O, P, Q, R (SES Solar Two 2008a).

D.1.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The purpose of this analysis is to ensure that the project would be built to applicable engineering codes and ensure public health and life safety. This analysis further verifies that applicable engineering LORS have been identified and that the project and its ancillary facilities have been described in adequate detail. It also evaluates the applicant’s proposed design criteria, describes the design review and construction inspection process, and establishes conditions of certification that would monitor and ensure compliance with engineering LORS and any other special design requirements. These conditions allow both the California Energy Commission (Energy Commission) compliance project manager (CPM) and the applicant to adopt a compliance monitoring scheme that will verify compliance with these LORS.

SITE PREPARATION AND DEVELOPMENT

Staff has evaluated the proposed design criteria for grading, flood protection, erosion control, site drainage, and site access, in addition to the criteria for designing and constructing linear support facilities such as natural gas and electric transmission interconnections. The applicant proposes the use of accepted industry standards (see SES Solar Two 2008a, Appendices F, K, M, O, P, Q, R, for a representative list of applicable industry standards), design practices, and construction methods in preparing and developing the site. Staff concludes that this project, including its linear facilities, would most likely comply with all applicable site preparation LORS, and proposes conditions of certification (see below and the **Geology and Paleontology** section of this document) to ensure that compliance.

MAJOR STRUCTURES, SYSTEMS, AND EQUIPMENT

Major structures, systems, and equipment are structures and their associated components or equipment that are necessary for power production, costly or time consuming to repair or replace, are used for the storage, containment, or handling of hazardous or toxic materials, or could become potential health and safety hazards if not constructed according to applicable engineering LORS. Major structures and equipment are identified in the proposed Condition of Certification **GEN-2**, below. Typically, **Facility Design Table 2** in Condition of Certification **GEN-2** lists the major structures and equipment identified in the AFC and other project related information available before project licensing; this list is based on the preliminary design of the project. The master drawing and master specifications lists described in Condition of Certification **GEN-2**, however, include the project-related documents based on the project's detailed design and may include additional documents for structures and equipment not identified in **Facility Design Table 2**. (Detailed project design typically occurs after project licensing and is not available at this time.)

SES Solar Two shall be designed and constructed to the 2007 California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and other applicable codes and standards in effect when the design and construction of the project actually begin. If the initial designs are submitted to the chief building official (CBO) for review and approval after the update to the 2007 CBSC takes effect, the 2007 CBSC provisions shall be replaced with the updated provisions.

Certain structures in a power plant may be required, under the CBC, to undergo dynamic lateral force (structural) analysis; others may be designed using the simpler static analysis procedure. In order to ensure that structures are analyzed according to their appropriate lateral force procedure, staff has included condition of certification **STRUC-1**, below, which, in part, requires the project CBO's review and approval of the owner's proposed lateral force procedures before construction begins.

PROJECT QUALITY PROCEDURES

The project's AFC (SES Solar Two 2008a, Appendices F, K, M, O, P, Q, R) describes a quality program intended to inspire confidence that its systems and components will be designed, fabricated, stored, transported, installed, and tested in accordance with all appropriate power plant technical codes and standards. Compliance with design requirements will be verified through specific inspections and audits. Implementation of this quality assurance/quality control (QA/QC) program will ensure that SES Solar Two is actually designed, procured, fabricated, and installed as described in this analysis.

COMPLIANCE MONITORING

Under Section 104.2 of the CBC, the CBO is authorized and directed to enforce all provisions of the CBC. The Energy Commission itself serves as the building official, and has the responsibility to enforce the code, for all of the energy facilities it certifies. In addition, the Energy Commission has the power to interpret the CBC and adopt and enforce both rules and supplemental regulations that clarify application of the CBC's provisions.

The Energy Commission's design review and construction inspection process conforms to CBC requirements and ensures that all facility design conditions of certification are met. As provided by Section 104.2.2 of the CBC, the Energy Commission appoints experts to perform design review and construction inspections and act as delegate CBOs on behalf of the Energy Commission. These delegates typically include the local building official and/or independent consultants hired to provide technical expertise that is not provided by the local official alone. The applicant, through permit fees provided by the CBC, pays the cost of these reviews and inspections. While building permits in addition to Energy Commission certification are not required for this project, the applicant pays in lieu of CBC permit fees to cover the costs of these reviews and inspections.

Engineering and compliance staff will invite Imperial County or a third-party engineering consultant to act as CBO for this project. When an entity has been assigned CBO duties, Energy Commission staff will complete a memorandum of understanding (MOU) with that entity to outline both its roles and responsibilities and those of its subcontractors and delegates.

Staff has developed proposed conditions of certification to ensure public health and safety and compliance with engineering design LORS. Some of these conditions address the roles, responsibilities, and qualifications of the engineers who will design and build the proposed project (conditions of certification **GEN-1** through **GEN-8**). These engineers must be registered in California and sign and stamp every submittal of design plans, calculations, and specifications submitted to the CBO. These conditions require that every element of the project's construction (subject to CBO review and approval) be approved by the CBO before it is performed. They also require that qualified special inspectors perform or oversee special inspections required by all applicable LORS.

While the Energy Commission and delegate CBO have the authority to allow some flexibility in scheduling construction activities, these conditions are written so that no element of construction (of permanent facilities subject to CBO review and approval) which could be difficult to reverse or correct can proceed without prior CBO approval. Elements of construction that are not difficult to reverse may proceed without approval of the plans. The applicant bears the responsibility to fully modify construction elements in order to comply with all design changes resulting from the CBO's subsequent plan review and approval process.

D.1.4.3 CEQA LEVEL OF SIGNIFICANCE

As described in the Introduction above, the Facility Design section addresses LORS consistency and provides the agencies a vehicle for verifying compliance with these LORS during construction and operation of power generating facilities. This section is not intended to address environmental impacts under either CEQA or NEPA.

D.1.5 300 MW ALTERNATIVE

The Facility Design section is not intended to address environmental impacts under either CEQA or NEPA.

D.1.6 DRAINAGE AVOIDANCE ALTERNATIVE #1

The Facility Design section is not intended to address environmental impacts under either CEQA or NEPA.

D.1.7 DRAINAGE AVOIDANCE ALTERNATIVE #2

The Facility Design section is not intended to address environmental impacts under either CEQA or NEPA.

D.1.8 NO PROJECT / NO ACTION ALTERNATIVE

The Facility Design section is not intended to address environmental impacts under either CEQA or NEPA.

D.1.9 CUMULATIVE IMPACT ANALYSIS

The Facility Design section is not intended to address environmental impacts under either CEQA or NEPA.

D.1.10 COMPLIANCE WITH LORS

A detailed discussion of the proposed project's compliance with LORS applicable to facility design is provided above in subsection D.1.4.2.

D.1.11 NOTEWORTHY PUBLIC BENEFITS

Staff has not identified any noteworthy public benefits associated with this Facility Design section.

D.1.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

GEN-1 The project owner shall design, construct, and inspect the project in accordance with the 2007 California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and all other applicable engineering LORS in effect at the time initial design plans are submitted to the CBO for review and approval (the CBSC in effect is the edition that has been adopted by the California Building Standards Commission and published at least 180 days previously). The project owner shall ensure that all the provisions of the above applicable codes are enforced during the construction, addition, alteration, moving, demolition, repair, or maintenance of the completed facility. All transmission facilities (lines, switchyards, switching stations and substations) are covered in the conditions of certification in the **Transmission System Engineering** section of this document.

In the event that the initial engineering designs are submitted to the CBO when the successor to the 2007 CBSC is in effect, the 2007 CBSC provisions shall be replaced with the applicable successor provisions. Where, in any specific case, different sections of the code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

The project owner shall ensure that all contracts with contractors, subcontractors, and suppliers clearly specify that all work performed and materials supplied comply with the codes listed above.

<u>Verification:</u> Within 30 days following receipt of the certificate of occupancy, the project owner shall submit to the CPM a statement of verification, signed by the responsible design engineer, attesting that all designs, construction, installation, and inspection requirements of the applicable LORS and the Energy Commission's decision have been met in the area of facility design. The project owner shall provide the CPM a copy of the certificate of occupancy within 30 days of receipt from the CBO.

Once the certificate of occupancy has been issued, the project owner shall inform the CPM at least 30 days prior to any construction, addition, alteration, moving, demolition, repair, or maintenance to be performed on any portion(s) of the completed facility that requires CBO approval for compliance with the above codes. The CPM will then determine if the CBO needs to approve the work.

GEN-2 Before submitting the initial engineering designs for CBO review, the project owner shall furnish the CPM and the CBO with a schedule of facility design submittals, and master drawing and master specifications lists. The schedule shall contain a list of proposed submittal packages of designs, calculations, and specifications for major structures and equipment. To facilitate audits by Energy Commission staff, the project owner shall provide specific packages to the CPM upon request.

Verification: At least 60 days (or a project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO and to the CPM the schedule, the master drawing and master specifications lists of documents to be submitted to the CBO for review and approval. These documents shall be the pertinent design documents for the major structures and equipment listed in **Facility Design Table 2**, below. Major structures and equipment shall be added to or deleted from the table only with CPM approval. The project owner shall provide schedule updates in the monthly compliance report.

Facility Design Table 2
Major Structures and Equipment List

Equipment/System	Quantity (Plant)
Solar Dish Stirling Unit (CT) Foundation and Connections	1 Lot
Administration Building Structure, Foundation and Connections	1
Maintenance Building Structure, Foundation and Connections	1
Assembly Building Structure, Foundation and Connections	3
Fuel Storage Tanks Structure, Foundation and Connections	2
Water Treatment Area Structure, Foundation and Connections	1
Potable Water Tank Structure, Foundation and Connections	1
Fire Protection/Mirror Washing Water Tank Structure, Foundation and Connections	1
Raw Water Tank Structure, Foundation and Connections	1
Waste Water Treatment Facility Structure, Foundation and Connections	1
Sewage Holding Tank Structure, Foundation and Connections	1
Diesel Standby Generator Foundation and Connections	1
Diesel Fire Pump Foundation and Connections	1
Service Transformer Foundation and Connections	1
Hydrogen Bottles Storage Area	1 Lot
Chemical Storage Area	1 Lot
Drainage Systems (including sanitary drain and waste)	1 Lot
High Pressure and Large Diameter Piping and Pipe Racks	1 Lot
HVAC and Refrigeration Systems	1 Lot
Temperature Control and Ventilation Systems (including water and sewer connections)	1 Lot
Building Energy Conservation Systems	1 Lot
Substation, Switchboards, Transformers, Buses and Towers	1 Lot
Electrical Cables/Duct Banks	1 Lot
Prefabricated Assemblies	1 Lot

GEN-3 The project owner shall make payments to the CBO for design review, plan checks, and construction inspections, based upon a reasonable fee schedule to be negotiated between the project owner and the CBO. These fees may be consistent with the fees listed in the 2007 CBC, adjusted for inflation and other appropriate adjustments; may be based on the value of the facilities reviewed; may be based on hourly rates; or may be otherwise agreed upon by the project owner and the CBO.

Verification: The project owner shall make the required payments to the CBO in accordance with the agreement between the project owner and the CBO. The project owner shall send a copy of the CBO's receipt of payment to the CPM in the next monthly compliance report indicating that applicable fees have been paid.

GEN-4 Prior to the start of rough grading, the project owner shall assign a California-registered architect, or a structural or civil engineer, as the resident engineer (RE) in charge of the project. All transmission facilities (lines, switchyards, switching stations, and substations) are addressed in the conditions of certification in the **Transmission System Engineering** section of this document.

The RE may delegate responsibility for portions of the project to other registered engineers. Registered mechanical and electrical engineers may be delegated responsibility for mechanical and electrical portions of the project, respectively. A project may be divided into parts, provided that each part is clearly defined as a distinct unit. Separate assignments of general responsibility may be made for each designated part.

The RE shall:

1. Monitor progress of construction work requiring CBO design review and inspection to ensure compliance with LORS;
2. Ensure that construction of all facilities subject to CBO design review and inspection conforms in every material respect to applicable LORS, these conditions of certification, approved plans, and specifications;
3. Prepare documents to initiate changes in approved drawings and specifications when either directed by the project owner or as required by the conditions of the project;
4. Be responsible for providing project inspectors and testing agencies with complete and up-to-date sets of stamped drawings, plans, specifications, and any other required documents;
5. Be responsible for the timely submittal of construction progress reports to the CBO from the project inspectors, the contractor, and other engineers who have been delegated responsibility for portions of the project; and
6. Be responsible for notifying the CBO of corrective action or the disposition of items noted on laboratory reports or other tests when they do not conform to approved plans and specifications.

The resident engineer (or his delegate) must be located at the project site, or be available at the project site within a reasonable period of time, during any hours in which construction takes place.

The RE shall have the authority to halt construction and to require changes or remedial work if the work does not meet requirements.

If the RE or the delegated engineers are reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, the resume and registration number of the RE and any other delegated engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the RE and other delegated engineer(s) within five days of the approval.

If the RE or the delegated engineer(s) is subsequently reassigned or replaced, the project owner has five days to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

GEN-5 Prior to the start of rough grading, the project owner shall assign at least one of each of the following California registered engineers to the project: a civil engineer; a soils, geotechnical, or civil engineer experienced and knowledgeable in the practice of soils engineering; and an engineering geologist. Prior to the start of construction, the project owner shall assign at least one of each of the following California registered engineers to the project: a design engineer who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; a mechanical engineer; and an electrical engineer. (California Business and Professions Code section 6704 et seq., and sections 6730, 6731 and 6736 require state registration to practice as a civil engineer or structural engineer in California). All transmission facilities (lines, switchyards, switching stations, and substations) are handled in the conditions of certification in the **Transmission System Engineering** section of this document.

The tasks performed by the civil, mechanical, electrical, or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (for example, proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California registered electrical engineer.

The project owner shall submit, to the CBO for review and approval, the names, qualifications, and registration numbers of all responsible engineers assigned to the project.

If any one of the designated responsible engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned responsible engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

A. The civil engineer shall:

1. Review the foundation investigations, geotechnical, or soils reports prepared by the soils engineer, the geotechnical engineer, or by a civil engineer experienced and knowledgeable in the practice of soils engineering;

2. Design (or be responsible for the design of), stamp, and sign all plans, calculations, and specifications for proposed site work, civil works, and related facilities requiring design review and inspection by the CBO. At a minimum, these include: grading, site preparation, excavation, compaction, construction of secondary containment, foundations, erosion and sedimentation control structures, drainage facilities, underground utilities, culverts, site access roads and sanitary sewer systems; and

3. Provide consultation to the RE during the construction phase of the project and recommend changes in the design of the civil works facilities and changes to the construction procedures.

B. The soils engineer, geotechnical engineer, or civil engineer experienced and knowledgeable in the practice of soils engineering, shall:

1. Review all the engineering geology reports;

2. Prepare the foundation investigations, geotechnical, or soils reports containing field exploration reports, laboratory tests, and engineering analysis detailing the nature and extent of the soils that could be susceptible to liquefaction, rapid settlement or collapse when saturated under load;

3. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with requirements set forth in the 2007 CBC (depending on the site conditions, this may be the responsibility of either the soils engineer, the engineering geologist, or both); and

4. Recommend field changes to the civil engineer and RE.

This engineer shall be authorized to halt earthwork and to require changes if site conditions are unsafe or do not conform to the predicted conditions used as the basis for design of earthwork or foundations.

C. The engineering geologist shall:

1. Review all the engineering geology reports and prepare a final soils grading report; and

2. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with the requirements set forth in the 2007 CBC (depending on the site conditions, this may be the

responsibility of either the soils engineer, the engineering geologist, or both).

D. The design engineer shall:

   1. Be directly responsible for the design of the proposed structures and equipment supports;

   2. Provide consultation to the RE during design and construction of the project;

   3. Monitor construction progress to ensure compliance with engineering LORS;

   4. Evaluate and recommend necessary changes in design; and

   5. Prepare and sign all major building plans, specifications, and calculations.

E. The mechanical engineer shall be responsible for, and sign and stamp a statement with, each mechanical submittal to the CBO, stating that the proposed final design plans, specifications, and calculations conform to all of the mechanical engineering design requirements set forth in the Energy Commission's decision.

F. The electrical engineer shall:

   1. Be responsible for the electrical design of the project; and

   2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible civil engineer, soils (geotechnical) engineer and engineering geologist assigned to the project.

At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of construction, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible design engineer, mechanical engineer, and electrical engineer assigned to the project.

The project owner shall notify the CPM of the CBO's approvals of the responsible engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has five days in which to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

GEN-6 Prior to the start of an activity requiring special inspection, including prefabricated assemblies, the project owner shall assign to the project, qualified and certified special inspector(s) who shall be responsible for the special inspections required by the 2007 CBC. All transmission facilities (lines, switchyards, switching stations, and substations) are handled in conditions of certification in the **Transmission System Engineering** section of this document.

A certified weld inspector, certified by the American Welding Society (AWS), and/or American Society of Mechanical Engineers (ASME) as applicable, shall inspect welding performed on-site requiring special inspection (including structural, piping, tanks and pressure vessels).

The special inspector shall:

1. Be a qualified person who shall demonstrate competence, to the satisfaction of the CBO, for inspection of the particular type of construction requiring special or continuous inspection;

2. Inspect the work assigned for conformance with the approved design drawings and specifications;

3. Furnish inspection reports to the CBO and RE. All discrepancies shall be brought to the immediate attention of the RE for correction, then, if uncorrected, to the CBO and the CPM for corrective action; and

4. Submit a final signed report to the RE, CBO, and CPM, stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications, and other provisions of the applicable edition of the CBC.

Verification: At least 15 days (or project owner- and CBO-approved alternative time frame) prior to the start of an activity requiring special inspection, the project owner shall submit to the CBO for review and approval, with a copy to the CPM, the name(s) and qualifications of the certified weld inspector(s), or other certified special inspector(s) assigned to the project to perform one or more of the duties set forth above. The project owner shall also submit to the CPM a copy of the CBO's approval of the qualifications of all special inspectors in the next monthly compliance report.

If the special inspector is subsequently reassigned or replaced, the project owner has five days in which to submit the name and qualifications of the newly assigned special inspector to the CBO for approval. The project owner shall notify the CPM of the CBO's approval of the newly assigned inspector within five days of the approval.

GEN-7 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone CBO design review and approval, the project owner shall document the discrepancy and recommend required corrective actions. The discrepancy documentation shall be submitted to the CBO for review and approval. The discrepancy documentation shall reference this condition of certification and, if appropriate, applicable sections of the CBC and/or other LORS.

Verification: The project owner shall transmit a copy of the CBO's approval of any corrective action taken to resolve a discrepancy to the CPM in the next monthly compliance report. If any corrective action is disapproved, the project owner shall advise the CPM, within five days, of the reason for disapproval and the revised corrective action to obtain CBO's approval.

GEN-8 The project owner shall obtain the CBO's final approval of all completed work that has undergone CBO design review and approval. The project owner shall request the CBO to inspect the completed structure and review the submitted documents. The project owner shall notify the CPM after obtaining the CBO's final approval. The project owner shall retain one set of approved engineering plans, specifications, and calculations (including all approved changes) at the project site or at another accessible location during the operating life of the project. Electronic copies of the approved plans, specifications, calculations, and marked-up as-builts shall be provided to the CBO for retention by the CPM.

Verification: Within 15 days of the completion of any work, the project owner shall submit to the CBO, with a copy to the CPM, in the next monthly compliance report, (a) a written notice that the completed work is ready for final inspection, and (b) a signed statement that the work conforms to the final approved plans. After storing the final approved engineering plans, specifications, and calculations described above, the project owner shall submit to the CPM a letter stating both that the above documents have been stored and the storage location of those documents.

Within 90 days of the completion of construction, the project owner shall provide to the CBO three sets of electronic copies of the above documents at the project owner's expense. These are to be provided in the form of "read only" (Adobe .pdf 6.0) files, with restricted (password-protected) printing privileges, on archive quality compact discs.

CIVIL-1 The project owner shall submit to the CBO for review and approval the following:

1. Design of the proposed drainage structures and the grading plan;
2. An erosion and sedimentation control plan;
3. Related calculations and specifications, signed and stamped by the responsible civil engineer; and
4. Soils, geotechnical, or foundation investigations reports required by the 2007 CBC.

Verification: At least 15 days (or project owner- and CBO-approved alternative time frame) prior to the start of site grading the project owner shall submit the documents described above to the CBO for design review and approval. In the next monthly compliance report following the CBO's approval, the project owner shall submit a written statement certifying that the documents have been approved by the CBO.

CIVIL-2 The resident engineer shall, if appropriate, stop all earthwork and construction in the affected areas when the responsible soils engineer, geotechnical engineer, or the civil engineer experienced and knowledgeable in the practice of soils engineering identifies unforeseen adverse soil or geologic conditions. The project owner shall submit modified plans, specifications, and calculations to the CBO based on these new conditions. The project owner shall obtain approval from the CBO before resuming earthwork and construction in the affected area.

Verification: The project owner shall notify the CPM within 24 hours, when earthwork and construction is stopped as a result of unforeseen adverse geologic/soil conditions. Within 24 hours of the CBO's approval to resume earthwork and construction in the affected areas, the project owner shall provide to the CPM a copy of the CBO's approval.

CIVIL-3 The project owner shall perform inspections in accordance with the 2007 CBC. All plant site-grading operations, for which a grading permit is required, shall be subject to inspection by the CBO.

If, in the course of inspection, it is discovered that the work is not being performed in accordance with the approved plans, the discrepancies shall be reported immediately to the resident engineer, the CBO, and the CPM. The project owner shall prepare a written report, with copies to the CBO and the CPM, detailing all discrepancies, non-compliance items, and the proposed corrective action.

Verification: Within five days of the discovery of any discrepancies, the resident engineer shall transmit to the CBO and the CPM a non-conformance report (NCR), and the proposed corrective action for review and approval. Within five days of resolution of the NCR, the project owner shall submit the details of the corrective action to the CBO and the CPM. A list of NCRs, for the reporting month, shall also be included in the following monthly compliance report.

CIVIL-4 After completion of finished grading and erosion and sedimentation control and drainage work, the project owner shall obtain the CBO's approval of the final grading plans (including final changes) for the erosion and sedimentation control work. The civil engineer shall state that the work within his/her area of responsibility was done in accordance with the final approved plans.

Verification: Within 30 days (or project owner- and CBO-approved alternative time frame) of the completion of the erosion and sediment control mitigation and drainage work, the project owner shall submit to the CBO, for review and approval, the final grading plans (including final changes) and the responsible civil engineer's signed statement that the installation of the facilities and all erosion control measures were completed in accordance with the final approved combined grading plans, and that the facilities are adequate for their intended purposes, along with a copy of the transmittal letter to the CPM. The project owner shall submit a copy of the CBO's approval to the CPM in the next monthly compliance report.

STRUC-1 Prior to the start of any increment of construction of any major structure or component listed in **Facility Design Table 2** of condition of certification **GEN-2**, above, the project owner shall submit to the CBO for design review and approval the proposed lateral force procedures for project structures and the applicable designs, plans and drawings for project structures. Proposed lateral force procedures, designs, plans and drawings shall be those for the following items (from **Table 2**, above):

1. Major project structures;

2. Major foundations, equipment supports, and anchorage; and

3. Large field-fabricated tanks.

Construction of any structure or component shall not begin until the CBO has approved the lateral force procedures to be employed in designing that structure or component.

The project owner shall:

1. Obtain approval from the CBO of lateral force procedures proposed for project structures;

2. Obtain approval from the CBO for the final design plans, specifications, calculations, soils reports, and applicable quality control procedures. If there are conflicting requirements, the more stringent shall govern (for example, highest loads, or lowest allowable stresses shall govern). All plans, calculations, and specifications for foundations that support structures shall be filed concurrently with the structure plans, calculations, and specifications;

3. Submit to the CBO the required number of copies of the structural plans, specifications, calculations, and other required documents of the designated major structures prior to the start of on-site fabrication and installation of each structure, equipment support, or foundation;

4. Ensure that the final plans, calculations, and specifications clearly reflect the inclusion of approved criteria, assumptions, and methods used to develop the design. The final designs, plans, calculations, and specifications shall be signed and stamped by the responsible design engineer; and

5. Submit to the CBO the responsible design engineer's signed statement that the final design plans conform to applicable LORS.

Verification: At least 60 days (or project owner- and CBO-approved alternative time frame) prior to the start of any increment of construction of any structure or component listed in **Facility Design Table 2** of condition of certification **GEN-2**,above, the project owner shall submit to the CBO the above final design plans, specifications and calculations, with a copy of the transmittal letter to the CPM.

The project owner shall submit to the CPM, in the next monthly compliance report, a copy of a statement from the CBO that the proposed structural plans, specifications, and calculations have been approved and comply with the requirements set forth in applicable engineering LORS.

STRUC-2 The project owner shall submit to the CBO the required number of sets of the following documents related to work that has undergone CBO design review and approval:

1. Concrete cylinder strength test reports (including date of testing, date sample taken, design concrete strength, tested cylinder strength, age of test, type and size of sample, location and quantity of concrete placement from which sample was taken, and mix design designation and parameters);

2. Concrete pour sign-off sheets;

3. Bolt torque inspection reports (including location of test, date, bolt size, and recorded torques);

4. Field weld inspection reports (including type of weld, location of weld, inspection of non-destructive testing (NDT) procedure and results, welder qualifications, certifications, qualified procedure description or number (ref: AWS); and

5. Reports covering other structural activities requiring special inspections shall be in accordance with the 2007 CBC.

Verification: If a discrepancy is discovered in any of the above data, the project owner shall, within five days, prepare and submit an NCR describing the nature of the discrepancies and the proposed corrective action to the CBO, with a copy of the transmittal letter to the CPM. The NCR shall reference the condition(s) of certification and the applicable CBC chapter and section. Within five days of resolution of the NCR, the project owner shall submit a copy of the corrective action to the CBO and the CPM.

The project owner shall transmit a copy of the CBO's approval or disapproval of the corrective action to the CPM within 15 days. If disapproved, the project owner shall advise the CPM, within five days, the reason for disapproval, and the revised corrective action to obtain CBO's approval.

STRUC-3 The project owner shall submit to the CBO design changes to the final plans required by the 2007 CBC, including the revised drawings, specifications, calculations, and a complete description of, and supporting rationale for, the proposed changes, and shall give to the CBO prior notice of the intended filing.

Verification: On a schedule suitable to the CBO, the project owner shall notify the CBO of the intended filing of design changes, and shall submit the required number of sets of revised drawings and the required number of copies of the other above-mentioned documents to the CBO, with a copy of the transmittal letter to the CPM. The project owner shall notify the CPM, via the monthly compliance report, when the CBO has approved the revised plans.

STRUC-4 Tanks and vessels containing quantities of toxic or hazardous materials exceeding amounts specified in the 2007 CBC shall, at a minimum, be designed to comply with the requirements of that chapter.

Verification: At least 30 days (or project owner- and CBO-approved alternate time frame) prior to the start of installation of the tanks or vessels containing the above specified quantities of toxic or hazardous materials, the project owner shall submit to the CBO for design review and approval final design plans, specifications, and calculations, including a copy of the signed and stamped engineer's certification.

The project owner shall send copies of the CBO approvals of plan checks to the CPM in the following monthly compliance report. The project owner shall also transmit a copy of the CBO's inspection approvals to the CPM in the monthly compliance report following completion of any inspection.

MECH-1 The project owner shall submit, for CBO design review and approval, the proposed final design, specifications and calculations for each plant major piping and plumbing system listed in **Facility Design Table 2**, condition of certification **GEN-2**, above. Physical layout drawings and drawings not related to code compliance and life safety need not be submitted. The submittal shall also include the applicable QA/QC procedures. Upon completion of construction of any such major piping or plumbing system, the project owner shall request the CBO's inspection approval of that construction.

The responsible mechanical engineer shall stamp and sign all plans, drawings, and calculations for the major piping and plumbing systems, subject to CBO design review and approval, and submit a signed statement to the CBO when the proposed piping and plumbing systems have been designed, fabricated, and installed in accordance with all of the applicable laws, ordinances, regulations and industry standards, which may include, but are not limited to:

- American National Standards Institute (ANSI) B31.1 (Power Piping Code);
- ANSI B31.2 (Fuel Gas Piping Code);
- ANSI B31.3 (Chemical Plant and Petroleum Refinery Piping Code);
- ANSI B31.8 (Gas Transmission and Distribution Piping Code);
- Title 24, California Code of Regulations, Part 5 (California Plumbing Code);
- Title 24, California Code of Regulations, Part 6 (California Energy Code, for building energy conservation systems and temperature control and ventilation systems);
- Title 24, California Code of Regulations, Part 2 (California Building Code); and
- Imperial County codes.

The CBO may deputize inspectors to carry out the functions of the code enforcement agency.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of any increment of major piping or plumbing construction listed in **Facility Design Table 2**, condition of certification **GEN-2,** above, the project owner shall submit to the CBO for design review and approval the final plans, specifications, and calculations, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with applicable LORS, and shall send the CPM a copy of the transmittal letter in the next monthly compliance report.

The project owner shall transmit to the CPM, in the monthly compliance report following completion of any inspection, a copy of the transmittal letter conveying the CBO's inspection approvals.

MECH-2 For all pressure vessels installed in the plant, the project owner shall submit to the CBO and California Occupational Safety and Health Administration (Cal-OSHA), prior to operation, the code certification papers and other documents required by applicable LORS. Upon completion of the installation of any pressure vessel, the project owner shall request the appropriate CBO and/or Cal-OSHA inspection of that installation.

The project owner shall:

1. Ensure that all boilers and fired and unfired pressure vessels are designed, fabricated, and installed in accordance with the appropriate section of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, or other applicable code. Vendor certification, with identification of applicable code, shall be submitted for prefabricated vessels and tanks; and

2. Have the responsible design engineer submit a statement to the CBO that the proposed final design plans, specifications, and calculations conform to all of the requirements set forth in the appropriate ASME Boiler and Pressure Vessel Code or other applicable codes.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of on-site fabrication or installation of any pressure vessel, the project owner shall submit to the CBO for design review and approval, the above listed documents, including a copy of the signed and stamped engineer's certification, with a copy of the transmittal letter to the CPM.

The project owner shall transmit to the CPM, in the monthly compliance report following completion of any inspection, a copy of the transmittal letter conveying the CBO's and/or Cal-OSHA inspection approvals.

MECH-3 The project owner shall submit to the CBO for design review and approval the design plans, specifications, calculations, and quality control procedures for any heating, ventilating, air conditioning (HVAC) or refrigeration system. Packaged HVAC systems, where used, shall be identified with the appropriate manufacturer's data sheets.

The project owner shall design and install all HVAC and refrigeration systems within buildings and related structures in accordance with the CBC and other applicable codes. Upon completion of any increment of construction, the project owner shall request the CBO's inspection and approval of that construction. The final plans, specifications and calculations shall include approved criteria, assumptions, and methods used to develop the design. In addition, the responsible mechanical engineer shall sign and stamp all plans, drawings and calculations and submit a signed statement to the CBO that the proposed final design plans, specifications and calculations conform with the applicable LORS.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of construction of any HVAC or refrigeration system, the project owner shall submit to the CBO the required HVAC and refrigeration calculations, plans, and specifications, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with the CBC and other applicable codes, with a copy of the transmittal letter to the CPM.

ELEC-1 Prior to the start of any increment of electrical construction for all electrical equipment and systems 480 Volts or higher (see a representative list, below), with the exception of underground duct work and any physical layout drawings and drawings not related to code compliance and life safety, the project owner shall submit, for CBO design review and approval, the proposed final design, specifications, and calculations. Upon approval, the above listed plans, together with design changes and design change notices, shall remain on the site or at another accessible location for the operating life of the project. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS. All transmission facilities (lines, switchyards, switching stations, and substations) are handled in conditions of certification in the **Transmission System Engineering** section of this document.

A. Final plant design plans shall include:

1. one-line diagrams for the 13.8 kV, 4.16 kV and 480 V systems; and
2. system grounding drawings.

B. Final plant calculations must establish:

1. short-circuit ratings of plant equipment;
2. ampacity of feeder cables;
3. voltage drop in feeder cables;
4. system grounding requirements;
5. coordination study calculations for fuses, circuit breakers and protective relay settings for the 13.8 kV, 4.16 kV and 480 V systems;
6. system grounding requirements; and
7. lighting energy calculations.

C. The following activities shall be reported to the CPM in the monthly compliance report:

   1. Receipt or delay of major electrical equipment;

   2. Testing or energization of major electrical equipment; and

   3. A signed statement by the registered electrical engineer certifying that the proposed final design plans and specifications conform to requirements set forth in the Energy Commission decision.

<u>Verification:</u> At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of each increment of electrical construction, the project owner shall submit to the CBO for design review and approval the above listed documents. The project owner shall include in this submittal a copy of the signed and stamped statement from the responsible electrical engineer attesting compliance with the applicable LORS, and shall send the CPM a copy of the transmittal letter in the next monthly compliance report.

D.1.13 CONCLUSIONS

1. The laws, ordinances, regulations and standards (LORS) identified in the AFC and supporting documents directly apply to the project.

2. Staff has evaluated the proposed engineering LORS, design criteria, and design methods in the record, and concludes that the design, construction, and eventual closure of the project will likely comply with applicable engineering LORS.

3. The proposed conditions of certification will ensure that SES Solar Two is designed and constructed in accordance with applicable engineering LORS. This will be accomplished through design review, plan checking, and field inspections that will be performed by the CBO or other Energy Commission delegate. Staff will audit the CBO to ensure satisfactory performance.

4. Though future conditions that could affect decommissioning are largely unknown at this time, it can reasonably be concluded that if, the project owner submits a decommissioning plan as required in the **General Conditions** portion of this document prior to decommissioning, decommissioning procedures will comply with all applicable engineering LORS.

Energy Commission staff recommends that:

1. The proposed conditions of certification be adopted to ensure that the project is designed and constructed in a manner that protects the public health and safety and complies with all applicable engineering LORS;

2. The project be designed and built to the 2007 CBSC (or successor standards, if in effect when initial project engineering designs are submitted for review); and

3. The CBO reviews the final designs, checks plans, and performs field inspections during construction. Energy Commission staff shall audit and monitor the CBO to ensure satisfactory performance.

D.1.14 REFERENCES

SES Solar Two 2008a – Application for Certification for the Stirling Energy Systems (SES) Solar Two Project, Volumes 1 and 2 (tn: 46819). Submitted to the California Energy Commission on June 30, 2008.

D.2 - GEOLOGIC STABILITY

Testimony of Dal Hunter, Ph.D., C.E.G.

D.2.1 SUMMARY OF CONCLUSIONS

(NOTE: The GEOLOGIC STABILITY issue area has been addressed as part of Section C.4 GEOLOGY, SOILS, AND PALEONTOLOGICAL RESOURCES. The summary below is from that environmental analysis. Please refer to that section for the full analysis.)

The proposed Stirling Energy Systems Solar Two (SES Solar Two) Project site is located in an active geological area of the south-central Colorado Desert Geomorphic Province in south-central Imperial County in southeastern California. Because of its geological setting, the site could be subject to intense levels of earthquake-related ground shaking. The effects of strong ground shaking would need to be mitigated through structural designs required by the California Building Code (CBC 2007) and the project geotechnical report. The CBC (2007) requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction potential. A geotechnical investigation has been performed and presents standard engineering design recommendations for mitigation of seismic shaking and site soil conditions.

There are no known viable geological or mineralogical resources at the proposed SES Solar Two site. Locally, paleontological resources have been documented within Quaternary alluvium, colluvium, lakebed sediments, and in sedimentary units of the Palm Springs Formation, all of which underlie the site in the near surface. Potential impacts to paleontological resources would be mitigated through worker training and monitoring by qualified paleontologists, as required by Conditions of Certification, **PAL-1** through **PAL-7**.

Based on its independent research and review, California Energy Commission staff concludes that the potential is low for significant adverse impacts to the proposed project from geological hazards during its design life and to potential geological, mineralogical, and paleontological resources from the construction, operation, and closure of the proposed project. It is staff’s opinion that the SES Solar Two Project will be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards and in a manner that both protects environmental quality and assures public safety.

D.3 - POWER PLANT EFFICIENCY

Testimony of Shahab Khoshmashrab

D.3.1 SUMMARY OF CONCLUSIONS

The SES Solar Two Project, if constructed and operated as proposed, would use solar energy to generate all of its capacity. The project would decrease reliance on fossil fuel, and would increase reliance on renewable energy resources. It would not create significant adverse effects on energy supplies or resources, would not require additional sources of energy supply, and would not consume energy in a wasteful or inefficient manner. No energy standards apply to this project. Staff therefore concludes that this project would present no significant adverse impacts on energy resources.

SES Solar Two, if constructed and operated as proposed, would occupy approximately eight acres per MW of power output, a figure about double that of some other solar power technologies. Employing a less land-intensive solar technology, such as the linear parabolic trough would reduce the resultant adverse environmental impacts. Staff believes Solar Two represents one of the least land use–efficient solar technologies currently available.

D.3.2 INTRODUCTION

The Stirling Energy Systems Solar Two Project, if constructed and operated as proposed, would generate 750 megawatts (nominal net output) of electricity. Solar Two would be a solar thermal power plant to be built on an approximately 6,500-acre site in Imperial County, California. The project would use a Stirling engine-based solar thermal technology to produce electrical power using 30,000 Stirling Energy Systems SunCatcher units. Solar Two would use solar energy to generate all of its capacity; no fossil fuel (natural gas) would be used for power production.

D.3.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Fossil Fuel Use Efficiency

One of the responsibilities of the California Energy Commission (Energy Commission) is to make findings on whether the energy use by a power plant, including the proposed Stirling Energy Systems Solar Two (SES Solar Two) Project, would result in significant adverse impacts on the environment, as defined in the California Environmental Quality Act (CEQA). If the Energy Commission finds that Solar Two's energy consumption creates a significant adverse impact, it must further determine if feasible mitigation measures could eliminate or minimize that impact. In this analysis, staff addresses the inefficient and unnecessary consumption of energy.

In order to develop the Energy Commission's findings, this analysis will:

- examine whether the facility would likely present any adverse impacts upon energy resources;
- examine whether these adverse impacts are significant; and if so,

- examine whether feasible mitigation measures or alternatives could eliminate those adverse impacts or reduce them to a level of insignificance.

Solar Land Use Efficiency

Solar thermal power plants typically consume much less fossil fuel (usually in the form of natural gas) than other types of thermal power plants; and some, such as SES Solar Two, do not consume any natural gas. Therefore, common measures of power plant efficiency such as those described above are less meaningful. So far as Energy Commission staff can determine, methods for determining the efficiency of a solar power plant have yet to be standardized; research has uncovered no meaningful attempt to quantify efficiency. The solar power industry appears to have begun discussing the issue, but a consensus is forthcoming (CEC 2008j). In the absence of accepted standards, staff proposes the following approach.

Solar thermal power plants convert the sun's energy into electricity in three basic steps:

- Mirrors and/or collectors capture the sun's rays.
- This solar energy is converted into heat.
- This heat is converted into electricity, typically in a heat engine such as a steam turbine generator or a Stirling Engine-powered generator.

The effectiveness of each of these steps depends on the specific technology employed; the product of these three steps determines the power plant's overall solar efficiency. The greater the project's solar efficiency, the less land the plant must occupy to produce a given power output.

The most significant environmental impacts caused by solar power plants result from occupying large expanses of land. The extent of these impacts is likely in direct proportion to the number of acres affected. For this reason, staff will evaluate the land use efficiency of proposed solar power plant projects. This efficiency will be expressed in terms of power produced, or MW per acre, and in terms of energy produced, or MW-hours per acre-year. Specifically:

- Power-based solar land use efficiency is calculated by dividing the maximum net power output in MW by the total number of acres impacted by the power plant, including roads and electrical switchyards and substations.
- Energy-based solar land use efficiency is calculated by dividing the annual net electrical energy production in MW-hours per year by the total number of acres impacted by the power plant. Since different solar technologies consume differing quantities of natural gas for morning warm-up, cloudy weather output leveling and heat transfer fluid freeze protection (and some consume no gas at all), this effect is be accounted for. Specifically, gas consumption is backed out by reducing the plant's net energy output by the amount of energy that could have been produced by consuming the project's annual gas consumption in a modern combined cycle power plant. (See **Efficiency Appendix A**, immediately following.) This reduced energy output is then be divided by acres impacted. However, this does not apply to SES Solar Two, because it would not use any natural gas.

D.3.4 PROPOSED PROJECT

D.3.4.1 SETTING AND EXISTING CONDITIONS

The applicant proposes to build and operate Solar Two, a solar thermal power plant producing a total of 750 MW (nominal net output) and employing Stirling Energy Systems SunCatcher technology. The project would occupy approximately 6,500 acres of land and would consist of 30,000 SunCatchers (SES Solar Two, LLC 2008a, AFC §§ 1.1, 1.3, 2.2, 3.1, 3.3.1).

Each SunCatcher is composed of a pedestal, a mirrored dish that tracks the sun, and a power conversion unit (PCU) consisting of a solar receiver, a closed-cycle Stirling engine, and a generator that capture the solar energy and convert it to electricity. Each SunCatcher is capable of generating 25 kW of power. Power would be routed from the SunCatchers to electrical transformers, then to a switchyard located near the center of the project (SES Solar Two, LLC 2008a, AFC §§ 3.1.1, 3.4.3, 3.4.4.1, 3.4.4.2).

The project would not use fossil fuel to generate electricity.

D.3.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Project Energy Requirements and Energy Use Efficiency

Solar Two would consume no natural gas or other fossil fuel for power generation.

Each of the 30,000 Stirling engines is filled with hydrogen gas, which acts as a working fluid that allows the engine to operate. During operation, hydrogen leaks from the engines and must be continuously replenished from pressure bottles located at each SunCatcher, or by means of a centralized hydrogen system connected to each SunCatcher.

Hydrogen is typically produced from natural gas. The applicant initially explained that approximately 24,400 therms of natural gas per year will be consumed to supply the necessary replenishment hydrogen, to be procured from suppliers of industrial gases (SES Solar Two, LLC 2008g, Data Response 26). The applicant subsequently changed its plans for supplying hydrogen to the project (SES 2009h, Data Responses 24-26). Hydrogen would be created on-site by electrolysis of water using electricity from the grid, consuming approximately 37 MWh of electrical energy annually. Compared to a typical power plant of equal capacity, this rate is insignificant. Energy Commission staff, however, will include this consumption in calculating the plant’s efficiency, below.

There are currently no legal or industry standards for measuring the efficiency of solar thermal power plants (CEC 2008J). Stirling Energy Systems claims that the SunCatcher exhibits a conversion efficiency of 31.25% (SES Solar Two, LLC 2008a, AFC § 1.3).

Because the project would consume no natural gas, staff considers the project’s fuel consumption to have no impact on energy supplies and energy efficiency.

Adverse Effects on Energy Supplies and Resources

The applicant would produce hydrogen gas onsite through electrolysis of water (SES Solar Two, LLC 2009h, Data Responses 24-26). Staff deems it unlikely that this could cause any measurable impact on energy supplies.

Additional Energy Supply Requirements

Since the project would not use fossil fuel, there is no likelihood that additional energy supplies would be required.

Compliance with Energy Standards

No standards apply to the efficiency of Solar Two or other non-cogeneration projects.

Alternatives to Reduce Wasteful, Inefficient, and Unnecessary Energy Consumption

Staff typically evaluates the project alternatives to determine if alternatives exist that could reduce the project's fuel use. The evaluation of alternatives to the project (that could reduce wasteful, inefficient, or unnecessary energy consumption) requires the examination of the project's energy consumption.

Efficiency of Alternatives to the Project

Please see the project alternatives discussed below.

Alternative Generating Technologies

Alternative generating technologies for Solar Two are considered in the AFC (SES Solar Two, LLC 2008a, AFC §§ 4.4.1, 4.4.2, 4.4.3). For purposes of this analysis, natural gas, oil, coal, nuclear, geothermal, biomass, hydroelectric, wind and solar photovoltaic technologies are all considered. Because this project would consume no fossil fuel for power production, staff believes that the SES Solar Two project would not constitute an adverse impact on fossil fuel energy resources compared to feasible alternatives.

The solar insolation falling on the earth's surface can be regarded as an energy resource. Since this energy is inexhaustible, its consumption does not present the concerns inherent in fossil fuel consumption. What is of concern, however, is the extent of land area required to capture this solar energy and convert it to electricity. Setting aside hundreds or thousands of acres of land for solar power generation removes it from alternative uses.

As discussed above, Energy Commission staff is unaware of any accepted standard for evaluating the efficiency of a solar power plant such as Solar Two. Accordingly, staff proposes to tabulate the land use efficiency of the project (described above) and compare it to similar measures for other solar power plant projects that have passed through, or are passing through, the Energy Commission's siting process.

Energy Commission staff proposes to compare the land use of a solar power plant project to that of other solar projects in the Energy Commission's siting process. It has not been determined how great a difference in land use would constitute a significant difference; staff proposes to compare four solar projects currently in the process.

As this is written, there are currently four solar power plant projects that have progressed significantly through the Energy Commission siting process. These projects' power and energy output, and the extent of the land occupied by them, are summarized in **Efficiency Table 1**, below. The solar land use efficiency for a typical natural gas-fired combined cycle power plant is shown only for comparison.

While the Energy Commission customarily requires full mitigation for such impacts, such mitigation is generally regarded as less effective in protecting resources than avoiding the impact entirely. A solar power project that occupies twice as much land as another project holds the potential to produce twice the environmental impacts.

The SES Solar Two Project would produce power at the rate of 750 MW net, and would generate energy at the rate of 1,620,000 MW-hours net per year, while occupying 6,500 acres (SES Solar Two, LLC 2008a, AFC §§ 1.1, 1.3, 2.2, 3.1, 3.11.1). Staff calculates power-based land use efficiency thus:

Power-based efficiency: 750 MW ÷ 6,500 acres = **0.12 MW/acre** or **8.7 acres/MW**

Staff calculates energy-based land use efficiency thus:

Energy-based efficiency: First, back out the electrical energy consumed in hydrogen replenishment:

1,620,000 MWh/year – 37 MWh/year = 1,619,963 MWh/year

1,619,963 MWh/year ÷ 6,500 acres = **249 MWh/acre-year**

As seen in **Efficiency Table 1**, Solar Two, employing the Stirling Energy Systems SunCatcher technology, is roughly one-half as efficient in use of land as the Beacon Solar project, which employs linear parabolic trough technology. Solar Two is roughly as efficient in use of land as the Ivanpah Solar Electric Generating System project, which employs BrightSource power tower technology.

alternatives to reduce solar land use impacts

Building and operating a natural gas-fired combined cycle power plant would yield much greater land use efficiency than any solar power plant; see **Efficiency Table 1**. However, this would not achieve the basic project objective, to generate electricity from the renewable energy of the sun.

Efficiency Table 1
Solar Land Use Efficiency

Project	Generating Capacity (MW net)	Annual Energy Production (MWh net)	Annual Fuel Consumption (MMBtu LHV)	Footprint (Acres)	Land Use Efficiency (Power-Based) (MW/acre)	Land Use Efficiency (Energy – Based) (MWh/acre-year)	
						Total	Solar Only[1]
SES Solar Two (08-AFC-5)	**750**	**1,620,000**	**0**	**6,500**	**0.12**	**249**	**249**
Beacon Solar (08-AFC-2)	250	600,000	36,000	1,240	0.20	484	480
Ivanpah SEGS (07-AFC-5)	400	960,000	432,432	3,744	0.11	256	238
Avenal Energy (08-AFC-1)[2]	600	3,023,388	24,792,786	25	24.0	120,936	N/A

1 - Net energy output is reduced by natural gas-fired combined cycle proxy energy output; see **Efficiency Appendix A.**
2 - Example natural gas-fired combined cycle plant.

Building a solar power plant employing a different technology, such as the linear parabolic trough technology of the Beacon Solar Energy project, would almost double the solar land use efficiency of Solar Two. This would likely reduce the environmental impacts brought about by the project. Staff believes Solar Two represents one of the least land use–efficient solar technologies currently available.

Alternative Heat Rejection System

The Stirling engine that is the heart of the SunCatcher technology is cooled by an automotive-style cooling system. Waste engine heat is conducted via an enclosed cooling loop to a radiator that dumps the waste heat to the atmosphere. This is a dry cooling system; its only water consumption is that required to make up any unintended leakage from the system. Thus, staff believes the cooling technology selected for this project is the optimum possible.

D.3.4.3 CEQA LEVEL OF SIGNIFICANCE

CEQA guidelines state that the environmental analysis "…shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy" (Title 14 CCR §15126.4[a][1]). Appendix F of the guidelines further suggests consideration of such factors as the project's energy requirements and energy use efficiency; its effects on local and regional energy supplies and energy resources; its requirements for additional energy supply capacity; its compliance with existing energy standards; and any alternatives that could reduce the wasteful, inefficient, and unnecessary consumption of energy (Title 14, CCR §15000 et seq., Appendix F).

The inefficient and unnecessary consumption of energy, in the form of non-renewable fuels such as natural gas and oil, constitutes an adverse environmental impact. An adverse impact can be considered significant if it results in:

- adverse effects on local and regional energy supplies and energy resources;
- a requirement for additional energy supply capacity;
- noncompliance with existing energy standards; or
- the wasteful, inefficient, and unnecessary consumption of fuel or energy.

The discussions under **Fossil Fuel Use Efficiency** and **Solar Land Use Efficiency** in Subsection D.3.3 also describe the CEQA level of significance as related to power plant efficiency.

D.3.5 300 MW ALTERNATIVE

The 300 MW alternative would essentially be Phase 1 of the proposed 750 MW project. This alternative is shown in Alternatives Figure 1.

D.3.5.1 SETTING AND EXISTING CONDITIONS

The 300 MW alternative would consist of approximately 40% as many SunCatchers (12,000 machines) producing 40% as much power (300 MW) and occupying 40% as much land as the proposed project.

D.3.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Fossil fuel use efficiency of the 300 MW alternative would be unchanged, that is, no impact. Land use efficiency of this alternative would remain the same, as both power output and occupied land are reduced proportionately.

D.3.5.3 CEQA LEVEL OF SIGNIFICANCE

The CEQA Level of Significance of the 300 MW alternative would be unchanged from the proposed project.

D.3.6 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives developed to reduce impacts to the waters of the U.S. would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative is illustrated in **Alternatives Figure 1B**. This alternative would have the same outer project boundaries as the proposed project, but it would include prohibition of installing permanent structures within drainages, thereby reducing the available acreage for development from 6,500 to 4,690, and reducing the generation capacity from 750 MW under the proposed project to 632 MW (84% of the proposed generation capacity). Rather than the 30,000 SunCatchers included in the proposed project, there would be approximately 25,290 installed.

D.3.6.1 SETTING AND EXISTING CONDITIONS

The proposed SES Solar Two Project would produce a total of 750 MW (nominal net output) and employing Stirling Energy Systems SunCatcher technology. The project would occupy approximately 6,500 acres of land and would consist of 30,000 SunCatchers (SES Solar Two, LLC 2008a, AFC §§ 1.1, 1.3, 2.2, 3.1, 3.3.1). As described above, the Drainage Avoidance #1 alternative would occupy the same total land area, but would be less densely developed.

D.3.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Fossil fuel use efficiency of the Drainage Avoidance #1 alternative would be unchanged, that is, no impact. Since the Drainage Avoidance #1 alternative plant would produce 632 MW while occupying 4,690 acres, it would occupy 7.4 acres per MW of power output (compared with 8.7 acres per MW of power output for the proposed project). Thus, this alternative would offer a slightly more efficient use of the land as compared to the proposed project. No Conditions of Certification or mitigation measures are proposed.

D.3.6.3 CEQA LEVEL OF SIGNIFICANCE

The CEQA Level of Significance of the Drainage Avoidance #1 alternative would be unchanged from the proposed project.

D.3.7 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative would eliminate both the eastern and western-most portions of the proposed project, where the largest drainage complexes are located. This alternative is shown in **Alternatives Figure 1C**. It would reduce the overall size of the project area by over 50% (from 6,500 acres to 3,153 acres). It would also reduce the generation capacity from 750 MW to 423 MW. In this alternative, permanent structures would be allowed within all drainages inside the revised, smaller project boundaries.

D.3.7.1 SETTING AND EXISTING CONDITIONS

The proposed Solar Two power plant would produce a total of 750 MW (nominal net output) and employing Stirling Energy Systems SunCatcher technology. The project would occupy approximately 6,500 acres of land and would consist of 30,000 SunCatchers (SES Solar Two, LLC 2008a, AFC §§ 1.1, 1.3, 2.2, 3.1, 3.3.1). As described above, the Drainage Avoidance #2 alternative would occupy a smaller land area (3,153 acres), with a greater development density to that of the proposed project.

D.3.7.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Fossil fuel use efficiency of the Drainage Avoidance #2 alternative would be unchanged, that is, no impact. Since the Drainage Avoidance #2 alternative plant would produce 423 MW while occupying 3,153 acres, it would occupy 7.5 acres per MW of power output (compared with 8.7 acres per MW of power output for the proposed project). Thus, this alternative would offer a slightly more efficient use of the land as compared to the proposed project.

D.3.7.3 CEQA LEVEL OF SIGNIFICANCE

The CEQA Level of Significance of the Drainage Avoidance #1 alternative would be unchanged from the proposed project.

D.3.8 NO PROJECT / NO ACTION ALTERNATIVE

D.3.8.1 NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on SES Solar Two project application and on CDCA land use plan amendment

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

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no ground disturbance. The decreased reliance on fossil fuel and increased reliance on renewable energy resources that would occur with the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations

D.3.8.2 NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on SES Solar Two project and amend the CDCA land use plan to make the area available for future solar development

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

Because the CDCA Plan would be amended, it is possible that the site will be developed with another solar technology. Construction and operation requirements for solar technologies vary; however, they would all decrease reliance on fossil fuel, and would increase reliance on renewable energy resources as with the proposed project.

C.3.8.3 NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on SES Solar Two project application and amend the CDCA land use plan to make the area unavailable for future solar development

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

Because the CDCA Plan would be amended so no solar projects can be approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no construction of a solar facility. Therefore, there would be no decreased reliance on fossil fuel and increased reliance on renewable energy resources as with the proposed project. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

D.3.9 CUMULATIVE IMPACT ANALYSIS

Section B.3, Cumulative Scenario, provides detailed information on the potential cumulative solar and other development projects in the project area. Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis for the proposed project. In summary, these projects are:

- Renewable energy projects on BLM, State, and private lands, as shown on **Cumulative Figures 1 and 2** and in **Cumulative Tables 1A and 1B.** Although not all of those projects are expected to complete the environmental review processes, or be funded and constructed, the list is indicative of the large number of renewable projects currently proposed in California.
- Foreseeable future projects in the immediate Plaster City area, as shown on **Cumulative Impacts Figure 3, Plaster City Existing and Future/Foreseeable Projects, and Cumulative Tables 2 and 3**. Table 2 presents existing projects in this area and Table 3 presents future foreseeable projects in the Plaster City Area. Both tables indicate project name and project type, its location and its status.

These projects are defined within a geographic area that has been identified by the Energy Commission and BLM as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all resource elements or environmental parameters. Most of these projects have, are, or will be required to undergo their own independent environmental review under CEQA and/or NEPA. Even if the cumulative projects described in Section B.3 have not yet completed the required environmental processes, they were considered in the cumulative impacts analyses in this SA/Draft EIS.

Geographic Scope of Analysis

The geographic area considered for cumulative impacts on Power Plant Efficiency is within the southern California desert.

Effects of Past and Present Projects

Power Plant Efficiency in the geographic area has not been impacted by past or present projects.

Effects of Reasonably Foreseeable Future Projects

Power Plant Efficiency would not be expected to be affected by the reasonably foreseeable future projects listed in Section B.3 (see below).

Contribution of the SES Solar Two Project to Cumulative Impacts

Construction. It is expected that some of the cumulative projects described above which are not yet built may be under construction the same time as the SES Solar Two Project. However, there would be no impacts during construction of those cumulative projects related to Power Plant Efficiency.

Operation. Power Plant Efficiency would be affected only if another energy project would use the SES Solar Two Project site to capture the energy of the sun for power production. Because this would not be possible if SES Solar Two Project is constructed (none of the reasonably foreseeable projects could possibly be located on the SES Solar Two Project site), the SES Solar Two Project would not be expected to contribute to any long term operational cumulative impacts related to Power Plant Efficiency.

Decommissioning. The decommissioning of the SES Solar Two Project is not expected to result in adverse impacts related to Power Plant Efficiency.

D.3.10 COMPLIANCE WITH LORS

No federal, state, or local/county laws, ordinances, regulations, and standards (LORS) apply to the efficiency of this project.

D.3.11 NOTEWORTHY PUBLIC BENEFITS

The SES Solar Two Project would employ an advanced solar thermal technology. Solar energy is renewable and unlimited. The project would have no impact on energy resources (natural gas). Consequently, the project would help in reducing California's dependence on fossil fuel-fired power plants.

D.3.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

No conditions of certification are proposed.

D.3.13 CONCLUSIONS

Fossil Fuel Energy Use

The SES Solar Two Project, if constructed and operated as proposed, would use solar energy to generate all of its capacity, consuming no natural gas for power production. The project would decrease reliance on fossil fuel, and would increase reliance on renewable energy resources. It would not create significant adverse effects on energy supplies or resources, would not require additional sources of energy supply, and would not consume energy in a wasteful or inefficient manner. No energy standards apply to this project. Staff therefore concludes that this project would present no significant adverse impacts on energy resources.

No cumulative impacts on energy resources are likely. Facility closure would not likely present significant impacts on electric system efficiency.

Land Use

SES Solar Two, if constructed and operated as proposed, would occupy approximately eight acres per MW of power output, a figure about double that of some other solar power technologies. Employing a less land-intensive solar technology would reduce the resultant adverse environmental impacts. Staff believes Solar Two represents one of the least land use–efficient solar technologies currently available.

D.3.14 REFERENCES

CEC 2008j – Report of Conversation between Steve Baker and Golam Kibrya – CEC staff. February 22, 2008.

SES Solar Two, LLC 2008a – Application for Certification for the Stirling Energy Systems (SES) Solar Two Project, Volumes 1 and 2. Submitted to the California Energy Commission on June 30, 2008.

SES Solar Two, LLC 2008g – Applicant's Response to Energy Commission Data Request Set 1, 1 through 74, June 20, 2008.

SES Solar Two, LLC 2009h – Responses to CEC and BLM Data Requests …24-26…, March 19, 2009.

EFFICIENCY APPENDIX A

Solar Power Plant Efficiency Calculation
Gas-Fired Proxy

In calculating the efficiency of a solar power plant, it is desired to subtract the effect of natural gas burned for morning startup, cloudy weather augmentation and Therminol freeze protection. As a proxy, we will use an average efficiency based on several recent baseload combined cycle power plant projects in the Energy Commission siting process. Baseload combined cycles were chosen because their intended dispatch most nearly mirrors the intended dispatch of solar plants, that is, operate at full load in a position high on the dispatch authority's loading order.

The most recent such projects are:

Colusa Generating Station (06-AFC-9)

Nominal 660 MW 2-on-1 Combined Cycle with GE Frame 7FA CGTs
Air cooled condenser, evaporative inlet air cooling
Efficiency with duct burners on: 666.3 MW @ 52.5% LHV
Efficiency with duct burners off: 519.4 MW @ 55.3% LHV
Efficiency (average of these two): **53.9% LHV**

San Gabriel Generating Station (07-AFC-2)

Nominal 696 MW 2-on-1 Combined Cycle with Siemens 5000F CGTs
Air cooled condenser, evaporative inlet air cooling
Efficiency with duct burners on: 695.8 MW @ 52.1% LHV
Efficiency with duct burners off: 556.9 MW @ 55.1% LHV
Efficiency (average of these two): **53.6% LHV**

KRCD Community Power Plant (07-AFC-7)

Nominal 565 MW 2-on-1 Combined Cycle with GE or Siemens F-class CGTs
Evaporative cooling, evaporative or fogging inlet air cooling
Efficiency with GE CGTs: 497 MW @ 54.6% LHV
Efficiency with Siemens CGTs: 565 MW @ 56.1% LHV
Efficiency (average of these two): **55.4% LHV**

Avenal Energy (08-AFC-1)

Nominal 600 MW 2-on-1 Combined Cycle with GE Frame 7FA CGTs
Air cooled condenser, inlet air chillers
Efficiency with duct burners on: 600.0 MW @ 50.5% LHV
Efficiency with duct burners off: 506.5 MW @ 53.4% LHV
Efficiency (average of these two): **52.0% LHV**

Average of these four power plants: **53.7% LHV**

D.4 - POWER PLANT RELIABILITY

Testimony of Shahab Khoshmashrab

D.4.1 SUMMARY OF CONCLUSIONS

The applicant predicts an availability factor of 99 percent. Staff cannot determine whether this is achievable and cannot predict what the actual availability might be, given the demonstration status of this Stirling engine and limited data on large-scaled deployments of Stirling engines. (The availability factor of a power plant is the percentage of time it is available to generate power; both planned and unplanned outages subtract from this availability.) Staff believes it possible that the project may face challenges from considerable maintenance demands, reducing its availability.

D.4.2 INTRODUCTION

In this analysis, California Energy Commission (Energy Commission) staff addresses the reliability issues of the Solar Two project to determine if the power plant is likely to be built in accordance with typical industry norms for reliable power generation. Staff uses this norm as a benchmark because it ensures that the resulting project would not be likely to degrade the overall reliability of the electric system it serves (see the “Setting” subsection, below).

The scope of this power plant reliability analysis covers:

- equipment availability;
- plant maintainability;
- fuel and water availability; and
- power plant reliability in relation to natural hazards.

Staff examined the project design criteria to determine if the project is likely to be built in accordance with typical industry norms for reliable power generation. While the applicant has predicted an availability factor of 99 percent for the Stirling Energy Systems Solar Two (SES Solar Two) Project (see below), staff commonly uses typical industry norms as the benchmark, rather than the applicant’s projection, to evaluate the project’s reliability.

D.4.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

METHOD FOR DETERMINING RELIABILITY

The Energy Commission must make findings as to how a project is designed, sited, and operated in order to ensure its safe and reliable operation (Title 20, CCR §1752[c]). Staff takes the approach that a project is acceptable if it does not degrade the reliability of the utility system to which it is connected. This is likely the case if a project is at least as reliable as other power plants on that system.

The availability factor of a power plant is the percentage of time it is available to generate power; both planned and unplanned outages subtract from this availability. Measures of power plant reliability are based upon both the plant's actual ability to generate power when it is considered to be available and upon starting failures and unplanned (or forced) outages. For practical purposes, reliability can be considered a combination of these two industry measures, making a reliable power plant one that is available when called upon to operate. Power plant systems must be able to operate for extended periods without shutting down for maintenance or repairs. Achieving this reliability requires adequate levels of equipment availability, plant maintainability with scheduled maintenance outages, fuel and water availability, and resistance to natural hazards. Staff examines these factors for the project and compares them to industry norms. If the factors compare favorably for the project, staff may then conclude that the project would be as reliable as other power plants on the electric system and would not degrade system reliability.

D.4.4 PROPOSED PROJECT

D.4.4.1 SETTING AND EXISTING CONDITIONS

In the restructured competitive electric power industry, the responsibility for maintaining system reliability falls largely to the state's control area operators, such as the California Independent System Operator (California ISO), that purchase, dispatch, and sell electric power throughout the state. Determining how the California ISO and other control area operators would ensure system reliability has been an ongoing effort. Protocols have been developed and put in place that allow sufficient reliability to be maintained under the competitive market system. "Must-run" power purchase agreements and "participating generator" agreements are two mechanisms that have been employed to ensure an adequate supply of reliable power.

The California ISO's mechanisms to ensure adequate power plant reliability apparently were devised under the assumption that the individual power plants that compete to sell power into the system will each exhibit a level of reliability similar to that of power plants of past decades. Accordingly, staff has recommended that power plant owners continue to build and operate their projects to the level of reliability to which all in the industry are accustomed.

As part of its plan to provide needed reliability, the applicant proposes to operate 750-megawatt (MW) (net power output) SES Solar Two, a solar thermal power plant facility employing advanced solar power technology. This project, using renewable solar energy, is intended to provide dependable power to the grid, generally during the hours of peak power consumption by San Diego Gas and Electric Company (SDG&E), the interconnecting utility. This project would help serve the need for renewable energy in California, as all its generated electricity would be produced by a reliable source of energy that is available during hot summer afternoons, when power is needed most.

The project applicant has indicated it expects the proposed project to achieve an availability factor of 99 percent. The project is anticipated to operate at an annual capacity factor of approximately 25 percent (SES Solar Two, LLC 2008a, AFC §§ 1.3, 3.1, 3.9.14, 3.11.1).

D.4.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

EQUIPMENT AVAILABILITY

Equipment availability would be ensured by adoption of appropriate quality assurance/ quality control (QA/QC) programs during the design, procurement, construction, and operation of the plant and by providing for adequate maintenance and repair of the equipment and systems discussed below.

Quality Control Program

The applicant describes a QA/QC program (SES Solar Two, LLC 2008a, AFC § 3.11.4) that is typical of the power industry. Equipment would be purchased from qualified suppliers based on technical and commercial evaluations. Suppliers' personnel, production capability, past performance, QA programs, and quality history would be evaluated. The project owner would perform receipt inspections, test components, and administer independent testing contracts. Staff expects that implementation of this program would result in typical reliability of design and construction. To ensure this implementation, staff has proposed appropriate conditions of certification in the section of this document entitled **Facility Design**.

PLANT MAINTAINABILITY

Equipment Redundancy

The project, as proposed in the AFC, would be able to operate only when the sun is shining. Maintenance or repairs could be done when the plant is shut down at night. This would help to enhance the project's reliability. Also, the project would incorporate redundant pieces of those components that are most likely to require service or repair. In this case, this redundancy is inherent in the incorporation of 30,000 individual SunCatcher units. This would allow service or repair to be done either at night when the plant is shut down, or during the day, when the plant is in operation, since only those SunCatchers actually being serviced or repaired would be unavailable to generate power.

In addition to the inherent redundancy of many independent units, the applicant plans to provide an appropriate redundancy of function for the remainder of project, including electrical transformers (SES Solar Two, LLC 2008a, AFC §§ 1.3, 3.1, 3.1.2, 3.4.3, 3.4.5.2, 3.11.2; Tables 3-1, 3-2). Major plant systems are designed with adequate redundancy to ensure their continued operation if equipment fails. Staff believes that this project's proposed equipment redundancy could be sufficient for its reliable operation.

Maintenance Program

Equipment manufacturers provide maintenance recommendations for their products, and the applicant would base the project's maintenance program on those recommendations (SES Solar Two, LLC 2008a, AFC § 3.11.1). Because the plant would operate only during the sunlight hours, planned maintenance outages could be performed during other hours, when the plant would not need to be in operation.

The applicant predicts that each machine will leak its entire inventory of hydrogen once a year, thus requiring constant replenishment of hydrogen. For this reason, the applicant proposes a hydrogen electrolyzer and piping system that uses electricity from the grid to convert water into hydrogen and oxygen, then compresses the hydrogen and pipes it to each of the 30,000 SunCatchers (SES 2009h)

An expert familiar with the machines claims that the SunCatcher exhibits a Mean Time Between Failures (MTBF) of only 40 hours (Butler 2007). This means each machine, if operating continuously on long summer days, would need to be shut down and repaired approximately every 3 to 5 days, depending on expected average 8 to 12 hours operation in winter and summer, respectively. Shutting down and repairing several thousand SunCatchers each day would likely result in enormous maintenance demands and the project would likely face challenges in achieving the predicted 99 percent availability factor. It is believed by one expert that a MTBF of 2,000 to 10,000 hours must be proven before a technology is ready for incorporation into a utility grid (Butler 2007, Public 2009a; Conklin 2009).

Staff conducted an online research to gather more information on the demonstration status of this Stirling engine on a large-scaled format, but no useful information was found. Due to the lack of sufficient information supporting the applicant's claim of an availability factor of 99 percent for the project, staff cannot determine whether the project would yield this availability factor.

FUEL AND WATER AVAILABILITY

The long-term availability of fuel and of water for cooling or process use is necessary to ensure the reliability of any power plant. The need for reliable sources of fuel and water is obvious; lacking long-term availability of either source, the service life of the plant could be curtailed, threatening both the power supply and the economic viability of the plant.

Fuel Availability

Solar Two would consume no natural gas or other fossil fuel. Therefore, there is no likelihood that availability of natural gas would cause concern.

Water Supply Reliability

Solar Two would use water from Imperial Irrigation District's (IID's) Westside Main Canal for mirror washing, for potable and fire protection water, and in an electrolysis process to produce hydrogen gas to replenish the hydrogen that leaks from the Stirling engines (SES Solar Two, LLC 2008a, AFC §§ 1.3, 1.4, 3.1.2, 3.5.6, 3.5.10, 3.7; Table 3-2; SES 2009h). (Since the Stirling engines are air-cooled, no water would be required for power plant cooling.) Water would be conducted to the site via a new 7-mile-long 6-inch diameter pipeline, treated onsite and stored in tanks holding raw water, demineralized water and potable water. IID is evaluating options for supplying the requisite water (SES Solar Two, LLC 2008a, AFC Appendix U). Staff believes this source would represent a reliable supply of water for the project. For further discussion of water supply, see the **Soil and Water Resources** section of this document.

POWER PLANT RELIABILITY IN RELATION TO NATURAL HAZARDS

Natural forces can threaten the reliable operation of a power plant. Tsunamis (tidal waves) and seiches (waves in inland bodies of water) are not likely to present hazards for this project, but seismic shaking (earthquakes), flooding and high winds could present credible threats to the project's reliable operation (SES Solar Two, LLC 2008a, AFC § 3.10.1).

Seismic Shaking

The site lies within Seismic Zone 4; a known fault traverses the northeast corner of the site (SES Solar Two, LLC 2008a, AFC § 3.3.1; Appendix M, § 3.1.4); see the "Faulting and Seismicity" portion of the **Geology and Paleontology** section of this document. The project will be designed and constructed to the latest applicable LORS (SES Solar Two, LLC 2008a, AFC § 3.10.1.1). Compliance with current seismic design LORS represents an upgrading of performance during seismic shaking compared to older facilities since these LORS have been continually upgraded. Because it would be built to the latest seismic design LORS, this project would likely perform at least as well as, and perhaps better than, existing plants in the electric power system. Staff has proposed conditions of certification to ensure this; see the section of this document entitled **Facility Design**. In light of the general historical performance of California power plants and the electrical system in seismic events, staff has no special concerns with the power plant's functional reliability during earthquakes.

Flooding

Portions of the site lie within the 100-year flood plain (SES Solar Two, LLC 2008a, AFC §§ 3.10.1.4). Project features would be designed and built to provide adequate levels of flood resistance. Staff believes there are no special concerns with power plant functional reliability due to flooding. For further discussion, see **Soil and Water Resources** and **Geology and Paleontology**.

High Winds

High winds are common in the region of the site; project features would be built to withstand winds over 90 miles per hour. Design would be in accordance with applicable LORS, including the 2007 California Building Code (SES Solar Two, LLC 2008a, AFC § 3.10.1.2). Staff believes there are no special concerns with power plant functional reliability due to wind.

COMPARISON WITH EXISTING FACILITIES

The North American Electric Reliability Corporation (NERC) maintains industry statistics for availability factors (as well as other related reliability data). The NERC regularly polls North American utility companies on their project reliability through its Generating Availability Data System and periodically summarizes and publishes those statistics on the Internet at <http://www.nerc.com>. Energy Commission staff typically compares the applicant's claims for reliability to the statistical reliability of similar power plants. Because solar technology is relatively new and the technologies employed so varied, no NERC statistics are available for solar power plants. Staff's typical comparison with other existing facilities thus cannot be accomplished.

D.4.4.3 CEQA LEVEL OF SIGNIFICANCE

This does not apply to power plant reliability.

D.4.5 300 MW ALTERNATIVE

The 300 MW alternative would essentially be Phase 1 of the proposed 750 MW project. This alternative is shown in Alternatives Figure 1.

D.4.5.1 SETTING AND EXISTING CONDITIONS

The 300 MW alternative would consist of approximately 40 percent as many SunCatchers (12,000 machines) producing 40 percent as much power (300 MW) and occupying 40 percent as much land as the proposed project.

D.4.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The availability factor of the 300 MW alternative would be unchanged from the proposed project because the same generating technology would be employed. The adverse impact of this alternative on the power system reliability in an event of a lower availability than expected would be less than 50 percent of the proposed project, because this alternative would be a 300 MW project, compared to the 750 MW proposed project.

D.4.5.3 CEQA LEVEL OF SIGNIFICANCE

The CEQA level of significance would be unchanged.

D.4.6 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives developed to reduce impacts to the waters of the U.S. would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative is illustrated in **Alternatives Figure 1B**. This alternative would have the same outer project boundaries as the proposed project, but it would include prohibition of installing permanent structures within drainages, thereby reducing the available acreage for development to 4,690 acres, and reducing the number of SunCatchers from 30,000 under the proposed project to 25,290.

D.4.6.1 SETTING AND EXISTING CONDITIONS

The existing conditions for power plant reliability are described in Section D.4.4.1, and apply to this alternative. Similar to the proposed project, this alternative would use the same technology but at a somewhat smaller scale.

D.4.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Section D.4.4.2 defines potential concerns about equipment availability, plant maintenance, and natural hazards that could affect reliability for the proposed project.

The availability factor of this alternative would be unchanged from the proposed project because the same generating technology would be employed. The adverse impact of this alternative on the power system reliability in an event of lower plant availability than expected would be slightly less than the proposed project, because the full generating capacity of this alternative would be approximately 84 percent of that of the proposed project (25,290 engines verses 30,000 engines).

D.4.6.3 CEQA LEVEL OF SIGNIFICANCE

The CEQA level of significance would be unchanged.

D.4.7 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative would eliminate both the eastern and westernmost portions of the proposed project, where the largest drainage complexes are located. This alternative is shown in **Alternatives Figure 1C**. It would reduce the overall size of the project site by 3,347 acres (from 6,500 acres to 3,153 acres) It would also reduce the number of SunCatchers from 30,000 under the proposed project to 16,915. In this alternative, permanent structures would be allowed within all drainages inside the revised project boundaries.

D.4.7.1 SETTING AND EXISTING CONDITIONS

The existing conditions for power plant reliability are described in Section D.4.4.1, and apply to this alternative. Similar to the proposed project, this alternative would use the same technology but at a smaller scale.

D.4.7.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Section D.4.4.2 defines potential concerns about equipment availability, plant maintenance, and natural hazards that could affect reliability for the proposed project.

The availability factor of this alternative would be unchanged from the proposed project because the same generating technology would be employed. The adverse impact of this alternative on the power system reliability in an event of lower plant availability than expected would be about half of the proposed project, because the full generating capacity of this alternative would be approximately 56 percent of that of the proposed project (16,915 engines verses 30,000 engines).

D.4.7.3 CEQA LEVEL OF SIGNIFICANCE

The CEQA level of significance would be unchanged.

D.4.8 NO PROJECT/NO ACTION ALTERNATIVE

D.4.8.1 NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on SES Solar Two project application and on CDCA land use plan amendment

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

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no ground disturbance. As a result, the power generation benefits of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates. However, if the current Stirling engine technology as proposed for SES Solar Two is proposed, reliability uncertainties similar to those described above, due to the lack of sufficient information supporting a high availability factor may result.

D.4.8.2 NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on SES Solar Two project and amend the CDCA land use plan to make the area available for future solar development

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

Because the CDCA Plan would be amended, it is possible that the site will be developed with another solar technology. It is expected that the solar technology would be built in accordance with typical industry norms for reliable power generation. However, if the current Stirling engine technology as proposed for SES Solar Two is proposed, reliability uncertainties similar to those described above, due to the lack of sufficient information supporting a high availability factor may result.

D.4.8.3 NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on SES Solar Two project application and amend the CDCA land use plan to make the area unavailable for future solar development

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

Because the CDCA Plan would be amended so no solar projects can be approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no construction of a solar facility. Therefore, no benefits resulting from additional power generation would occur with this alternative. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates. But, if the current Stirling engine technology as proposed for SES Solar Two is proposed, reliability uncertainties similar to those described above, due to the lack of sufficient information supporting a high availability factor may result.

D.4.9 CUMULATIVE IMPACT ANALYSIS

Geographic Extent

Any reliability impacts caused by the project would act upon the SDG&E power system.

Existing Cumulative Conditions

The SDG&E system is projected to serve a peak load, in the year 2013 (when the Solar Two project is expected to be on-line) of nearly 5,000 MW (CEC 2007). SDG&E currently acquires power from numerous sources, chiefly fossil fuel-fired and nuclear.

Future Foreseeable Projects

The power to serve the SDG&E system demand would be acquired from numerous sources, some of which would be solar power plants. The Solar Two project would contribute up to 750 MW of the total of 5,000 MW, or 15 percent, on hot summer days. This comprises a substantial portion of the total; insufficient reliability of Solar Two could adversely impact SDG&E’s ability to serve its load.

Overall Conclusion

Were the Solar Two project to prove insufficiently reliable, it would impact the reliability of the SDG&E power system.

D.4.10 COMPLIANCE WITH LORS

No federal, state, or local/county laws, ordinances, regulations, or standards (LORS) apply to the reliability of this project.

D.4.11 NOTEWORTHY PUBLIC BENEFITS

This project, if successful, would help serve the need for renewable energy in California, as all of the electricity generated would be produced by a reliable source of energy that is available during the hot summer afternoons, when power is needed most.

D.4.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

No conditions of certification are proposed.

D.4.13 CONCLUSIONS

The applicant predicts an availability factor of 99 percent. Staff cannot determine whether this is achievable and cannot predict what the actual availability might be, given the demonstration status of this Stirling engine and limited data on large-scaled deployments of Stirling engines. Staff believes it possible that the project may face challenges from considerable maintenance demands, reducing its availability.

D.4.14 REFERENCES

Butler 2007 – Phase I Direct Expert Testimony of Dr. Barry Butler on Behalf of Conservation Groups, Before the Public Utilities Commission of the State of California, Dated 5/31/2007.

CEC 2007 – *California Energy Demand 2008-2018 Staff Revised Forecast*, CEC-200-2007-015-SF2, November 2007; p. 122, Table 22.

Conklin 2009 – Letter to Christopher Meyer, CEC staff, from Diane Conklin, Mussey Grade Road Alliance, January 2, 2009.

Public 2009a – Public Scoping Comments Summary, p. 3-23, Dated February 04, 2009.

SES Solar Two, LLC 2008a – Application for Certification for the Stirling Energy Systems (SES) Solar Two Project, Volumes 1 and 2. Submitted to the California Energy Commission, June 30, 2008.

SES 2009h – Applicant's Responses to BLM and Energy Commission Data Requests 1-3, 5-10, 24-26, 31-33, 36-38, 44, and 111-127, March 19, 2009.

D.5 - TRANSMISSION SYSTEM ENGINEERING

Testimony of Sudath Arachchige and Mark Hesters

D.5.1 SUMMARY OF CONCLUSIONS

The proposed Stirling Energy Systems (SES) Solar Two (phase 1 and 2) Project outlet lines and termination are acceptable and would comply with all applicable laws, ordinances, regulations, and standards. The analysis of project transmission lines and equipment, both from the power plant up to the point of interconnection with the existing transmission network as well as upgrades beyond the interconnection that are attributable to the project have been evaluated by Energy Commission and U.S. Bureau of Land Management (BLM) staff and are included in the environmental sections of this Staff Assessment/Draft Environmental Impact Statement (SA/DEIS).
Staff concludes:

- Mitigation of thermal overloads caused by the Phase 1 under N-1 contingency analysis would require installing a 500/230kV, 1120 megavolt ampere (MVA) transformer bank at the existing Imperial Valley Substation. The transformer installation would occur within the fence line of the existing Imperial Valley Substation and would not trigger California Environmental Quality Act (CEQA) analysis.
- Mitigation of base case thermal overloads caused by Phase 2 would require installing a third 230/69 kV, 224MVA transformer bank at the existing Sycamore Substation. The transformer installation would occur within the fence line of the existing Sycamore substation and would not trigger CEQA analysis.
- The proposed SES Solar Two project should be designed and constructed with adequate reactive power resources to compensate the consumption of Var by the generator step-up transformers, distribution feeders and generator tie-lines.

D.5.2 INTRODUCTION

D.5.2.1 STAFF ANALYSIS

This transmission system engineering (TSE) analysis examines whether this project’s proposed interconnection conforms to all laws, ordinances, regulations, and standards (LORS) required for safe and reliable electric power transmission. Additionally, under CEQA, the Energy Commission must conduct an environmental review of the “whole of the action,” which may include facilities not licensed by the Energy Commission (Title 14, California Code of Regulations Section 15378). The Energy Commission must, therefore, identify the system impacts and necessary new or modified transmission facilities downstream of the proposed interconnection that are required for interconnection and that, when included with the other project features, represent the whole of the action.

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

D.5.2.2 SDG&E'S ROLE

SDG&E is responsible for ensuring electric system reliability in its service territory for proposed transmission modifications. For the proposed SES Solar Two project, SDG&E performed a System Impact Study (SIS) used to determine whether or not the proposed transmission modifications needed for the proposed SES Solar Two project conform to reliability standards. Because the project would be connected to the California ISO controlled transmission grid, the California ISO's role is to review and approve the SIS and its conclusions.

D.5.2.3 CALIFORNIA ISO'S ROLE

The California ISO is responsible for ensuring electric system reliability for all participating transmission owners and for developing the standards to achieve system reliability. The power generated by the proposed SES Solar Two project will be dispatched to the California ISO grid via SDG&E's existing Imperial Valley 500/230-kV Substation. Therefore, the California ISO will review the studies of the SDG&E system to ensure adequacy of the proposed transmission interconnection. The California ISO determines the reliability impacts of proposed transmission modifications on the SDG&E transmission system in accordance with all applicable reliability criteria. According to the California ISO tariffs, the California ISO will determine the need for transmission additions or upgrades downstream from the interconnection point to insure reliability of the transmission grid.

The California ISO reviewed the SIS prepared by SDG&E for the proposed SES Solar Two project and issued a preliminary approval to SDG&E. On completion of the SDG&E Facility Study, the California ISO will review the study results and provide its conclusions and recommendations. The California ISO may provide written and verbal testimony on its findings at the Energy Commission hearings.

D.5.2.4 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The LORS that apply to the transmission facilities associated with the proposed SES Solar Two project are:

- California Public Utilities Commission (CPUC) General Order 95 (GO-95), Rules for Overhead Electric Line Construction, sets forth uniform requirements for the construction of overhead lines. Compliance with this Order ensures adequate service and the safety of the public and the people who build, maintain, and operate overhead electric lines.
- CPUC General Order 128 (GO-128), Rules for Construction of Underground Electric Supply and Communications Systems, sets forth uniform requirements and minimum standards for underground supply systems to ensure adequate service and the safety of the public and the people who build, maintain, and operate underground electric lines.

- The National Electric Safety Code, 1999, provides electrical, mechanical, civil, and structural requirements for overhead electric line construction and operation.
- The combined North American Electric Reliability Corporation/Western Electricity Coordinating Council (NERC/WECC) planning standards provide system performance standards for assessing the reliability of the interconnected transmission system. These standards require continuity of service and the preservation of interconnected operation as the first and second priorities, respectively. Some aspects of NERC/WECC standards are either more stringent or more specific than the either agency's standards alone. These standards are designed to ensure that transmission systems can withstand both forced and maintenance outage system contingencies while operating reliably within equipment and electric system thermal, voltage, and stability limits. These standards include reliability criteria for system adequacy and security, system modeling data requirements, system protection and control, and system restoration. Analysis of the WECC system is based to a large degree on Section I.A of WECC standards, NERC and WECC Planning Standards with Table I and WECC Disturbance-Performance Table, and on Section I.D, NERC and WECC Standards for Voltage Support and Reactive Power. These standards require that power flows and stability simulations verify defined performance levels. Performance levels are defined by specifying allowable variations in thermal loading, voltage and frequency, and loss of load that may occur during various disturbances. Performance levels range from no substantial adverse effects inside and outside a system area during a minor disturbance (such as the loss of load from a single transmission element) to a catastrophic loss level designed to prevent system cascading and the subsequent blackout of islanded areas and millions of consumers during a major transmission disturbance (such as the loss of multiple 500-kV lines along a common right-of- way, and/or of multiple large generators). While the controlled loss of generation or system separation is permitted under certain specific circumstances, a major uncontrolled loss is not permitted (WECC, 2002).
- NERC's reliability standards for North America's electric transmission system spell out the national policies, standards, principles, and guidelines that ensure the adequacy and security of the nation's transmission system. These reliability standards provide for system performance levels under both normal and contingency conditions. While these standards are similar to the combined NERC/WECC standards, certain aspects of the combined standards are either more stringent or more specific than the NERC performance standards alone. NERC's reliability standards apply to both interconnected system operations and to individual service areas (NERC, 2006).
- California ISO planning standards provide the standards and guidelines that ensure the adequacy, security, and reliability of the state's member grid facilities. These standards incorporate the combined NERC/WECC and NERC standards. These standards are also similar to the NERC/WECC or NERC standards for transmission system contingency performance. However, the California ISO standards provide additional requirements not included in the WECC/NERC or NERC standards. The California ISO standards apply to all participating transmission owners interconnecting to the California ISO-controlled grid. They also apply to non-member

facilities that impact the California ISO grid through their interconnections with adjacent control grids (California ISO, 2002a).

- California ISO/Federal Energy Regulatory Commission (FERC) electricity tariffs contain guidelines for building all transmission additions/upgrades within the California ISO-controlled grid. (California ISO, 2003a).

D.5.3 PROPOSED PROJECT

D.5.3.1 SETTING AND EXISTING CONDITIONS

The applicant proposes to interconnect the proposed 750 megawatt (MW) SES Solar Two project to SDG&E's existing Imperial Valley 500/230 kV Substation which is located southwest of El Centro, California. The proposed project would be developed in two phases, one 300 MW phase (SES Solar Two Phase 1), and one 450 MW phase (SES Solar Two Phase 2), with planned operational dates of summer of 2010, and spring 2011 respectively, for a total 750MW facility.

The proposed SES Solar Two project is a solar concentrating thermal power plant, based on the proprietary SunCatcher technology of Stirling Energy System, Inc. Each SunCatcher consists of a 25-kilowatt (kW) solar power generating system. The system is designed to track the sun automatically and to focus solar energy onto a power conversion unit (PCU), which generates electricity. Each SunCatcher consists of a 38-foot high by 40-foot wide solar concentrator in a dish structure that supports an array of curved glass mirror facets. These mirrors collect and concentrate solar energy onto the solar receiver of the PCU. Both phases of the project will consist of a total of approximately 30,000 SunCatchers. Each SunCatcher will produce 575 volts alternating current. The project will be electrically designed to 575V, 1.5 MW, three phase, 60Hz solar groups. Each complete solar group will consist of 60 SunCatchers, which correlates to a 1.5 MW power block with a corresponding GSU transformer. The 1750 KVA GSU transformer will step up the 575 volt (V) collector feeder voltage to 34.5 kV. The 1.5 MW solar groups will be connected by underground electrical cables to create the 3, 6 and 9 MW solar groups. Five 9 MW groups and one 3 MW group will be coupled through underground 4/0 aluminum electrical cables and ascend through a pole riser to create an overhead 48MW distribution collector line. Five 9 MW groups and one 6 MW group will be coupled through underground 4/0 aluminum electrical cables and ascend through a pole riser to create an overhead 51MW distribution collector line. The overhead collector groups will deliver the solar electric generated power to a new 750MW substation constructed on the site as part of the project. (SES Solar Two, 2007c, Section 3.4, pages 3-6 to 3-17 and Figure 3-11 to 3-18)

D.5.3.2 SWITCHYARD AND INTERCONNECTION FACILITIES

The applicant will build a 34.5 kV to 230 kV 750 MW substation on the project site. The substation will consist of five segments of 34.5 kV open air bus with each bus segment consist of five 1200A **,** 35 kV collection feeder circuit breakers. The 48 MW or 51 MW overhead collection lines will be connected to the five 34.5 kV bus segments via circuit breakers. Additional 35 kV circuit breakers will connect to power factor correction capacitor banks in the substation yard. For Phase 1 of the project, the first interconnection substation will initially consist of two power transformers rated at 120/160/200 MVA each to convert the generation collection voltage from 34.5 kV to the transmission tie voltage of 230kV. The substation will also contain five 120/160/200 MVA, 34.5 kV to 230kV step up transformers. Each power transformer will serve 3 of the 15 overhead collection lines. The high side of each step up transformer will be connected to the 230kV bus segments via 2000A, 230kV circuit breakers. One common bus for each phase will be formed by connecting the 230 kV bus segments through 2000A disconnect switches.

An approximately, 10.3 mile long 230kV double circuit will be used to interconnect the 750 MW SES Solar Two substation to the Imperial Valley Substation. The double circuit of the overhead 230kV transmission line will be constructed with one 1590 kcmil per phase, aluminum conductor steel-reinforced (ACSR) conductor per line; each thermally rated to carry full project output in emergency conditions. Each circuit of the overhead line begins at a dead-end structure in the SES Solar Two substation, continues south and east across the project site, and moves southeast adjacent to the SDG&E 500kV Southwest power link transmission line to the Imperial Valley Substation. The transmission lines will start within the project site boundary but a 7.56 mile long segment from the project site to the Imperial Valley Substation will be outside the project site boundary. Construction of that line will include dead-end structures in the substation and 85 to 100 230 kV lattice steel towers and/ or tubular steel poles and new 1590 kcmil ACSR conductors for each phase of the circuit.

Additionally, the Imperial Valley Substation should be modified to include 230kV bay position to terminate the new 230 kV double circuit. This work includes installation of one or more 230kV breakers and associated switches, metering equipments, protection system and may also include reconfiguration of existing facilities. (SES Solar Two, 2007c, Section 3.6 pages 3.25 to 3.30, and Figures 3-5, 3-6, and 3-7)

D.5.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

For the interconnection of this proposed project to the grid, the interconnecting utility (SDG&E) and the control area operator (California ISO) are responsible for ensuring grid reliability. These two entities will assess the potential impacts of the proposed SES Solar Two project on the transmission system and any mitigation measures needed to ensure system conformance with the applicable utility reliability criteria, NERC planning standards, WECC reliability criteria, and California ISO reliability criteria. System impact and facilities studies are used to determine the impacts of the proposed SES Solar Two project on the transmission grid. Staff relies on these studies and any review conducted by the California ISO to determine the potential effects of the proposed SES Solar Two project on the transmission grid and to identify any necessary downstream facilities or indirect project impacts required to bring the transmission network into compliance with applicable reliability standards. System impact and facilities studies analyze the grid with and without the proposed SES Solar Two project, under conditions specified in the planning standards and reliability criteria. The standards and criteria define the assumptions used in the study and establish the thresholds through which grid reliability is determined. The studies analyze the potential impact of the proposed SES Solar Two project for the anticipated first year of operation, and are based on a forecast of loads, generation, and transmission. Load forecasts are developed by the interconnected utility. Generation and transmission forecasts are established by an interconnection queue. The studies focus on thermal overloads, voltage deviations, system stability (excessive oscillations in generators and transmission system, voltage collapse, loss of loads, or cascading outages), and short circuit current. If the studies show that the interconnection of the project causes the grid to be out of compliance with the reliability standards, then the study will identify mitigation measures or ways in which the grid could be brought into compliance with the reliability standards.

When a project connects to the California ISO-controlled grid, both the studies and mitigation measures must be reviewed and approved by the California ISO. If either the California ISO or interconnecting utility determines that the only feasible mitigation includes transmission modifications or additions requiring CEQA review, the Energy Commission must analyze those modifications or additions according to CEQA requirements.

D.5.4.3 SCOPE OF SYSTEM IMPACT STUDIES

The System Impact Studies (SIS) were performed by SDG&E at the request of Stirling Energy Systems, Inc, to identify the potential impacts of the proposed SES Solar Two project on SDG&E’s 69/115/230kV transmission system. The SIS included power flow, sensitivity, and short circuit studies, and transient and post-transient analyses (SES Solar Two, Phase 1-2006a, Phase 2-2008b SIS). The SIS modeled the proposed project for a net output of 300 MW for Phase 1 and Phase 2 for 450 MW. The base cases included all California ISO approved major SDG&E transmission projects, the transmission system for the Imperial Valley Irrigation District, **Comisión Federal de Electricidad (**CFE), and major path flow limits of Southern California Import Transmission, East-Of-River, West-of-River and 500kV Southwest Power link and 230kV phase shifting transformer at Imperial Valley at the interconnection between SDG&E and IID. The SIS considered light load conditions with generation patterns and Path 44 imports maximized to identify the extent of potential congestion and fully stress the SDG&E system in the area where the project phases of the proposed SES Solar Two project would be interconnecting. The study assumptions are described in further detail in the SIS. The power flow studies were conducted with and without SES Solar Two (Phase 1) connected to SDG&E’s grid at the existing Imperial Valley Substation, using 2009 heavy summer and 2008/2009 light spring base cases. Additional power flow studies were conducted with and without SES Solar Two (Phase 2) connected to SDG&E’s grid at the existing Imperil Valley Substation, using 2011 heavy summer and 2011/2012 light winter base cases. The power flow study assessed the potential impacts of the proposed SES Solar Two project on thermal loading of the transmission lines and equipment. Transient and post-transient studies were conducted for Phases 1 and 2 of the proposed SES Solar Two project using the 2009 and 2011 heavy summer base case to determine whether the project would create instability in the system following certain selected outages. Short circuit studies were conducted to determine if Phases 1 and 2 of the proposed SES Solar Two project would overstress existing substation facilities.

Power Flow Study Results and Mitigation Measures (Phase 1 and 2)

Phase 1 (300 MW) Study Results

The power flow analysis determined there would be no N-0 thermal or voltage violations of the SDG&E and adjacent systems as a result of Phase 1 of the proposed SES Solar Two project. However, the study identified the following N-1 thermal constraints which would occur as a result of Phase 1 of the project.

Overload: The Imperial Valley Substation 500/230kV transformer bank 80 was overloaded under the 2009 heavy summer N-1 contingency analysis.

> Mitigation: The recommended mitigation for this project effect is to install an additional 1120/1194 MVA, 500/230kV transformer bank at Imperial Valley Substation.

Overload: Miguel 500/230kV transformer banks 80 and 81 were overloaded under the 2009 heavy summer N-1 contingency analysis as a result of Phase 1 of the proposed SES Solar Two project.

> Mitigation: Install Special Protection System (SPS) to prevent overloading of the Miguel 500/230kV transformer banks. This upgrade is required to relieve post-contingency overloads on the existing Miguel 500/230kV transformer banks. This includes installation of protection and control equipment at the Miguel, Imperial Valley and SES Solar Two substations, and establishment of redundant communication paths between all three substations.

Phase 2 (450 MW) Study Results

Overload: Sycamore Canyon 230/69 kV transformer banks 70 and 71 were overloaded above continuous ratings for N-0, heavy summer 2011 contingency analysis as a result of the Phase 2 of the proposed SES Solar Two project. However, if a higher queue generation project does not occur, these transformers might not overload.

> Mitigation: Recommended mitigation is to install a third 230/69kV, 224 MVA transformer bank at the Sycamore Substation.

Overload: The Sycamore-Chicarita 138kV transmission line was overloaded above continuous ratings for N-1, heavy summer 2011 contingency analysis as a result of Phase 2 of the proposed SES Solar Two project. This line might not be overload if a generation project ahead of SES Solar Two (phase 2) does not occur.

> Mitigation: Reconductoring the Sycamore Canyon-Chicarita 138 kV transmission line to a continuous rating of 250MVA from bus to bus. Alternatively, operating procedures may include curtailing the output of the project during planned or extended forced outages in order to operate reliably.

Overload: At the Imperial Valley Substation, 500/230kV transformer bank 81 was overloaded under the 2011/2012 light winter N-1 contingency analysis as a result of Phase 2 of the proposed SES Solar Two project.

Mitigation: The recommended mitigation is to install an additional 1120/1194 MVA, 500/230kV transformer bank at Imperial Valley Substation

Transient Study Results

The Transient Study was conducted for the critical single and double contingencies affecting the area on page 19 and Appendix J in the SES Solar Two (Phases 1 and 2) SIS. The three-phase faults with normal clearing are studied for single contingencies; single-line-to-ground faults with delayed clearing are studied for double contingencies. All outage cases were evaluated with the assumption that existing Special Protection Schemes (SPS) or Remedial Action Schemes (RAS) would operate as designed where required. The Transient Studies concluded that the WECC transmission system remained stable for all contingency simulations and no criteria violations were found as a result of Phases 1 and 2 of the proposed SES Solar Two project.

Post-Transient Study Results

The NERC/WECC planning standards require that the system maintain post-transient voltage stability when either critical path transfers or area loads increase by 5% for Category B contingencies, and 2.5% for Category C contingencies. Post-transient studies conducted for similar or larger generators in the area concluded that voltage remains stable under both N-1 and N-2 contingencies. All outage cases were evaluated with the assumption that existing SPS or RAS would operate as designed where required. The studies determined that the system remained stable under both single and double contingency outage conditions and the addition of Phases 1 and 2 of the proposed SES Solar Two project for the primary point of interconnection.

Short-Circuit Duty Study Results

Short circuit studies were performed to determine the degree to which the addition of the power generated by the SES Solar Two project increases fault duties at SDG&E substations, and other 69kV, 115 kV, 230 kV, and 230 kV busses in the study area. The busses at which faults were simulated, the maximum three-phase and single-line-to-ground fault currents at these busses both with and without the project, and information on the breaker duties at each location are summarized in the Short Circuit Study results tables in the SIS (SES Solar Two, Phase 1 – Table 9.1 and Phase 2 - Appendix G,SIS). The results of the three-phase-to-ground and single-phase-to-ground short-circuit duty studies identified that there are no overstressed breakers as a result of Phases 1 and 2 of the proposed SES Solar Two project.

Reactive Power Deficiency Analysis Results

A case in each study period was analyzed for post-transient reactive power sufficiency using the Voltage Analysis Tool (VSAT). VSAT performs post-transient governor power flow analysis, and recognizes the WECC base load flag. The cases analyzed in VSAT are summarized Table 13.1 in the SIS for Phases 1 and 2. The power flow cases reached convergence for all contingencies, thereby meeting the reactive power criteria. The proposed SES Solar Two would be the net consumer of reactive power at its full 750 MW output level. It is recommended that the SES Solar Two project include sufficient reactive power resources to compensate for the VAR consumption of the generator step-up transformers and generator tie line.

Compliance with LORS

The findings of the studies conducted for the proposed SES Solar Two project and summarized above indicate that Phases 1 and 2 of the project would comply with the NERC/WECC planning standards and California ISO reliability criteria. The project will be designed and constructed to include the 230 kV substation on the project site and a new 10.3 mile long, 230kV double circuit transmission facility from the project site to the Imperial Valley Substation. Staff concludes that, assuming the proposed conditions of certification are met, the project would meet the requirements and standards of all applicable LORS for TSE.

D.5.5 ALTERNATIVE 1 (300 MW ALTERNATIVE)

The 300 MW Alternative would essentially be Phase 1 of the proposed 750 MW project. It would include only the 300 MW phase and would not include any future phases of 450 MW or any other phases to provide a total of 750 MW. This alternative is shown in Alternatives Figure 1.

D.5.5.1 Setting and Existing Conditions

Like the proposed project, this alternative would include numerous groups of 60 SunCatchers, connected by underground electrical cables. When aggregated at the project substation, the power generated would interconnect to SDG&E's existing Imperial Valley 500/230 kV substation which is located southwest of El Centro, California. There would be fewer SunCatcher groups in this alternative, but the system of aggregation and method of power transmission would be the same as for the proposed project.

D.5.5.2 Assessment of Impacts and Discussion of Mitigation

This alternative would require fewer SunCatcher groups to generate 300 MW (phase one) of the project. Therefore, it would require fewer distribution and substation facilities to be built within the project site. Additionally, this alternative would not cause any reconductoring of the SDG&E transmission system.

D.5.5.3 CEQA Level of Significance

This alternative would require fewer distribution and transmission facilities to be built in the project site. Therefore, installation of fewer transformers, fewer collector distribution feeders and other electrical components would contribute lesser environmental impacts and trigger lesser CEQA analysis.

D.5.6 DRAINAGE AVOIDANCE #1 ALTERNATIVE

The first of two alternatives developed to reduce impacts to the waters of the U.S. would prohibit permanent impacts within the 10 primary drainages within the proposed project boundaries. This alternative is illustrated in **Alternatives Figure 1B**. This alternative would have the same outer project boundaries as the proposed project, but it would include prohibition of installing permanent structures within drainages, thereby reducing the available acreage for development from 6,500 acres to 4,690 acres, and reducing the number of SunCatchers from 30,000 under the proposed project to 25,290.

D.5.6.1 Setting and Existing Conditions

Like the proposed project, this alternative would include numerous groups of 60 SunCatchers, connected by underground electrical cables. When aggregated at the project substation, the power generated would interconnect to SDG&E's existing Imperial Valley 500/230 kV substation which is located southwest of El Centro, California. There would be fewer SunCatcher groups in this alternative, but the system of aggregation and the method of power transmission would be the same as for the proposed project.

D.5.6.2 Assessment of Impacts and Discussion of Mitigation

The System Impact Studies completed for the proposed project would also apply generally to this smaller alternative. However, the smaller generation capacity of this alternative may reduce the amount of distribution and substation facilities, thereby reducing the environmental impacts caused by the proposed project in Section D.5.1, Summary of Conclusions.

D.5.6.3 CEQA Level of Significance

Like the proposed project, the transmission system required for the Drainage Avoidance #1 alternative requires new components. While System Impact Studies have not been completed for the smaller generation capacity of this alternative, it is likely that this alternative would require fewer distribution and transmission facilities to be built in the project site. Therefore, installation of fewer transformers, fewer collector distribution feeders and other electrical components would contribute lesser environmental impacts and would trigger lesser CEQA analysis.

D.5.7 DRAINAGE AVOIDANCE #2 ALTERNATIVE

The Drainage Avoidance #2 alternative would eliminate both the eastern and westernmost portions of the proposed project, where the largest drainage complexes are located. This alternative is shown in **Alternatives Figure 1C**. It would reduce the overall size of the project site by 3,347 acres (from 6,500 acres to 3,153 acres) It would also reduce the number of SunCatchers from 30,000 under the proposed project to 16,915. In this alternative, permanent structures would be allowed within all drainages inside the revised project boundaries.

D.5.7.1 Setting and Existing Conditions

Like the proposed project, this alternative would include numerous groups of 60 SunCatchers, connected by underground electrical cables. When aggregated at the project substation, the power generated would interconnect to SDG&E's existing Imperial Valley 500/230 kV substation which is located southwest of El Centro, California. There would be fewer SunCatcher groups in this alternative, but the system of aggregation and the method of power transmission would be the same as for the proposed project.

D.5.7.2 Assessment of Impacts and Discussion of Mitigation

The System Impact Studies completed for the proposed project would also apply generally to this smaller alternative. However, the smaller generation capacity of this alternative may reduce the amount of distribution and substation facilities, thereby reducing the environmental impacts caused by the proposed project in Section D.5.1, Summary of Conclusions.

D.5.7.3 CEQA Level of Significance

Like the proposed project, the transmission system required for the Drainage Avoidance #2 alternative requires new components. While System Impact Studies have not been completed for the smaller generation capacity of this alternative, it is likely that this alternative would require fewer distribution and transmission facilities to be built in the project site. Therefore, installation of fewer transformers, fewer collector distribution feeders and fewer other electrical components would contribute lesser environmental impacts and would trigger lesser CEQA analysis.

D.5.6 NO PROJECT / NO ACTION ALTERNATIVE

There are three No Project/No Action Alternatives evaluated in this section, as follows:

NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on SES Solar Two project application and on CDCA land use plan amendment

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

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no ground disturbance. Because the project would not be built the proposed interconnection would not be required and no impacts to safe and reliable electric power transmission would occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on SES Solar Two project and amend the CDCA land use plan to make the area available for future solar development

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

Because the CDCA Plan would be amended, it is possible that the site will be developed with another solar technology. The different solar technology would require a transmission line and laws, ordinances, regulations, and standards required for safe and reliable electric power transmission would be similar to those under the proposed project.

D.5.7 CUMULATIVE IMPACT ANALYSIS

Staff has reviewed the lists of existing and foreseeable projects as presented in the Cumulative Scenario section of this SA/DEIS. Staff's review considers whether the interconnection of SES Solar Two to SDG&E's transmission system along with other existing and foreseeable generation projects would conform to all LORS required for safe and reliable electric power transmission. The analysis described above under the heading Proposed Project – Scope of System Impact Studies is conducted in coordination with, and the approval of, California ISO to consider existing and proposed generator interconnections to the transmission grid and their potential safety and reliability impacts under a number of conservative contingency conditions.

The cumulative marginal impacts to the safe and reliable operation of the transmission system due to the SES Solar Two project, as identified in the SIS, would be mitigated with the Energy Commission's and BLM's incorporation of the mitigation measures and CoC's set forth in this section. Staff also believes that there would be some positive impacts because the SES Solar Two project would supplement local solar generation and import of power to the SDG&E system, meet the increasing load demand in the San Diego County, Imperial Valley and provide additional reactive power and voltage support in the local network, and may reduce system losses in the SDG&E system.

D.5.8 PROPOSED CONDITIONS OF CERTIFICATION

The following conditions of certification/mitigation measures are incorporated in the proposed SES Solar Two project to address potential project impacts related to the transmission system.

TSE-1 The project owner shall furnish to the Compliance Project Manager (CPM) and to the Chief Building Official (CBO) a schedule of transmission facility design submittals, a Master Drawing List, a Master Specifications List, and a Major Equipment and Structure List. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment. To facilitate audits by

Energy Commission staff, the project owner shall provide designated packages to the CPM when requested

Verification: At least 60 days prior to the start of construction (or a lesser number of days mutually agreed to by the project owner and the CBO), the project owner shall submit the schedule, a Master Drawing List, and a Master Specifications List to the CBO and to the CPM. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment (see a list of major equipment in Table 1: Major Equipment List below). Additions and deletions shall be made to the table only with CPM and CBO approval. The project owner shall provide schedule updates in the Monthly Compliance Report.

TRANSMISSION SYSTEM ENGINEERING Table 1
Major Equipment List

Breakers
Step-Up Transformer
Switchyard
Busses
Surge Arrestors
Disconnects
Take Off Facilities
Electrical Control Building
Switchyard Control Building
Transmission Pole/Tower
Grounding System

TSE-2 Prior to the start of construction, the project owner shall assign an electrical engineer and at least one of each of the following to the project: A) a civil engineer; B) a geotechnical engineer or a civil engineer experienced and knowledgeable in the practice of soils engineering; C) a design engineer who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; or D) a mechanical engineer. (Business and Professions Code Sections 6704 et seq. require state registration to practice as a civil engineer or structural engineer in California).

The tasks performed by the civil, mechanical, electrical, or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (e.g., proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California-registered electrical engineer. The civil, geotechnical or civil, and design engineer assigned in conformance with Facility Design condition GEN-5, may be responsible for design and review of the TSE facilities.

The project owner shall submit to the CBO for review and approval, the names, qualifications, and registration numbers of all engineers assigned to the project. If any one of the designated engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer. This engineer shall be authorized to halt earthwork and to require changes if site conditions are unsafe or do not conform with predicted conditions used as a basis for design of earthwork or foundations.

The electrical engineer shall:

1. Be responsible for the electrical design of the power plant switchyard, outlet and termination facilities; and
2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: At least 30 days prior to the start of rough grading (or a lesser number of days mutually agreed to by the project owner and the CBO), the project owner shall submit to the CBO for review and approval, the names, qualifications, and registration numbers of all the responsible engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner shall have five days in which to submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of that approval.

TSE-3 If any discrepancy in design and/or construction is discovered in any engineering work that has previously undergone CBO design review and approval, the project owner shall document the discrepancy and recommend corrective action (California Building Code, 1998, Chapter 1, Section 108.4, Approval Required; Chapter 17, Section 1701.3, Duties and Responsibilities of the Special Inspector; Appendix Chapter 33, Section 3317.7, Notification of Noncompliance). The discrepancy documentation shall become a controlled document and shall be submitted to the CBO for review and approval and shall reference this condition of certification.

Verification: The project owner shall submit a copy of the CBO's approval or disapproval of any corrective action taken to resolve a discrepancy to the CPM within 15 days of receipt. If disapproved, the project owner shall advise the CPM, within five days, the reason for disapproval, and the revised corrective action required obtaining the CBO's approval**.**

TSE-4 For the power plant switchyard, outlet line, and termination, the project owner shall not begin any increment of construction until plans for that increment have been approved by the CBO. These plans, together with design changes and design change notices, shall remain on the site for one year after completion of construction. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS. The following activities shall be reported in the Monthly Compliance Report:

1. Receipt or delay of major electrical equipment;
2. Testing or energization of major electrical equipment; and
3. The number of electrical drawings approved, submitted for approval, and still to be submitted**.**

Verification: At least 30 days prior to the start of each increment of construction (or a lesser number of days mutually agreed to by the project owner and the CBO), the project owner shall submit to the CBO for review and approval the final design plans, specifications, and calculations for equipment and systems of the power plant switchyard, outlet line, and termination, including a copy of the signed and stamped statement from the responsible electrical engineer attesting to compliance with the applicable LORS, and shall include a copy of the transmittal letter in the next Monthly Compliance Report**.**

TSE-5 The project owner shall ensure that the design, construction, and operation of the proposed transmission facilities conform to all applicable LORS, including the requirements listed below. The project owner shall submit the required number of copies of the design drawings and calculations as determined by the CBO.

1. The SES Solar Two project shall be interconnected to the SDG&E grid via a segment of 230kV, 1590 kcmil-ACSR, approximately 10.3 mile long double circuit extending from the new substation on the project site to the Imperial Valley Substation.

   The SES Solar Two substation on the project site shall use 34.5kV, 1200A, 25 breakers and five, three phase, 120/160/200 MVA, 34.5kV/230 kV transformers.

2. The power plant outlet line shall meet or exceed the electrical, mechanical, civil, and structural requirements of CPUC General Order 95 and General Order 98 or National Electric Safety Code (NESC), Title 8 of the California Code and Regulations (Title 8), Articles 35, 36, and 37 of the “High Voltage Electric Safety Orders”, California ISO standards, National Electric Code (NEC), and related industry standards.
3. Breakers and busses in the power plant switchyard and other switchyards, where applicable, shall be sized to comply with a short-circuit analysis.
4. Outlet line crossings and line parallels with transmission and distribution facilities shall be coordinated with the transmission line owner and comply with that owner’s standards.
5. The project conductors shall be sized to accommodate the full output from the project.

6. Termination facilities shall comply with applicable SCE interconnection standards.
7. The project owner shall provide to the CPM:
    a. The final Detailed Facility Study (DFS) including a description of facility upgrades, operational mitigation measures, and/or Special Protection System (SPS) sequencing and timing if applicable,
    b. Executed project owner and California ISO Facility Interconnection Agreement.

Verification: At least 60 days prior to the start of construction of transmission facilities (or a lessor number of days mutually agreed to by the project owner and CBO), the project owner shall submit to the CBO for approval:

1. Design drawings, specifications, and calculations conforming with CPUC General Order 95 and General Order 98 or NESC; Title 8, California Code of Regulations, Articles 35, 36, and 37 of the "High Voltage Electric Safety Orders"; NEC; applicable interconnection standards, and related industry standards for the poles/towers, foundations, anchor bolts, conductors, grounding systems, and major switchyard equipment.
2. For each element of the transmission facilities identified above, the submittal package to the CBO shall contain the design criteria, a discussion of the calculation method(s), a sample calculation based on worst-case conditions,[1] and a statement signed and sealed by the registered engineer in responsible charge**,** or other acceptable alternative verification, that the transmission element(s) will conform with CPUC General Order 95 or NESC; Title 8, California Code of Regulations, Articles 35, 36 and 37 of the "High Voltage Electric Safety Orders"; NEC; applicable interconnection standards, and related industry standards.
3. Electrical one-line diagrams signed and sealed by the registered professional electrical engineer in responsible charge, a route map, and an engineering description of equipment and the configurations covered by requirements TSE-5 1) through 5) above.
4. The final Detailed Facility Study, including a description of facility upgrades, operational mitigation measures, and/or SPS sequencing and timing if applicable, shall be provided concurrently to the CPM.

TSE-6 The project owner shall provide the following Notice to the California Independent System Operator (California ISO) prior to synchronizing the facility with the California transmission system:

1. At least one week prior to synchronizing the facility with the grid for testing, provide the California ISO a letter stating the proposed date of synchronization; and

[1] Worst-case conditions for the foundations would include for instance, a dead-end or angle pole.

2. At least one business day prior to synchronizing the facility with the grid for testing, provide telephone notification to the California ISO Outage Coordination Department.

Verification: The project owner shall provide copies of the California ISO letter to the CPM when it is sent to the California ISO one week prior to initial synchronization with the grid. A report of the conversation with the California ISO shall be provided electronically to the CPM one day before synchronizing the facility with the California transmission system for the first time.

TSE-7 The project owner shall be responsible for the inspection of the transmission facilities during and after project construction, and any subsequent CPM and CBO approved changes thereto, to ensure conformance with CPUC GO-95 or NESC; Title 8, CCR, Articles 35, 36 and 37 of the "High Voltage Electric Safety Orders"; applicable interconnection standards; NEC; and related industry standards. In case of non-conformance, the project owner shall inform the CPM and CBO in writing, within 10 days of discovering such non-conformance and describe the corrective actions to be taken.

Verification: Within 60 days after first synchronization of the project, the project owner shall transmit to the CPM and CBO:

1. As-built engineering description(s) and one-line drawings of the electrical portion of the facilities signed and sealed by the registered electrical engineer in responsible charge. A statement attesting to conformance with CPUC GO-95 or NESC; Title 8, California Code of Regulations, Articles 35, 36 and 37 of the "High Voltage Electric Safety Orders"; applicable interconnection standards; NEC; and related industry standards, and these conditions shall be provided concurrently with the submittal of the as-built plans.
2. An as-built engineering description of the mechanical, structural, and civil portions of the transmission facilities signed and sealed by the registered engineer in responsible charge or acceptable alternative verification. As-built drawings of the electrical, mechanical, structural, and civil portions of the transmission facilities shall be maintained at the power plant and made available, if requested, for CPM audit as set forth in the "Compliance Monitoring Plan."
3. A summary of inspections of the completed transmission facilities, and identification of any nonconforming work and corrective actions taken, signed and sealed by the registered engineer in charge.

D.5.9 CONCLUSIONS

The outlet lines and termination of Phases 1 and 2 of the proposed SES Solar Two project are acceptable and would comply with all applicable LORS. The analysis of project transmission lines and equipment, both from the power plant up to the point of interconnection with the existing transmission network as well as upgrades beyond that interconnection that are attributable to the project have been evaluated by staff and are included in the environmental sections of this SA/DEIS.

Staff's analysis with respect to Transmission System Engineering concludes that the SES Solar Two project needs to meet the following mitigation measures:

- Mitigation of thermal overloads caused by Phase 1 of the proposed SES Solar Two project under N-1 contingency analysis would require installing a 500/230kV, 1120MVA transformer bank at existing Imperial Valley Substation.
- Mitigation of base case thermal overloads caused by Phase 2 of the proposed SES Solar Two project, would require installing a third 230/69 kV, 224MVA transformer bank at the existing Sycamore Substation.
- The proposed SES Solar Two project should be designed and constructed with adequate reactive power resources to compensate the consumption of Var by the generator step-up transformers, distribution feeders and generator tie-lines.

RECOMMENDATIONS

If the BLM and Energy Commission approve the proposed SES Solar Two project, staff recommends that the applicant be required to satisfy the conditions of certification/mitigation measures set forth in this section to ensure both system reliability and conformance with LORS.

D.5.10 REFERENCES

California ISO (California Independent System Operator) 1998a – Cal-ISO Tariff Scheduling Protocol. Posted April 1998, Amendments 1,4,5,6, and 7 incorporated.

California ISO (California Independent System Operator) 1998b – Cal-ISO Dispatch Protocol. Posted April 1998.

California ISO (California Independent System Operator) 2002a – Cal-ISO Grid Planning Standards. February 2002.

SES Solar Two phase 1 (SES Solar Two) 2006a – Stirling Energy System, Inc, (System Impact Study) submitted to the California Energy Commission.

SES Solar Two phase 2 (SES Solar Two expansion) 2007b – Stirling Energy System, Inc, (System Impact Study) submitted to the California Energy Commission.

SES Solar Two phase 1 and 2 (SES Solar 2). 2007c – SES Solar Two, LLC, Application for Certification. Submitted to the California Energy Commission.

NERC/WECC (North American Reliability Council/Western Electricity Coordinating Council) 2002 – NERC/WECC Planning Standards. August 2002.

DEFINITION OF TERMS

AAC – All aluminum conductor

ACSR – Aluminum conductor steel-reinforced

ACSS – Aluminum conductor steel-supported

Ampacity – Current-carrying capacity, expressed in amperes, of a conductor at specified ambient conditions, at which damage to the conductor is nonexistent or deemed acceptable based on economic, safety, and reliability considerations.

Ampere – The unit of current flowing in a conductor.

Bundled – Two wires, 18 inches apart.

Bus – Conductors that serve as a common connection for two or more circuits.

Conductor – The part of the transmission line (the wire) that carries the current.

Congestion management – A scheduling protocol, which provides that dispatched generation and transmission loading (imports) will not violate criteria.

Emergency overload – See “Single Contingency.” This is also called an N-1.

Kcmil– Thousand circular mil. A unit of the conductor’s cross sectional area. When divided by 1,273, the area in square inches is obtained

Kilovolt (kV) – A unit of potential difference, or voltage, between two conductors of a circuit, or between a conductor and the ground.

Megavars – Mega-volt-Ampere-Reactive. One million Volt-Ampere-Reactive. Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system.

Megavolt ampere (MVA) – A unit of apparent power. It equals the product of the line voltage in kilovolts, current in amperes, and the square root of 3, divided by 1,000.

Megawatt (MW) – A unit of power equivalent to 1,341 horsepower.

Normal operation/normal overload – The condition arrived at when all customers receive the power they are entitled to, without interruption and at steady voltage, and with no element of the transmission system loaded beyond its continuous rating.

Outlet – Transmission facilities (circuit, transformer, circuit breaker, etc.) linking generation facilities to the main grid.

Power flow analysis – A forward-looking computer simulation of essentially all generation and transmission system facilities that identifies overloaded circuits, transformers, and other equipment and system voltage levels.

Reactive power – Generally associated with the reactive nature of motor loads that must be fed by generation units in the system. An adequate supply of reactive power is required to maintain voltage levels in the system.

Remedial action scheme (RAS) – An automatic control provision, which, for instance, will trip a selected generating unit upon a circuit overload.

Single contingency – Also known as “emergency” or “N-1 condition,” the occurrence when one major transmission element (circuit, transformer, circuit breaker, etc.) or one generator is out of service.

Solid dielectric cable – Copper or aluminum conductors that are insulated by solid polyethylene type insulation and covered by a metallic shield and outer polyethylene jacket.

Switchyard – An integral part of a power plant and used as an outlet for one or more electric generators.

TSE – Transmission system engineering.

Underbuild – A transmission or distribution configuration where a transmission or distribution circuit is attached to a transmission tower or pole below (under) the principle transmission line conductors.

Undercrossing – A transmission configuration where a transmission line crosses below the conductors of another transmission line, generally at 90 degrees.