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The California Occupational Safety and Health Administration (Cal/OSHA) has promulgated Occupational Noise Exposure Regulations (Cal. Code Regs., tit. 8, §§ 5095–5099) that set employee noise exposure limits. These standards are equivalent to the federal OSHA standards (see the **Worker Safety and Fire Protection** section of this document, and **Noise Appendix A, Table A4**).

LOCAL

San Bernardino County General Plan Noise Element

The San Bernardino County General Plan Noise Element establishes noise performance standards for stationary sources. These limits are those specified in the San Bernardino County Development Code (below).

San Bernardino County Development Code

Chapter 83.01 of the San Bernardino County Development Code sets noise performance standards for noise from stationary noise sources measured at the boundaries of noise-sensitive land uses. These limits are reproduced here as **Noise Table 3**. The Code stipulates an allowance to these limits if the measured ambient noise level exceeds any of the four noise limit categories, such that "the allowable noise exposure standard shall be increased to reflect the ambient noise level" (COSB 2007b, § 83.01.080[e]).

Noise Table 3
Noise Standards for Stationary Noise Sources

Noise Level (dBA L_{eq})		
Receiving Land Use Category	**7:00 a.m. to 10:00 p.m.**	**10:00 p.m. to 7:00 a.m.**
Residential	55	45
Professional Services	55	55
Other Commercial	60	60
Industrial	70	70

Source: COSB 2007b, Ch. 83.01, Table 83-2

Construction noise is exempt from these limits between the hours of 7:00 a.m. and 7:00 p.m. except Sundays and federal holidays (COSB 2007b, § 83.01.080[g][3]).

Vibration is limited to that which cannot be felt without the aid of instruments at or beyond the lot line, and that which does not produce a particle velocity greater than or equal to 0.2 inches per second at the lot line (COSB 2007b, § 83.01.090[a]). Construction vibration is exempt from this limit between the hours of 7:00 a.m. and 7:00 p.m. except Sundays and federal holidays (COSB 2007b, § 83.01.090[c][2]).

Note that, since the project will be built on federally owned land, these San Bernardino County LORS do not apply. They are listed here solely as guidelines.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The analysis of proposed project effects must comply with both CEQA and NEPA requirements given the respective power plant licensing and land jurisdictions of the

California Energy Commission and U.S. Bureau of Land Management (BLM). CEQA requires that the significance of individual effects be determined by the Lead Agency; however, the use of specific significance criteria is not required by NEPA.

Because this document is intended to meet the requirements of both NEPA and CEQA, the methodology used for determining environmental impacts of the proposed project includes a consideration of guidance provided by both laws.

CEQA identifies criteria that may be used to determine the significance of identified impacts. A significant impact is defined by CEQA as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project" (State CEQA Guidelines Section 15382).

In comparison, NEPA states that "'Significantly' as used in NEPA requires considerations of both context and intensity…" (40 CFR 1508.27). Therefore, thresholds serve as a benchmark for determining if a project action will result in a significant adverse environmental impact when evaluated against the baseline. NEPA requires that an Environmental Impact Statement (EIS) is prepared when the proposed federal action (project) as a whole has the potential to "significantly affect the quality of the human environment."

Thresholds for determining significance in this section are based on Appendix G of the CEQA Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission staff. In addition, staff's evaluation of the environmental effects of the proposed project on land uses (i.e., those listed below) includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27.

Effects of the proposed project on noise and vibration (and in compliance with both CEQA and NEPA) have been determined using the thresholds listed below.

C.9.4 PROPOSED PROJECT

C.9.4.1 SETTING AND EXISTING CONDITIONS

The Calico Solar Project was originally proposed to be constructed on an 8,230-acre site located in San Bernardino County, approximately 37 miles east of the city of Barstow. Due to project redesigns to avoid sensitive environmental resources, the northern project boundary was moved south by several thousand feet and the project was reduced in size to 6,215 acres. The site is on undisturbed public land managed by the BLM (SES 2008a, AFC §§ 3.2, 3.3.1).

The ambient noise regime in the project vicinity consists of train traffic, highway traffic, aircraft traffic, wind and wildlife. The nearest sensitive receptor is a single residence, designated SR1, located approximately 1,200 feet from the project's southwest border. A second sensitive receptor, a residence designated SR2, is located approximately 7,800 feet east of the project boundaries. (SES 2008a, AFC 5.12.1.1, Figure 5.12-1).

Ambient Noise Monitoring

In order to establish a baseline for comparison of predicted project noise to existing ambient noise, the applicant has presented the results of an ambient noise survey (SES 2008a, AFC § 5.12.1.4, Appendix CC-3, Tables CC-3-1 through CC-3-3; SES 2009i, DR68, Table DR68-1). The survey was conducted from November 2 to November 7, 2008, and monitored existing noise levels at the following locations, shown on **Noise and Vibration Figure 1**:

1. Measuring Location 3 (LT3): Near the residence located approximately 1,200 feet south-west of the project site, to the south of Route 66 and west of Hector Road, designated SR1. This is the sensitive receptor closest to the project site. Long-term (25 hour) monitoring showed elevated ambient noise levels consistent with the receptor's proximity to the nearby rail lines and highway.
2. Measuring Location 4 (LT4): Near an abandoned corral west of the project site. Long-term monitoring (18 hour) showed ambient noise levels consistent with a rural environment.

Ambient noise measurements were not taken at the second sensitive receptor, a residence located approximately 7,800 feet east of the project site and 5300 feet north of the rail line and Interstate 40, designated SR2 in **Noise and Vibration Figure 1**. On the basis of comparable noise conditions such as noise source proximity and exposure, ambient noise at this receptor is likely similar to that at measuring location LT4 (SES 2009i, DR 68). Energy Commission staff has chosen to analyze project noise impacts at SR2 using the ambient noise data from LT4 as a proxy measurement.

Noise Table 4 summarizes the ambient noise measurements:

Noise Table 4
Summary of Measured Ambient Noise Levels

Measurement Location	Measured Noise Levels, dBA		
	L_{eq} – Daytime[1]	L_{eq} – Nighttime[2]	L_{90} – Nighttime[3]
LT3/SR1	65	63	47
LT4/SR2	41	38	35

Source: SES 2008a AFC Appendix CC-3, Tables CC-3-1 through CC-3-3; SES 2009i table DR68-1
1 - Staff calculations of average of 10 daytime hours
2 - Staff calculations of average of 8 nighttime hours
3 - Staff calculations of average of 4 consecutive quietest hours of the nighttime

C.9.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

DIRECT IMPACTS AND MITIGATION

Noise impacts associated with the project can be created by short-term construction activities and by normal long-term operation of the power plant.

Construction Impacts and Mitigation

Construction noise is usually considered a temporary phenomenon. Construction of Calico Solar is expected to occur in two phases over a period of approximately 41

months. However, the 41 months of active construction may not be contiguous. Phase I would be constructed first, on the eastern half of the project site; Phase II would subsequently be constructed on the western half of the project site (SES 2008a, AFC § 5.12.2.1).

Compliance with LORS

Construction of an industrial facility such as a power plant is typically noisier than permissible under usual noise ordinances. In order to allow the construction of new facilities, construction noise during certain hours of the day is commonly exempt from enforcement by local ordinances.

The applicant has predicted the noise impacts of project construction on the nearest sensitive receptors (SES 2008a, AFC § 5.12.2.1, Tables 5.12-4 and 5.12-5). Assembly and installation of solar collectors (Sun Catchers) for the project is expected to be performed in blocks around the site with additional, more substantial structural construction taking place at the Main Services Complex centrally located on the site. The applicant has estimated that the noise resulting from construction of the collector block closest to the receptor south of the project border, SR1, would be no more than 74 dBA at the receptor. Similarly, noise resulting from the construction of the collector blocks closest to location SR2 would be no more than 60 dBA. A maximum construction noise level for all other project construction (such as roads and buildings) is estimated to be no more than 55 dBA L_{eq} at SR1, and 58 dBA L_{eq} at SR2. Overall construction noise would, therefore, be no more than 74 dBA at location SR1 and 62 dBA at location SR2 (SES 2008a, AFC § 5.12.2.1, Tables 5.12-4 and 5.12-5; and staff calculations). A comparison of construction noise estimates to measured ambient conditions is summarized in **Noise Table 5**.

Noise Table 5
Predicted Power Plant Construction Noise Impacts

Receptor	Highest Construction Noise Level[1] (dBA L_{eq})	Measured Existing Ambient[2] (dBA L_{eq})	Cumulative (dBA L_{eq})	Change (dBA)
SR1 – South Residence	74	65 daytime	75 daytime	+10 daytime
		63 nighttime	74 nighttime	+11 nighttime
SR2 – East Residence	62	41 daytime	62 daytime	+21 daytime
		38 nighttime	62 nighttime	+24 nighttime

1 - Source: SES 2008a, AFC § 5.12.2.1, Tables 5.12-4 and 5.12-5; and staff calculations
2 - Source: SES 2008a, AFC Appendix CC-3, Tables CC-3-1 through CC-3-3; and staff calculations of average of daytime and nighttime hours.

The San Bernardino County Development Code limits noise levels at residential receptors to no more than 55 dBA L_{eq}. The Code exempts construction noise from these limits during the daytime hours of 7:00 a.m. to 7:00 p.m. except Sundays and federal

holidays. To ensure that these hours are, in fact, enforced, staff proposes Condition of Certification **NOISE-6**.

Compliance with **NOISE-6** would insure that the noise impacts of Calico Solar Project construction activities would comply with the local noise LORS.

CEQA Impacts

Power Plant Site

To evaluate construction noise impacts, staff compares the projected noise levels to the ambient. Since construction noise typically varies continually with time, it is most appropriately measured by, and compared to, the L_{eq} (energy average) metric.

The applicant estimates that construction of the Calico Solar Project would take place in two phases over a period of approximately 60 months, which is significantly longer than the 12- to 16-month construction period of a traditional power plant. However, the construction of the Calico Solar Project would be conducted modularly, each module taking approximately 4 months to construct. Thus, maximum construction noise would occur during the construction of the module closest to the receptor for a duration of 4 months and would decrease as construction activity moved on to the next module, further from the receptor. Construction for the Calico Solar Project would therefore still constitute a temporary noise impact.

Aggregate construction noise may be expected to reach levels as high as 62 dBA L_{eq} at the sensitive receptor east of the project, SR2, for a period of approximately 4 months; an increase of 21 dBA during daytime hours (see **Noise Table 5**, above). Such an increase represents a quadrupling of noise level at the receptor and would generally be considered a significant impact. The projected construction noise levels, however, are most likely conservative, calculated from manufacturers' estimated data and engine power sound generation formulae; actual noise levels may be less than predicted. Since noisy construction work will be restricted to daytime hours, staff believes it will be noticeable, but tolerable, at the nearest residences.

The increase of construction noise over nighttime ambient noise levels at SR2 would be approximately 24 dBA. Such an increase represents more than a quadrupling in noise level, and at night, when people are sleeping, would clearly prove annoying. However, the schedule constraints on construction presented by the San Bernardino County Development Code and Condition of Certification **NOISE-6** further enforcing these constraints, would result in less than significant adverse impacts at the most noise-sensitive receptors.

In the event that actual construction noise should annoy nearby residents, staff proposes Conditions of Certification **NOISE-1** and **NOISE-2**, which would establish a Notification Process to make nearby residents aware of the project, and a Noise Complaint Process that requires the applicant to resolve any problems caused by noise from the project.

Linear Facilities

Linear facilities include new electrical transmission lines interconnecting a proposed new onsite substation to the transmission system on the project's eastern boundary. The transmission lines would extend past the project site boundaries only minimally and would not pass any sensitive receptors (SES 2008a, AFC Figure 5.12-1). While construction noise levels for linears would be noticeable, construction on linears proceeds rapidly, so no particular area is exposed to noise for more than a few days.

Pile Driving

The applicant does not explicitly state that pile driving would be necessary for construction of the Calico Solar Project, however staff has analyzed the potential noise impacts of pile driving in case it is found necessary during the construction process. If pile driving is required for construction of the project, the noise from this operation could be expected to reach 104 dBA at a distance of 50 feet. Pile driving noise would thus be projected to reach levels of 76 dBA at SR1 and 60 dBA at SR2 (staff calculation). Added to the existing daytime ambient levels of 65 and 41 dBA L_{eq} at SR1 and SR2, respectively, this would combine to produce an increase of 11 dBA over ambient noise levels at SR1 and 19 dBA over ambient at SR2 (see **Noise Table 6,** below). While this would produce a noticeable impact, staff believes that limiting pile driving to daytime hours, in conjunction with its temporary nature, would result in impacts tolerable to residents. Staff proposes Condition of Certification **NOISE-6** to ensure that pile driving noise, should it occur, would be limited to daytime hours.

Noise Table 6
Pile Driving Noise Impacts

Receptor	Pile Driving Noise Level (dBA L_{eq})	Daytime Ambient Noise Level (dBA L_{eq})	Cumulative Level (dBA)	Change (dBA)
SR1	76	65	76	+11
SR2	60	41	60	+19

Source: SES 2008a, AFC Appendix CC-3, Tables CC-3-1 through CC-3-3; SES 2009i, DR 68; and staff calculations

Vibration

The only construction operation likely to produce vibration that could be perceived off site would be pile driving, should it be employed. Vibration attenuates rapidly; it is likely that no vibration would be perceptible at any appreciable distance from the project site. Staff therefore believes there would be no significant impacts from construction vibration.

Worker Effects

The applicant has acknowledged the need to protect construction workers from noise hazards and has recognized those applicable LORS that would protect construction workers (SES 2008a, AFC § 5.12.2.1). To ensure that construction workers are, in fact, adequately protected, staff has proposed Condition of Certification **NOISE-3**, below.

Operation Impacts and Mitigation

The primary noise sources of the Calico Solar Project would consist of the reciprocating Stirling Engines (including generator, cooling fan and air compressor) utilized on each of the Sun Catchers that make up the project, as well as step-up transformers and a new substation (SES 2008a, AFC § 3.4.4.1, 5.12.2.2). Staff compares the projected noise with applicable LORS. In addition, staff evaluates any increase in noise levels at sensitive receptors due to the project in order to identify any significant adverse impacts.

Compliance with LORS

The applicant performed noise modeling to determine the project's noise impacts on sensitive receptors (SES 2008a, AFC § 5.12.2.2, Table 5.12-7; Data Response 68, Table DR68-1).

As seen in **Noise Table 7**, the project's operational noise level at the nearest sensitive receptor would be no more than 57 dBA L_{eq}. While this value exceeds the noise level limits specified in the San Bernardino County Development Code (55 dBA L_{eq} for residential receptors), it follows the stipulated allowable increase in noise level given that the measured ambient level at that receptor (65 dBA L_{eq}) is greater than the stated limit, and is thus in compliance. The project's operational noise at the second sensitive receptor is below the specified LORS limit.

Noise Table 7
Plant Operating Noise LORS Compliance

Receptor	LORS	LORS Limit	Projected Noise Level (CNEL)
SR1	San Bernardino County Development Code	65 dBA L_{eq}, Existing Daytime Ambient	57 dBA
SR2		55 dBA L_{eq}, LORS Daytime Requirement	52 dBA

Source: San Bernardino County 2007, and AFC Table 5.12-7.

CEQA Impacts

Power plant noise is unique. Essentially, a power plant operates as a steady, continuous, broadband noise source, unlike the intermittent sounds that comprise the majority of the noise environment. As such, power plant noise contributes to, and becomes part of, the background noise level, or the sound heard when most intermittent noises cease. Where power plant noise is audible, it will tend to define the background noise level. For this reason, staff typically compares the projected power plant noise to the existing ambient background (L_{90}) noise levels at the affected sensitive receptors. If this comparison identifies a significant adverse impact, then feasible mitigation must be incorporated in the project to reduce or remove the impact.

In many cases, a power plant will be intended to operate around the clock for much of the year. As a solar thermal generating facility, the Calico Solar Project would operate only during daytime hours, typically 15 hours per day during the summer (with fewer hours during the fall, winter, and spring), when sufficient solar insolation is available.

Typically, daytime ambient noise consists of both intermittent and constant noises. The noise that stands out during this time is best represented by the average noise level, or L_{eq}. Staff's evaluation of the above noise surveys shows that the daytime noise environment in the Calico Solar Project area consists of both intermittent and constant noises. Thus, staff compares the project's daytime noise levels to the daytime ambient L_{eq} levels at the project's noise-sensitive receptors.

As seen in **Noise Table 8**, power plant noise levels are predicted to be no greater than 57 dBA L_{eq} and 52 dBA L_{eq} at receptors SR1 and SR2, respectively, during daytime operation.

Noise Table 8
Power Plant Noise Impacts at Nearest Sensitive Receptors

Location	Power Plant Noise Level, dBA L_{eq} [1]	Ambient Noise Level, dBA L_{eq} [2]	Cumulative Noise Level, dBA	Change from Ambient Level dBA
SR1	57	65	66	+1
SR2	52	41	52	+11

1 - Source: SES 2008a AFC Table 5.12-7; and staff calculations.
2 - Source: SES 2008a, AFC Appendix CC-3, Tables CC-3-1 through CC-3-3; SES 2009i, DR 68, table DR68-1; and staff calculations of average of fifteen consecutive daytime hours.

When projected plant noise is added to the daytime ambient value (as calculated by staff), the cumulative level is higher than the ambient value at location SR1 by an inaudible amount (see **Noise Table 8**). The cumulative level at location SR2 is considerably higher, more than 10 dBA, than the ambient value and is thus considered a significant impact. No change in ambient noise at any sensitive receptor at night would result from plant operation.

Because project operating noise would only occur during daytime hours, staff considers an increase of 10 dBA or less to be a less than significant impact. In order for the cumulative level to be no more than 10 dBA over ambient at SR2, the project noise alone must not exceed 51 dBA at location SR2. Thus, the applicant's predicted noise level of 52 dBA must be reduced to 51 dBA, at SR2. Staff proposes Condition of Certification **NOISE-4** to ensure that the project does not exceed the noise levels specified above.

Tonal Noises

One possible source of disturbance would be strong tonal noises. Tonal noises are individual sounds (such as pure tones) that, while not louder than permissible levels, stand out in sound quality. To ensure that tonal noises do not cause annoyance, staff proposes Condition of Certification **NOISE-4**, below.

Linear Facilities

Noise effects from the electrical interconnection line typically do not extend beyond the right-of-way easement of the line and would thus be inaudible to any receptors.

Vibration

Vibration from an operating power plant could be transmitted by two chief means; through the ground (groundborne vibration) and through the air (airborne vibration).

The Calico Solar Project would be essentially comprised of a large number of solar dish generators, the operating components of each consisting of a relatively small reciprocating engine, cooling fans and air compressor. All of these pieces of equipment must be carefully balanced in order to operate. Given the distributive layout of the project, Energy Commission staff believes that the ground borne vibration from the Calico Solar Project would be undetectable by any likely receptor.

Airborne vibration (low frequency noise) can rattle windows and objects on shelves and can rattle the walls of lightweight structures. None of the project equipment is likely to produce low frequency noise; this makes it highly unlikely that the Calico Solar Project would cause perceptible airborne vibration effects.

Worker Effects

The applicant has acknowledged the need to protect plant operating and maintenance workers from noise hazards and has committed to comply with applicable LORS (SES 2008a, AFC § 5.12.2.2). To ensure that plant operation and maintenance workers are, in fact, adequately protected, Energy Commission staff has proposed Condition of Certification **NOISE-5**, below.

C.9.4.3 CEQA LEVEL OF SIGNIFICANCE

For the purposes of CEQA compliance, the significance of construction and operating noise impacts of the proposed project at the nearest sensitive receptors has been determined.

Construction Impacts

As discussed in detail in section C10.4.2 above (under the subsection entitled "Construction Impacts and Mitigation"), the noise level increase at the nearest sensitive receptors resulting from construction of the project (presented in **Noise Table 5**) would be noticeable. However, given the temporary nature of construction noise and the fact that noisy construction activity would be restricted to daytime hours (by both the local LORS and Condition of Certification **NOISE-6**), the impacts due to construction noise are considered less than significant.

Operation Impacts

As discussed in detail in section C10.4.2 above (under the subsection entitled "Operation Impacts and Mitigation"), power plant noise levels are predicted to be less than 52 dBA L_{eq} at receptor SR2 and 57 dBA L_{eq} at receptor SR1 during daytime operation. This would result in an increase of 11 dBA over ambient noise at location SR2, which is considered significant. Staff proposes Condition of Certification **Noise-4** to bring project noise impacts down to 51 dBA at SR2, which, given that operation would only occur during daytime hours, is considered less than significant.

C.9.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the boundaries of Phase 2 of the proposed 850 MW project. This alternative and alternative locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

C.9.5.1 SETTING AND EXISTING CONDITIONS

The reduced acreage alternative would consist of approximately one third as many SunCatchers (11,000 machines), producing 32% as much power (275 MW) and occupying 40% as much land as the proposed project. The project boundary for the alternative would be approximately 2,000 feet further away from SR2, the sensitive receptor that would be most impacted by noise from the proposed project.

C.9.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Given the distributive nature of the operational noise produced by the chosen project technology, the 275 MW alternative would most likely correspond to lower operational noise impacts at the noise receptor located east of the project, SR2; a receptor that faces significant, though mitigable, noise impacts from the proposed project. Operational noise impacts at the receptor south of the project would likely be the same as that of the 850 MW project. Certainly, the noise impacts of the 275 MW alternative would not be greater than the noise impacts from the proposed 850 MW project.

C.9.5.3 CEQA LEVEL OF SIGNIFICANCE

The CEQA Level of Significance of the 275 MW alternative would be unchanged from the proposed project.

C.9.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

Due to the reduction in project size and impacts associated with the northern portion of the originally proposed project layout, the Avoidance of Donated and Acquired Lands Alternative shown in **Alternatives Figure 2** will be addressed in the **Alternatives** section of this SSA.

C.9.7 NO PROJECT / NO ACTION ALTERNATIVES

There are three No Project / No Action Alternatives evaluated as follows:

No Project / No Action Alternative #1: No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue

to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

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

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

If the proposed project is not approved, renewable projects would likely be developed on other sites in San Bernardino County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District.

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

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

The noise impacts of the proposed project would not occur under this No Project Alternative. If another solar project were constructed at the site, noise impacts could potentially occur; however, without project specific data (such as the type of technology that would be used), staff cannot determine what those noise impacts might be.

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

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

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. The noise impacts of the proposed project would not occur under this No Project Alternative.

C.9.8 PROJECT-RELATED FUTURE ACTIONS

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the transmissions interconnection (gen-tie) from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE Right of Ways (ROWs).
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.9.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

Noise is the general term given to unwanted sound. Sound is measured in units of decibels (dB), which is a logarithmic measure of sound power. Sound measurements are corrected to provide an approximate measure of normal human hearing. The correction to sound measurement is called the A-weighted decibel (dBA) scale. This scale provides a general correlation to a human's sensing of noise under normal circumstances. Noise control is regulated for two main purposes, the first is to control public nuisance associated with excessive noise in the public environment. The second control is for worker safety associated with chronic noise exposure that may cause permanent damage to an individual's hearing.

The levels of noise in a given environment are dependent on the amount of human activity and the environmental conditions present. The SCE upgrades project area contains a broad range of environmental conditions, ranging from the urban conditions present in Hesperia at the west end of the project area near Lugo Substation, to undeveloped areas, such as the Ordman and Roman mountain areas in the central and eastern sections of the project area. Typical noise levels for these areas may range from 70 dBA in an urban setting to 35 dBA in a rural setting (CSU 2009).

C.9.8.2 ENVIRONMENTAL IMPACTS

Construction of the upgrades and tower removal would require short-term use of heavy-duty equipment such as trenchers, excavators, drill rigs, cranes, and trucks. Although the new ROW has not been finalized, residences would be located nearby to the transmission line ROW near the Hesperia area. In general, construction work within 200 feet of any location would cause noise levels averaging around 65 dBA, with intermittent peaks up to about 88 dBA. This would be a noticeable (more than 5 dBA) temporary increase in the ambient noise levels near the work that would fade into quiet background noise at distances over one-quarter mile. Although construction noise would be required to comply with local ordinances, it may still be disruptive. The 275 MW Early Interconnection upgrades would be located entirely in rural areas (except for work at the southwestern end of the OPGW installation on the Eldorado-Lugo 500 kV transmission line), would have a reduced scope of construction activities, and would occur over a shorter duration than the 850 MW Full Build-Out option.

Project construction activities may last up to 24 months for the 850 MW Full Build-Out option, with activities generally progressing along the length of the transmission and telecomm ROW alignments and around the expanded Pisgah Substation. Noise levels during construction in any given area would increase above background levels. The level of increase would be dependent on the background levels present in the area and the level of activity. Noise levels would vary based on the type of activity occurring and the associated equipment in operation to perform a given task.

Normal operation of the transmission line would include routine inspection of the line and possible repair and maintenance activities. These activities would create short-term increases in noise levels, depending on the level of activity. After installation of the new 500 kV line is complete and the line operational, there may be a change in corona noise levels. Corona noise is a function of the line voltage and the condition of the line. The voltage would be increased, but the condition of the line would be improved, so the net change in corona noise may minor.

In areas of the new ROW, the proposed 500 kV transmission line would cause a permanent noise increase due to the corona effect. The precise location of highest possible corona noise cannot be known until after commencing operation. This is because conductor surface defects, damage, and inconsistencies influence corona. Because the approximately 10 miles of new ROW would be in more developed areas with higher ambient noise, it is likely that the resulting overhead transmission line noise would not violate any local standards or cause a substantial (more than 5 dBA) noise increase for any nearby noise-sensitive receptor.

C.9.8.3 MITIGATION

Implementation of mitigation measures similar to the proposed Conditions of Certification from the Calico Solar Project Staff Assessment/EIS are recommended to minimize potential impacts and adhere to all permit conditions. These conditions would require notification of affected residents of impending construction, establishing a noise complaint resolution process, and limiting noisy construction to daytime hours.

Implementation of mitigation that would require all vehicles and equipment to be equipped with exhaust noise abatement devices, such as sound mufflers, and would require landowner notification are also recommended. To minimize disturbance, mitigation should also be implemented that would limit work to daytime hours and institute timing control for all activities that are known to have high noise levels.

In order to reduce impacts from corona noise, especially to areas around the new 500 kV ROW, SCE should be required to respond to third-party complaints of corona noise generated by operation of the transmission line by investigating the complaints and by implementing feasible and appropriate measures (such as repair damaged conductors, insulators, or other hardware). As part of SCE's repair inspection and maintenance program, the transmission line should be patrolled, and damaged insulators or other transmission line materials, which could cause excessive noise, should be repaired or replaced.

C.9.8.4 CONCLUSION

Implementing mitigation measures discussed above and similar to the Conditions of Certification that are proposed in the Staff Assessment/DEIS for construction of the Calico Solar Project would likely avoid potential significant noise impacts from work associated with the SCE upgrades.

C.9.9 CUMULATIVE IMPACT ANALYSIS

Geographic Extent

The geographic scope for considering cumulative noise impacts on sensitive receptors for this project is the region immediately surrounding those receptors identified in the project application.

Existing Cumulative Conditions

Any existing cumulative noise conditions are included in the existing ambient noise survey conducted at the sensitive receptors.

Future Foreseeable Projects

Foreseeable Projects in the Newberry Springs/Ludlow Area

The applicant originally identified two additional potential projects in the vicinity of Calico Solar that might propose a potential for cumulative noise impacts. The applicant planned to propose an additional solar project (SES Solar Three) northwest of the Calico Solar Project site and a wind power facility has been proposed to the east of the Calico Solar

Project site. Subsequent to the filing of the AFC, the applicant withdrew the Plan of Development for the SES Solar Three Project with the BLM and doesn't intend to develop the site. Another developer is now in the primary position with the BLM for development of the site west of the proposed Calico Solar Project. Since the potential solar project would be located on the opposite side of the Calico Solar Project site from the identified noise sensitive receptors, a significant cumulative impact from that project would not be expected. Noise data from the proposed wind power facility are not available for a cumulative impacts assessment; further analysis would be necessary as data becomes available (SES 2008a, AFC § 5.12.3).

Foreseeable Renewable Projects in the California and Arizona Desert

Additional projects outside the immediate vicinity of Calico Solar would not pose a potential for cumulative noise impacts.

C.9.10 COMPLIANCE WITH LORS

Compliance with LORS is discussed in section C.9.4.2 above.

C.9.11 NOTEWORTHY PUBLIC BENEFITS

Staff has not identified and noteworthy public benefits to noise and vibration from the proposed Calico Solar Project.

C.9.12 FACILITY CLOSURE

In the future, upon closure of the Calico Solar Project, all operational noise from the project would cease, and no further adverse noise impacts from operation of the Calico Solar Project would be possible. The remaining potential temporary noise source is the dismantling of the structures and equipment and any site restoration work that may be performed. Since this noise would be similar to that caused by the original construction, it can be treated similarly. That is, noisy work could be performed during daytime hours, with machinery and equipment properly equipped with mufflers. Any noise LORS that were in existence at that time would apply. Applicable conditions of certification included in the Energy Commission decision would also apply unless modified.

C.9.13 RESPONSE TO PUBLIC AND AGENCY COMMENTS

Staff received comments from the applicant on the **Noise and Vibration** section of the SA/DEIS. Staff's responses to the applicant's April 14, 2010 comments are outlined below and have been incorporated in the appropriate areas of this section. Specific Final Environmental Impact Statement (FIES)-related comments will be responded to by the BLM in the FEIS for this project.

Comment: Page C.9-7 of the SA/DEIS (**Noise Table 4**). Edits to the table footnotes are suggested merely for consistency with Table DR68-1.

Response: Staff has updated the referenced table to reflect the current numbers.

Comment: On Page C.9-7 of the SA/DEIS, staff states that construction is expected to occur over a period of 41 to 48 months. The suggested text below reflects recently updated proposed construction duration:

> "Construction noise is usually considered a temporary phenomenon. Construction of Calico solar is expected to occur in two phases over a period of 41 ~~to 48~~ months."

Response: Staff has changed the construction period to 41 months and clarified that the 41-month construction period would not be contiguous.

Comment: On Page C.9-11 of the SA/DEIS, staff states projected power plant noise is compared to the existing ambient background (L_{90}) noise levels at the affected sensitive receptors. The Applicant believes that the suggested text below helps improve compatibility with subsequent paragraphs in the section that observes daytime-only Project operation and the usage of daytime ambient L_{eq} levels at the Project's noise sensitive receptors:

> "For this reason, staff <u>typically</u> compares the projected power plant noise to the existing ambient background (L_{90}) noise levels at the affected sensitive receptors."

Response: Staff agrees that the proposed clarification is appropriate and has made the corresponding change in the analysis.

Comment: On Page C.9-12 of the SA/DEIS, staff states tonal noises can be avoided by balancing the noise emissions of various power plant features during plant design. The Applicant believes that the stricken sentence below is more appropriate for power plants that have a variety of sound generators and where noise emission balance may thus be appropriate and effective. The Applicant's project, because it involves fewer types of sound generators, may rely on other tonal noise annoyance reduction methods or techniques. The Applicant suggests the revised text:

> "One possible source of disturbance would be strong tonal noises. Tonal noises are individual sounds (such as pure tones) that, while not louder than permissible levels, stand out in sound quality. ~~The applicant can avoid the creation of annoying tonal (pure tone) noises by balancing the noise emissions of various power plant features during plant design.~~ To ensure that tonal noises do not cause annoyance, staff proposes Condition of Certification **NOISE-4**, below."

Response: Staff agrees that the proposed clarification is appropriate and has made the corresponding change in the analysis.

Comment: On page C.9-20 of the SA/DEIS, staff provides condition **NOISE-1**. The Applicant anticipates that certain construction processes, such as concrete pours, will need to occur outside the hours of 7:00 a.m. to 7:00 p.m. The Applicant requests that **NOISE-1** be revised as recommended below. The Applicant submits that this special notice, combined with the requirements of mitigation measure **NOISE-2** that require the project owner to "[t]ake all feasible measures to reduce the noise at its source" if there is a complaint about project-related noise, with oversight from the CPM, would mitigate

any noise impacts from necessary nighttime construction to less-than-significant and would meet the intent of the San Bernardino County LORS.

> "**NOISE-1** At least 15 days prior to the start of ground disturbance, the project owner shall notify all residents within 2 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>If construction outside the hours of 7:00 a.m. to 7:00 p.m. is required for any construction activity, the project owner shall provide an additional notice, to the CPM as well as to all residents within 2 miles of the site, by mail or other effective means, of the commencement and anticipated duration of the nighttime construction, at least 15 days prior to the commencement of the nighttime construction."</u>

Response: Staff agrees that the proposed modification of Condition of Certification **NOISE-1** is appropriate and has made the corresponding change in the analysis. Nonetheless, all noisy construction activities must still be in compliance with Condition of Certification **NOISE-6**.

Comment: On Page C.9-21 of the SA/DEIS (**NOISE-4)**, staff states no new pure-tone components shall be caused by the project. The Applicant believes that the suggested text below helps clarify the definition of "pure tone" that is suitable for this context and provides a quantitative means of evaluation with one-third octave band data collected from the post-construction field noise survey as required by the **NOISE-4** verification language.

> **"NOISE-4** The project design and implementation shall include appropriate noise mitigation measures adequate to ensure that the operation of the project will not cause the noise levels due to plant operation alone to exceed an average of 51 dBA Leq measured at or near monitoring location SR2, and an average of 57 dBA Leq measured at or near monitoring location SR1.
>
> No new pure-tone components shall be caused by the project, <u>whereby 'pure-tone' shall be understood to mean, for purposes of this condition, a prominent one-third octave band with prominence evaluated between adjacent one-third octave band project operation sound levels and using frequency-dependent prominence ratio criteria values (ΔLp) similar to those as defined by ANSI S1.13-2005 A.8.6.</u> No single piece of equipment shall be allowed to stand out as a source of noise that draws legitimate complaints."

Response: Staff agrees that the proposed modification of Condition of Certification **NOISE-4** is appropriate and has made the corresponding change.

C.9.14 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 2 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. If construction outside the hours of 7:00 a.m. to 7:00 p.m. is required for any construction activity the project owner shall provide an additional notice, to the CPM as well as to all residents within 2 miles of the site, by mail or other effective means, of the commencement and anticipated duration of the nighttime construction at least 15 days prior to the commencement of the nighttime construction.

Verification: Prior to ground disturbance, the project owner shall transmit to the Compliance Project Manager (CPM) a statement, signed by the project owner's project manager, stating that the above notification has been performed and describing the method of that notification, verifying that the telephone number has been established and posted at the site, and giving that telephone number.

NOISE COMPLAINT PROCESS

NOISE-2 Throughout the construction and operation of the project, the project owner shall document, investigate, evaluate, and attempt to resolve all project-related noise complaints. The project owner or authorized agent shall:

- Use the Noise Complaint Resolution Form (below), or a functionally equivalent procedure acceptable to the CPM, to document and respond to each noise complaint;
- Attempt to contact the person(s) making the noise complaint within 24 hours;
- Conduct an investigation to determine the source of noise related to the complaint;
- Take all feasible measures to reduce the noise at its source if the noise is project related; and
- Submit a report documenting the complaint and the actions taken. The report shall include: a complaint summary, including final results of noise

reduction efforts, and if obtainable, a signed statement by the complainant stating that the noise problem is resolved to the complainant's satisfaction.

Verification: Within 5 days of receiving a noise complaint, the project owner shall file a copy of the Noise Complaint Resolution Form with the CPM, documenting the resolution of the complaint. If mitigation is required to resolve a complaint, and the complaint is not resolved within a 3-day period, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is implemented.

NOISE-3 The project owner shall submit to the CPM for review and approval a noise control program and a statement, signed by the project owner's project manager, verifying that the noise control program will be implemented throughout construction of the project. The noise control program shall be used to reduce employee exposure to high noise levels during construction and also to comply with applicable OSHA and Cal/OSHA standards.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit to the CPM the noise control program and the project owner's project manager's signed statement. The project owner shall make the program available to Cal/OSHA upon request.

NOISE RESTRICTIONS

NOISE-4 The project design and implementation shall include appropriate noise mitigation measures adequate to ensure that the operation of the project will not cause the noise levels due to plant operation alone to exceed an average of 51 dBA L_{eq} measured at or near monitoring location SR2, and an average of 57 dBA L_{eq} measured at or near monitoring location SR1.

No new pure-tone components shall be caused by the project. "Pure-tone" shall be understood to mean, for purposes of this condition, a prominent one-third octave band with prominence evaluated between adjacent one-third octave band project operation sound levels and using frequency-dependent prominence ratio criteria values similar to those defined by ANSI S1.13-2005 A.8.6. No single piece of equipment shall be allowed to stand out as a source of noise that draws legitimate complaints.

A. When the project first achieves a sustained output of 85% or greater of rated capacity, the project owner shall conduct a 25-hour community noise survey at monitoring location SR2, or at a closer location acceptable to the CPM. This survey shall also include measurement of one-third octave band sound pressure levels to ensure that no new pure-tone noise components have been caused by the project.

   During the period of this survey, the project owner shall also conduct a short-term survey of noise at monitoring location SL1 or at a closer location acceptable to the CPM. The short-term noise measurements at this location shall be conducted during morning, early afternoon, and evening hours.

   The measurement of power plant noise for the purposes of demonstrating compliance with this condition of certification may alternatively be made at a location, acceptable to the CPM, closer to the plant (e.g., 400 feet from

the plant boundary) and this measured level then mathematically extrapolated to determine the plant noise contribution at the affected residence. The character of the plant noise shall be evaluated at the affected receptor locations to determine the presence of pure tones or other dominant sources of plant noise.

B. If the results from the noise survey indicate that the power plant noise at the affected receptor sites exceeds the above specified values, mitigation measures shall be implemented to reduce noise to a level of compliance with these limits.

C. If the results from the noise survey indicate that pure tones are present, mitigation measures shall be implemented to eliminate the pure tones.

Verification: The survey shall take place within 30 days of the project first achieving a sustained output of 85% or greater of rated capacity. Within 15 days after completing the survey, the project owner shall submit a summary report of the survey to the CPM. Included in the survey report will be a description of any additional mitigation measures necessary to achieve compliance with the above listed noise limit, and a schedule, subject to CPM approval, for implementing these measures. When these measures are in place, the project owner shall repeat the noise survey.

Within 15 days of completion of the new survey, the project owner shall submit to the CPM a summary report of the new noise survey, performed as described above and showing compliance with this condition.

NOISE-5 Following the project's first achieving a sustained output of 80% or greater of rated capacity, the project owner shall conduct an occupational noise survey to identify the noise hazardous areas in the facility.

The survey shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations sections 5095–5099 and Title 29, Code of Federal Regulations section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure.

The project owner shall prepare a report of the survey results and, if necessary, identify proposed mitigation measures that will be employed to comply with the applicable California and federal regulations.

Verification: Within 30 days after completing the survey, the project owner shall submit the noise survey report to the CPM. The project owner shall make the report available to OSHA and Cal/OSHA upon request.

CONSTRUCTION TIME RESTRICTIONS

NOISE-6 Heavy equipment operation, including pile driving, and noisy construction work relating to any project features shall be restricted to the times of day delineated below, unless a variance has been issued by San Bernardino County for limited nighttime construction:

Mondays through Saturdays:	7:00 a.m. to 7:00 p.m.
Sundays and Holidays:	No Construction Allowed

Haul trucks and other engine-powered equipment shall be equipped with mufflers that meet all applicable regulations. Haul trucks shall be operated in accordance with posted speed limits. Truck engine exhaust brake use shall be limited to emergencies.

Verification: Prior to ground disturbance, the project owner shall transmit to the CPM a statement acknowledging that the above restrictions will be observed throughout the construction of the project. Prior to ground disturbance, a copy of the variance issued by the county, if one should be issued, shall be submitted to the CPM for review and approval.

C.9.15 CONCLUSIONS

Staff concludes that the Calico Solar Project, if built and operated in conformance with the proposed conditions of certification, would comply with all applicable noise and vibration LORS and would produce no significant adverse noise impacts on people within the project area, directly, indirectly, or cumulatively.

EXHIBIT 1 – NOISE COMPLAINT RESOLUTION FORM

Calico Solar Project
(08-AFC-13)

NOISE COMPLAINT LOG NUMBER _____

Complainant's name and address:

Phone number: _____

Date complaint received: _____
Time complaint received: _____

Nature of noise complaint:

Definition of problem after investigation by plant personnel:

Date complainant first contacted: _____

Initial noise levels at 3 feet from noise source _____ dBA Date: _____

Initial noise levels at complainant's property: _____ dBA Date: _____

Final noise levels at 3 feet from noise source: _____ dBA Date: _____

Final noise levels at complainant's property: _____ dBA Date: _____

Description of corrective measures taken:

Complainant's signature: _____ Date: _____

Approximate installed cost of corrective measures: $ _____
Date installation completed: _____
Date first letter sent to complainant: _____ (copy attached)
Date final letter sent to complainant: _____ (copy attached)

This information is certified to be correct:

Plant Manager's Signature: _____

(Attach additional pages and supporting documentation, as required).

C.9.16 REFERENCES

San Bernardino 2007 – San Bernardino County General Plan.

San Bernardino County 2007 – San Bernardino County Development Code, Title 8, Division 3, Chapter 83.01, Section 80: Noise. Effective April 12, 2007.

SES 2008a – Stirling Energy Systems/R. Liden (tn: 49181). Application for Certification, dated December 1, 2008. Submitted to CEC/Docket Unit on December 1, 2008.

SES 2009i – Stirling Energy Systems/C. Champion (tn: 52466). Applicant's Responses to Energy Commission and Bureau of Land Management's Data Requests Set 1, Part 1, dated July 17, 2009. Submitted to CEC/Docket Unit on July 20, 2009.

NOISE APPENDIX A
FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

To describe noise environments and to assess impacts on noise sensitive area, a frequency weighting measure, which simulates human perception, is customarily used. It has been found that "A-weighting" of sound intensities best reflects the human ear's reduced sensitivity to low frequencies and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. Decibels are logarithmic units that conveniently compare the wide range of sound intensities to which the human ear is sensitive. **Noise Table A1** provides a description of technical terms related to noise.

Noise environments and consequences of human activities are usually well represented by an equivalent A-weighted sound level over a given time period (L_{eq}), or by average day and night A-weighted sound levels with a nighttime weighting of 10 dBA (L_{dn}). Noise levels are generally considered low when ambient levels are below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. Outdoor day-night sound levels vary over 50 dBA depending on the specific type of land use. Typical L_{dn} values might be 35 dBA for a wilderness area, 50 dBA for a small town or wooded residential area, 65 to 75 dBA for a major metropolis downtown (e.g., San Francisco), and 80 to 85 dBA near a freeway or airport. Although people often accept the higher levels associated with very noisy urban residential and residential-commercial zones, those higher levels nevertheless are considered to be levels of noise adverse to public health.

Various environments can be characterized by noise levels that are generally considered acceptable or unacceptable. Lower levels are expected in rural or suburban areas than would be expected for commercial or industrial zones. Nighttime ambient levels in urban environments are about 7 decibels lower than the corresponding average daytime levels. The day-to-night difference in rural areas away from roads and other human activity can be considerably less. Areas with full-time human occupation that are subject to nighttime noise, which does not decrease relative to daytime levels, are often considered objectionable. Noise levels above 45 dBA at night can result in the onset of sleep interference effects. At 70 dBA, sleep interference effects become considerable (U.S. Environmental Protection Agency, *Effects of Noise on People*, December 31, 1971).

To help the reader understand the concept of noise in decibels (dBA), **Noise Table A2** illustrates common noises and their associated sound levels, in dBA.

Noise Table A1
Definition of Some Technical Terms Related to Noise

Terms	Definitions
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this testimony are A-weighted.
L_{10}, L_{50}, & L_{90}	The A-weighted noise levels that are exceeded 10%, 50%, and 90% of the time, respectively, during the measurement period. L_{90} is generally taken as the background noise level.
Equivalent Noise Level, L_{eq}	The energy average A-weighted noise level during the noise level measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 4.8 decibels to levels in the evening from 7 p.m. to 10 p.m., and after addition of 10 decibels to sound levels in the night between 10 p.m. and 7 a.m.
Day-Night Level, L_{dn} or DNL	The Average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10 p.m. and 7 a.m.
Ambient Noise Level	The composite of noise from all sources, near and far. The normal or existing level of environmental noise at a given location.
Intrusive Noise	That noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.
Pure Tone	A pure tone is defined by the Model Community Noise Control Ordinance as existing if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the two contiguous bands by 5 decibels (dB) for center frequencies of 500 Hz and above, or by 8 dB for center frequencies between 160 Hz and 400 Hz, or by 15 dB for center frequencies less than or equal to 125 Hz.

Source: Guidelines for the Preparation and Content of Noise Elements of the General Plan, *Model Community Noise Control Ordinance*, California Department of Health Services 1976, 1977.

Noise Table A2
Typical Environmental and Industry Sound Levels

Noise Source (at distance)	A-Weighted Sound Level in Decibels (dBA)	Noise Environment	Subjective Impression
Civil Defense Siren (100')	140-130		Pain Threshold
Jet Takeoff (200')	120		Very Loud
Very Loud Music	110	Rock Music Concert	
Pile Driver (50')	100		
Ambulance Siren (100')	90	Boiler Room	
Freight Cars (50')	85		
Pneumatic Drill (50')	80	Printing Press Kitchen with Garbage Disposal Running	Loud
Freeway (100')	70		Moderately Loud
Vacuum Cleaner (100')	60	Data Processing Center Department Store/Office	
Light Traffic (100')	50	Private Business Office	
Large Transformer (200')	40		Quiet
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing

Source: *Handbook of Noise Measurement*, Arnold P.G. Peterson, 1980

Subjective Response to Noise

The adverse effects of noise on people can be classified into three general categories:

- Subjective effects of annoyance, nuisance, dissatisfaction.
- Interference with activities such as speech, sleep, and learning.
- Physiological effects such as anxiety or hearing loss.

The sound levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Workers in industrial plants can experience noise effects in the last category. There is no completely satisfactory way to measure the subjective effects of noise or of the corresponding reactions of annoyance and dissatisfaction, primarily because of the wide variation in individual tolerance of noise.

One way to determine a person's subjective reaction to a new noise is to compare the level of the existing (background) noise, to which one has become accustomed, with the level of the new noise. In general, the more the level or the tonal variations of a new noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

With regard to increases in A-weighted noise levels, knowledge of the following relationships can be helpful in understanding the significance of human exposure to noise.

1. Except under special conditions, a change in sound level of 1 dB cannot be perceived.
2. Outside of the laboratory, a 3-dB change is considered a barely noticeable difference.
3. A change in level of at least 5 dB is required before any noticeable change in community response would be expected.
4. A 10-dB change is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response (Kryter, Karl D., *The Effects of Noise on Man*, 1970).

Combination of Sound Levels

People perceive both the level and frequency of sound in a non-linear way. A doubling of sound energy (for instance, from two identical automobiles passing simultaneously) creates a 3-dB increase (i.e., the resultant sound level is the sound level from a single passing automobile plus 3 dB). **Noise Table A3** indicates the rules for decibel addition used in community noise prediction.

Noise Table A3
Addition of Decibel Values

When two decibel values differ by:	Add the following amount to the larger value
0 to 1 dB	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0
Figures in this table are accurate to ± 1 dB.	

Source: *Architectural Acoustics*, M. David Egan, 1988.

Sound and Distance

Doubling the distance from a noise source reduces the sound pressure level by 6 dB.

Increasing the distance from a noise source 10 times reduces the sound pressure level by 20 dB.

Worker Protection

OSHA noise regulations are designed to protect workers against the effects of noise exposure and list permissible noise level exposure as a function of the amount of time to which the worker is exposed, as shown in **Noise Table A4**.

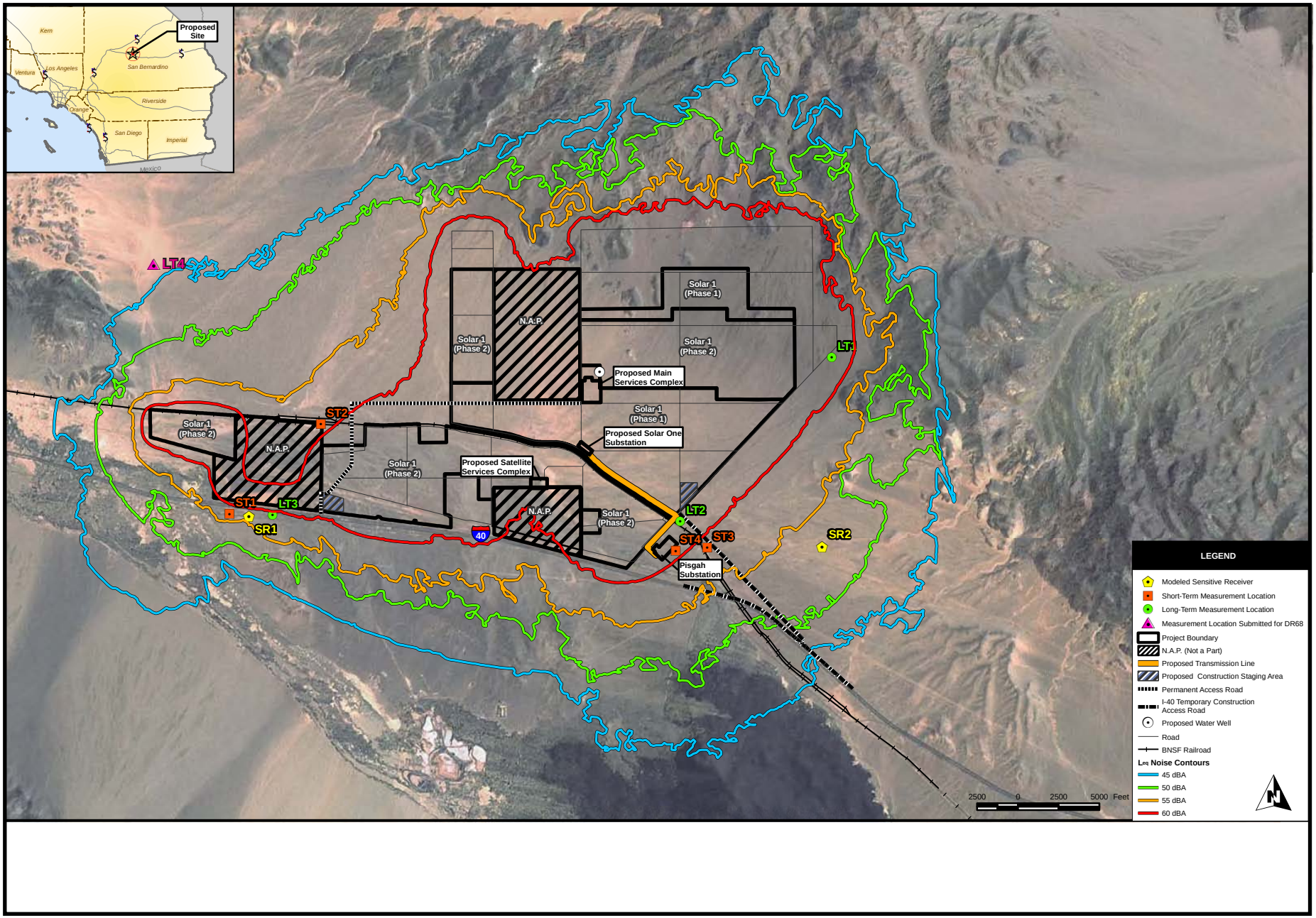
Noise Table A4
OSHA Worker Noise Exposure Standards

Duration of Noise (Hrs/day)	A-Weighted Noise Level (dBA)
8.0	90
6.0	92
4.0	95
3.0	97
2.0	100
1.5	102
1.0	105
0.5	110
0.25	115

Source: 29 CFR § 1910.95.

NOISE AND VIBRATION - FIGURE 1

Calico Solar Project - Sound Measurment Location and L_{eq} Noise Contours



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

SOURCE: AFC Figure 5.12-1

C.10 – SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

Testimony of Kristin Ford

C.10.1 SUMMARY OF CONCLUSIONS

Energy Commission staff (hereafter referred to as "staff") have reviewed the Calico Solar Project in accordance with the California Environmental Quality Act (CEQA). Staff concludes that the Calico Solar Project would not under CEQA cause a significant adverse direct or indirect impact or contribute to a cumulative socioeconomic impact on the area's housing, schools, parks and recreation, police, emergency medical services, or hospitals, because the project's construction and operation workforce currently resides in the regional or local labor market area. Staff also concludes that the project would not require the construction of new or altered public facilities.

The construction and operation of the proposed project would not result in any disproportionate socioeconomic impacts to low-income or minority populations. Gross public benefits from the project include capital costs, construction and operation payroll, and sales tax from construction and operation spending. No Conditions of Certification are proposed.

Please refer to the **Land Use, Recreation, and Wilderness** section of this document for further analysis of recreation impacts.

C.10.2 INTRODUCTION

Staff's socioeconomics impact analysis evaluates the project-induced changes on community services and/or infrastructure, and related community issues such as environmental justice. Staff discusses the estimated beneficial impacts of the construction and operation of the Calico Solar Project and other related economic impacts.

C.10.3 METHODOLGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The analysis of proposed project effects must comply with both California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) requirements given the respective power plant licensing and land jurisdictions of the California Energy Commission and U.S. Bureau of Land Management (BLM). CEQA requires that the significance of individual effects be determined by the Lead Agency; however, the use of specific significance criteria is not required by NEPA.

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).

The socioeconomic resource areas evaluated by staff are based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines. Staff's assessment of impacts

on population, housing, police protection, schools, emergency medical services, and parks and recreation are based on professional judgments, input from local and state agencies, and the industry-accepted two hour commute range for construction workers.

Effects of the proposed project on socioeconomic resources (and in compliance with CEQA) have been determined using the thresholds listed below.

According to Appendix G of the CEQA guidelines, a project may have a significant effect on population, housing, and public services if the project will:

- Induce substantial population growth in an area, either directly or indirectly;
- Displace substantial numbers of people and/or existing housing, necessitating the construction of replacement housing elsewhere; or
- Adversely impact acceptable levels of service for fire and police protection, schools, parks and recreation, and other public facilities.

A socioeconomic analysis looks at beneficial impacts on local finances from property and sales taxes as well as potential adverse impacts on public services. To determine if a project would have any significant impacts, staff analyzes whether the current status of these community services and capacities can absorb the project-related impacts in each of these areas. A project's property taxes, sales tax, local school impact fees, or development fees can help local governments augment public services required to meet project needs. If the project's impacts could appreciably strain or degrade these services, staff considers this to be a significant adverse impact and would propose mitigation.

In this analysis, staff used fixed percentage criteria for evaluating demography for environmental justice. Impacts on housing, schools, medical services, law enforcement, parks and recreation, and cumulative impacts are based on professional judgments or input from local and state agencies. Substantial employment of people coming from regions outside the study area has the potential to create significant adverse socioeconomic impacts. Significance criteria for subject areas such as utilities, fire protection, water use, and wastewater disposal are identified in the **Soil and Water Resources**, **Reliability**, **Worker Safety And Fire Protection**, and **Waste Management** sections of this staff assessment/draft environmental impact statement (SA/DEIS).

Laws, Ordinances, Regulations, and Standards

The following table contains all applicable socioeconomic laws, ordinances, regulations, and standards (LORS).

Socioeconomics and Environmental Justice Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

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	Except for a fee, charge, dedication, or other requirement authorized under Section 17620 of the Education Code**,** state and local public agencies may not impose fees, charges, or other financial requirements to offset the cost for school facilities.
California Revenue and Taxation Code Section 70-74.7	Property taxes are not assessed on solar facilities. Assembly Bill 1451 extended the current property tax exclusion for new construction of solar energy systems to January 1, 2017.

C.10.4 PROPOSED PROJECT

C.10.4.1 SETTING AND EXISTING CONDITIONS

The 850 MW project would be located in an undeveloped area of San Bernardino County, north of Interstate 40, approximately 37 miles east of Barstow. The project would require approximately 6,215 acres of land to be authorized under a Right of Way (ROW) permit from the Bureau of Land Management (BLM)(TS 2010ag). The project site is approximately 115 miles east of Los Angeles, which is located in Los Angeles County.

The applicant expects construction of the Calico Solar Project would take place in two phases and employ an average of 400 workers a month for the approximately 41-month construction period. Phase I of the proposed project will consist of up to 20,000 Sun Catchers configured in 333 (1.5MW) solar groups of 60 SunCatchers per group that will have a net nominal generating capacity of 500MW. Phase II would expand the proposed project to 34,000 SunCatchers configured in 567 (1.5MW) solar groups with a total net generating capacity of 850MW. Monthly construction employment would peak at a maximum of 700 workers in the seventh month, with all other months below 700 workers. Construction for the proposed project would be for a 41-month period (5.10-16, Calico, AFC). At operation, the proposed project would employ approximately 180 full time workers, with maintenance activities occurring seven days a week, 24 hours a day (5.10-26, Calico, AFC).

ENVIRONMENTAL JUSTICE/DEMOGRAPHIC SCREENING

Executive Order 12898, “Federal Actions to address environmental justice in Minority Populations and Low-Income Populations,” focuses federal attention on the environment and human health conditions of minority communities and calls on agencies to achieve environmental justice as part of this mission. The order requires the US Environmental Protection Agency (EPA) and all other federal agencies (as well as state agencies

receiving federal funds) to develop strategies to address this issue. The agencies are required to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations.

Civil Rights Act of 1964, Public Law 88-352, 78 Stat.241 (Codified as amended in scattered sections of 42 U.S.C.) Title VI of the Civil Rights Act prohibits discrimination on the basis of race, color, or national origin 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 Natural 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.

When **Socioeconomics and Environmental Justice Figure 1** shows a minority population present within the six-mile radius, staff in the 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 sections of this document consider whether the project would have a significant adverse impact to an environmental justice population.

Minority Populations

According to *Environmental Justice: Guidance Under the National Environmental Policy Act*, minority individuals are defined as members of the following groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.

A minority population, for the purposes of environmental justice, is identified when the minority population of the potentially affected area is greater than 50% or meaningfully greater than the percentage of the minority population in the general population or other appropriate unit of geographical analysis.

The total population within the six-mile radius of the proposed site is 83 persons and the total minority population is 20 persons, or about 25% of the total population (see **Socioeconomics and Environmental Justice Figure 1**).

Below-Poverty-Level Populations

Based on the census geography (block groups) used to determine below-poverty-level populations, the poverty data would not be accurate for the six-mile radius because the block groups are so large that they would include persons well beyond the 6-mile radius and would misrepresent the poverty data for the proposed project.

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 and Environmental Justice Table 2**. Staff's assessment of impacts on population, housing, emergency medical services, police protection, schools, emergency medical services, and parks and recreation, are based on professional judgments, input from local and state agencies, and the industry-accepted two hour commute range for construction workers. Criteria for subject areas such as utilities, fire protection, water supply, and wastewater disposal are analyzed in the **Reliability**, **Worker Safety and Fire Protection**, and **Water Resources** sections of this document.

DIRECT/INDIRECT/INDUCED IMPACTS

Induce Substantial Population Growth

For the purpose of this analysis, staff defines "induce substantial population growth" as workers permanently moving into the project area because of project construction and operation, thereby encouraging construction of new homes or extension of roads or other infrastructure. To determine whether the project would induce population growth, staff analyzes the availability of the local workforce and the population within the region. Staff defines "local workforce" as the Riverside-San Bernardino-Ontario and the Los Angeles Metropolitan Statistical Areas MSA.

Staff used the San Bernardino and Riverside County labor market area (and two hour commute of project site) for its evaluation of construction worker availability. Project construction would take place in two phases and employ an average of 400 workers a month for the 41-month construction period. Monthly construction employment would

peak at a maximum of 700 workers in month seven of the proposed schedule, with a total of 41 construction months (5.10-16, Calico, AFC). After construction, the project would employ approximately 180 employees.

Socioeconomics and Environmental Justice Table 2 shows that the total labor by skill in the Riverside-San Bernardino-Ontario and Los Angeles County MSAs is more than adequate to provide construction labor for the Calico Solar Project.

Socioeconomics and Environmental Justice Table 2
Total Labor by Skill in San Bernardino/Los Angeles County
Annual Average for 2016

Trade	San Bernardino County MSA	Los Angeles County MSA	Peak Number of Workers for Project Construction by Craft
Carpenters	32,390	30,050	41
Concrete Crews	4,690	4,530	49
Electricians	7,600	13,700	104
Ironworkers	1,090	770	38
Laborers	32,080	34,810	136
Miscellaneous Crews[1]	4,960	8,610	10
Operators	5,460	4,780	112
Plumbers	5,330	12,900	26
SES Technicians	N/A	N/A	32
SunCatcher Assemblers	990[1]	1,350[1/3]	64
SunCatcher Electricians	7,600[3]	13,700[3]	16[3]
SunCatcher Ironworkers	1,090[3]	770[3]	32[3]
SunCatcher Laborers	32,080[3]	34,810[3]	16[3]
SunCatcher Material Handlers	990[1/3]	1,350[1/3]	16[3]
SunCatcher Operators	5,460[3]	4,780[3]	8[3]
SunCatcher Teamsters	N/A	N/A	12[3]
SunCatcher Technicians	1,150[3]	5,130[3]	32[3]
Teamsters	N/A	N/A	58[3]
Technicians[2]	1,150	5,130	6[3]

1 - Other Construction and Related Workers
2 - Electrical and Electronic Engineering Technicians
3 - The applicant has indicated that local resources, hires and contractors would be used to the best extent practical. However, some positions would potentially need to be more specialized and may come from outside the area.
Source: EDD Labor Market Information; Occupational Employment Projections 2006-2016., Calico Solar AFC, 5.10-17, Table 5.10-10

Because the majority of the construction workforce currently resides within San Bernardino and Riverside Counties, construction, and operation of the project would have little impact with respect to inducing substantial population growth. For operations, the workforce is modest (180 workers) and most would reside within one hour commute of the proposed project site (5.10-26, Calico, AFC). Staff concludes that inducement of substantial population growth either directly or indirectly by the Calico Solar Project, under CEQA would not be significant or adverse.

Housing Supply

When considering potential socioeconomic impacts of workers required for Calico construction, staff considered information provided in the AFC and current California Department of Finance data for the Riverside/San Bernardino/Ontario and the Los Angeles MSAs as presented in **Socioeconomics and Environmental Justice Table 2**. During preparation of this analysis, staff reviewed the Socioeconomic analysis for the Blythe Solar Power Project (BSPP), specifically information from the Building and Trades Council of San Bernardino and Riverside Counties that construction workers within San Bernardino and Riverside Counties regularly commute 2-hours each direction daily for work (BTC 2010). Based on these data sources, staff concludes the majority of construction workers would come from within this regional study area.

Staff assumes that because data indicates the workforce would likely come from within the regional study area, it is speculative to quantify if and in what numbers construction workers may permanently relocate from the regional study area to the Calico local area for a limited duration construction job with the Calico project. To evaluate the potential for impacts, staff assumes that up to 15% of construction workers could seek local lodging in the Calico local area during the workweek. It should be noted that this is an average weekly assumption and would be a temporary and fluctuating demand on local lodging. Based on this assumption, it is possible that during the peak construction month (worst-case scenario) up to 105 workers could seek local lodging.

Hotel/Motel. Data compiled by Smith Travel Research for hotels, motels, and bed and breakfast inns (B&Bs) with 15 or more rooms identified 49 hotels with a total of 3,397 rooms within one hour's driving distance of the project site the in 2008, which presents the most current available data (5.10-6, Calico, AFC). Twenty-seven of these hotels and 1,902 rooms are located in the city of Barstow. An additional 20 hotels and 1,397 rooms were identified in Victorville. Smith Travel Research also identified hotels in Yermo and Helendale. The average annual occupancy rate for hotels in Riverside and San Bernardino Counties in 2008 was 73.26%, a decrease of 4.1% from 2007 (5.10-6, Calico, AFC). Applying this ratio (73.26%) to the total number of hotel rooms identified within one hour of the Calico site suggests that, on average, a total of 509 unoccupied rooms were available for rent in Barstow in 2008, 374 rooms were available in Victorville, and 26 unoccupied rooms were available for rent in Yermo and Helendale, for a total of 908 unoccupied motel and hotel rooms available for rent within one hour's drive of the project site. These estimates do not include hotels, motels, and B&Bs with less than 15 rooms.

Twenty hotels with a total of 863 rooms were identified in communities located from 1 to 1.5 hours drive from the Calico site (5.10-7, Calico, AFC). These communities include Hesperia, Adelanto, and Apple Valley. Applying the 2008 average occupancy ratio (73.26%) suggests that, on average, 231 unoccupied rooms are available for rent within 1 to 1.5 hours drive of the Calico site. A total of 252 hotels with 17,309 rooms were identified in communities within 1.5 to 2 hours drive from the Calico site (5.10-7, Calico, AFC). These communities include San Bernardino, Ontario, Big Bear Lake, and Riverside. Assuming an annual average occupancy rate of 73.26%, 4,639 unoccupied motel and hotel rooms were available for rent within 1.5 to 2 hours drive from the Calico site. These estimates do not include hotels, motels, and B&Bs with less than 15 rooms; however, these estimates represent a reasonable approximation of the number of hotel

and motel rooms based on the best available data.

Housing Vacancy. Based on current vacancy rates for the city of Barstow, approximately 1,706 vacant housing units (single, multi-family and mobile home for sale and rent) were available in 2008, representing a vacancy rate of 17.1% (5.10-6, Calico, AFC). Approximately 2,690 vacant housing units were available, representing a 7.7 vacancy rate. Housing vacancy rates for Apple Valley, Adelanto, and San Bernardino County for 2008 are approximately 2,084 (8.4%), 1,287 (15.1%), and 79,637 (11.6%), respectively (5.10-6, Calico, AFC).

Campground/RV Parks. There are at least 11 Recreational Vehicle (RV) parks located within one hour's driving distance of the project site, the closest parks are in the unincorporated town of Newberry Springs, approximately 15 miles west of the project site. The Newberry Mountain RV and Motel Park and Twin Lakes RV Park have 18 and 45 RV camp spaces, respectively (5.10-7, Calico, AFC). Other RV parks within one hour's drive of the project site are located in Barstow (five RV parks), Yermo (three RV parks), and Hinkley (one RV site). The unincorporated towns of Yermo and Hinkley are located approximately 33 miles and 47 miles west of the project site, respectively.

BLM operates two campgrounds in the general vicinity of the project site with a limited number of RV hookups: Owl Canyon Campground and Afton Canyon Campground north of Barstow. Camping is restricted to recreational use and long-term camping is not permitted (5.10-7, Calico, AFC). Camping is allowed anywhere on BLM-administered land in the vicinity of the project site, except for "special areas" with specific camping regulations. Vehicle camping is permitted within 300 feet of any posted Open Route. There are, however, no facilities in these locations and there is a 14-day limit for camping in any one location (5.10-7, Calico, AFC).

Conclusion. Because of the large labor force within commuting distance of the project, staff expects the majority of construction and operations workers would commute to the project daily from their existing residences, and those that might in-migrate with their families could settle in the Barstow area with no expected adverse impacts on the local infrastructure or community services. The project would have 180 full-time employees; the majority of whom are expected to already reside in the area; the applicant expects that workers for up to 20 operational jobs would be recruited from outside the immediate project area. Staff anticipates there would be ample local housing available to any construction worker seeking local housing. Based on the availability of short-term housing and as the project is location in a relatively remote and largely uninhabited area, staff concludes that construction and operation of the project is not expected to adversely impact existing housing supply.

Displace Existing Housing and Substantial Numbers of People

The approximately 7,130-acre proposed site is located in an undeveloped area of San Bernardino County. The project site would be located approximately 37 miles east of Barstow, California and north of Interstate 40 (I-40). The proposed project is located primarily on Bureau of Land Management (BLM) land. The area is open, undeveloped land within the Mojave Desert (5.9-1, Calico, AFC).

The lands located within the project boundary are designated multi-use class M (moderate) by the BLM, and are zoned Resource Conservation by San Bernardino County. The Resource Conservation covers all the county lands within 1 mile of the proposed project. Land uses immediately adjacent to the proposed project site include transportation use, open space, and resource conservation. Newberry Springs, located 17 miles from the project site consists of single-family homes, mobile homes, recreational vehicle parts and commercial lots. One rural residence is located approximately 2 miles east and southwest (5.9-3, Calico, AFC).

Because of the large labor force within commuting distance of the project, staff expects the majority of construction workers would commute to the project daily from their existing residences. No new housing construction would be required. The project would have 180 new full-time employees; the applicant expects that the majority of these employees would be hired within commuting distance of the project, with up to 20 new employees recruited from outside this area. Given the labor forces in San Bernardino County and surrounding counties within commuting distance of the project, staff does not expect employees would relocated to the immediate project area.

Housing in San Bernardino County was at an 11.6% (2008) vacancy rate. The geographic area of Adelanto, Apple Valley, Barstow, Hesperia and Victorville was at 15.1%, 8.4%, 17.1%, 6.5% and 7.7%, respectively (Table 5.10-3, Calico, AFC). Operation of the Calico Solar Project would require 180 new employees. The applicant estimates that operation of the project would result in up to 20 workers permanently relocating to the project area. The potential increase of 20 workers would have negligible effects on existing housing. Staff concludes that the proposed project would not displace any people or necessitate construction of replacement housing elsewhere

Result in Substantial Physical Impacts to Government Facilities

Emergency Medical Services

Emergency services would be coordinated with the nearby fire department of Newberry Springs, California, and a hospital in Barstow, California. The San Bernardino County Fire Department indicated in the AFC, (5.10-31) that additional resources may be required to enable the Fire Department to provide adequate fire protection and emergency response services during construction and operation of the project. The applicant states in the AFC (5.10-36) they would work with the local fire protection and emergency response service providers to address the need for additional resources during the construction and operation phases of the project.

The city of Barstow and the county of San Bernardino, Hazardous Materials Units would respond to any hazardous material calls from the project site as part of the county-wide San Bernardino County Intra-agency Hazardous Materials Response Team. The Hazardous Materials team consists of approximately 150 members and is a Level A, which is capable of handling chemical, biological, radiological and nuclear responses. Response times from the City of Barstow Hazardous Materials unit would be approximately 35 minutes. The closest County Hazardous Materials unit is located at Station 322 in Adelanto, and the response time to the project site would be approximately 90 minutes (5.10-14, Calico, AFC).

An off-site medical clinic would be contracted to set up nonemergency physician referrals. First aid kits and fire extinguishers would be provided around the site and in offices, and would be regularly inspected and maintained by qualified personnel. Safety personnel trained in first aid would be part of the construction staff. An Emergency Medical Technician or other highly trained medical professional would be assigned to the site to provide advanced injury care. In addition, all foremen and supervisors would be given first aid training (5.17-14, Calico, AFC).

The Barstow Community Hospital is the closest hospital to the project site. The hospital has an emergency room onsite; however, does not have a trauma level emergency room. An ambulance would take approximately 20 to 30 minutes from project site to the Barstow Community Hospital. Loma Linda University Medical Center would treat all major life threatening injuries. A helicopter flight from the project site to Loma Linda University Medical Center would take approximately 20 to 30 minutes. The medical center is a full service hospital with a level 1 trauma center and is capable of treating almost any injury (5.10-14, Calico, AFC).

The applicant states in the **Worker Safety and Fire Protection** section of the SA/DEIS that several programs would be required for construction and operation workers and would address health and safety, injury and illness prevention, personal protection equipment, fire protection and prevention, and hazardous materials handling and storage. As stated in the **Worker Safety and Fire Protection** section of this document, the applicant (or construction contractor) would ensure compliance with the all federal, state, and local health standards that pertain to worker health and safety and first-aid trained safety personnel would comprise part of the construction staff.

As previously discussed above, the applicant states in the AFC that the San Bernardino Fire Department may need additional resources to provide adequate fire protection and emergency response services during construction and operation of the project. However, the applicant's proposed safety procedures and employee training would minimize potential unsafe work conditions and the need for outside emergency medical response. Staff concludes that the emergency medical services provided by the local fire department and hospitals, in addition with the trained medical professional's located onsite, would be adequate during construction and operation of the proposed 850 MW project.

Law Enforcement

As stated in the AFC and verified by staff (http://www.sbcounty.gov/sheriff), the project falls under the jurisdiction of the San Bernardino County Sheriff's Department. The closest sheriff's office is located in Barstow. The office employs approximately 60 individuals; 35 deputies, two detectives, one "active detective" (detective in training), five sergeants, one school resource officer, a lieutenant, a captain and administrative staff. Response time to the project site would take approximately 20 minutes (5.10-13, Calico, AFC). The applicant states in the AFC (5.10-31), that San Bernardino County Sheriff's Department resources would not likely be impacted by operation of the project. In addition, the applicant states the department is well staffed and local/regional facilities are capable of handling any injuries that might occur at the project site.

The California Highway Patrol (CHP) (http://www.chp.ca.gov) is the primary law enforcement agency for state highways and roads. Services include law enforcement, traffic control, accident investigation and the management of hazardous material spill incidents. The nearest CHP office is located approximately 37 miles from the project site in Barstow, California.

The applicant states in the AFC that onsite security measures would be installed as part of the project. Controlled access gates would be maintained at the entrances to the site. The Hector Road access would also serve as the main entry and exit gate during project operations. Twenty-four hour site security monitoring would be provided in the control room via closed-circuit television and intercom system.

Perimeter security fencing and access gates would be provided for the project site, including fencing and gates around the main buildings, the electrical substation, and the construction laydown areas. Security monitoring cameras and active detection systems would be provided for project buildings, support areas, and the entire site perimeter. Regular site security vehicular patrols would be conducted to provide additional site security. Site access would be provided to off-site emergency response teams that respond in the event of an “after-hours emergency.” Entry into the project site by fire department or emergency units would be handled on a manual override basis by 24-hour security officers stationed at both entrances (3-24, Calico, AFC).

Unlike residential or commercial developments, power plants do not attract large numbers of people and thus require little in the way of law enforcement. Because of this factor and the proposed onsite security measures, staff concludes that the existing law enforcement resources would be adequate to provide services to the Calico Solar Project during construction and operation.

Education

There are two school districts located within the vicinity of the project site; Barstow Unified School District and the Silver Valley Unified School District. The project site is located within the Silver Valley Unified School District boundary. Silver Valley District serves the smaller communities located east of Barstow, including Yermo and Newberry Springs. The closest school to the project site is Newberry Springs Elementary, approximately 14 miles west of the project site. The closest high school is located in Yermo, approximately 33 miles west of the project site. Staff has provided information for the Barstow Unified School District in the event that construction workers or operations employees and their families who may choose to relocate to the vicinity would likely reside in the Barstow area.

The Barstow Unified School District has 13 schools; nine elementary schools, one junior high school, one high school, one continuation school and one community day school. Student enrollment in the Barstow Unified School District has declined with approximately 5% fewer students enrolled in the 2007/8 school year (5.10-12, Calico, AFC) than two years before. Barstow Unified would be able to accommodate up to approximately 150 new students without requiring additional resources (5.10-12, Calico, AFC).

The Silver Valley Unified School District has eight schools; four elementary schools, one middle school, one high school, one alternative school, and a continuation school. Enrollment has increased in recent years with approximately 2% more students enrolled in the 2007/8 school year (5.10-12, Calico, AFC). The Silver Valley Unified School District is not currently at capacity and could accommodate approximately 300 new students without additional resources (5.10-12, Calico, AFC).

During construction, staff expects the labor force would commute daily from the region and that the enrollment in local school districts would not increase. The applicant estimates that operation of the project would result in 20 workers of 180 required for project operation would permanently relocating to the project area from outside of the project area. The potential increase of 20 workers would have negligible effects to schools from the construction of the project. However, in the unlikely scenario in which all 180 operation workers are newly relocated to the Silver Valley Unified School District, an average family size of 3.15 persons per household (San Bernardino County) would result in the addition of about 207 school children to the schools in the district. Barstow and Silver Valley School Districts could accommodate approximately 150 new students and 300 new students, respectively. Potential new students would not impact existing school resources and the project would not require the construction of new or physically altered school facilities. Staff concludes that construction and operation of the proposed project would not cause a significant adverse impact on school facilities.

Like all school districts in the state, the Silver Valley Unified School District is entitled to collect school impact fees for new construction within their district under the California Education Code Section 17620. These fees are based on the project's square feet of habitable space. Because the main services complex of the Calico Solar Project (considered "habitable space") would be constructed entirely on BLM land, no private land would be affected and therefore, the provisions of Education Code Section 17620 would not apply to this project.

In addition, the Silver Valley Unified School District indicated that the proposed project would be exempt from the school impact fees because it would be developed on federal lands. (5.10-13, Calico Solar, AFC).

Increase the Use of Existing Recreation Facilities

The San Bernardino County Regional Parks (http://www.sbcounty.gov/parks) maintains a variety of regional parks, outdoor recreation and special activities. The regional parks amenities include picnicking, fishing, hiking, horseback riding, bird watching, overnight camping, horseshoes, swimming, water skiing, passive recreation and a ghost town.

Given the large labor force in the San Bernardino and Riverside Counties residing within two hours commuting time of the project, staff does not expect employees to relocate to the immediate project area. Staff concludes that there are a number and variety of parks within the regional project area and does not expect the construction or operation workforce to have a significant adverse impact on parks or necessitate construction of new parks in the area.

C.10.4.3 CEQA LEVEL OF SIGNIFICANCE

As discussed in the subject headings above, under CEQA, project-related socioeconomic impacts would be less than significant for population, employment, housing, schools, parks and recreation, emergency medical services, and law enforcement.

C.10.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the central portion of the proposed 850 MW project. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

C.10.5.1 Setting and Existing Conditions

The setting for the Reduced Acreage Alternative would eliminate approximately 67% of the proposed 850 MW project area. Potential impacts related to socioeconomic resources would be reduced. The Reduced Acreage Alternative would transmit the power generated without requiring an upgrade to 65 miles of the existing 200 kV SCE Pisgah-Lugo transmission line. The Reduced Acreage Alternative would affect 33% of the land of the proposed 850 MW project.

C.10.5.2 Assessment of Impacts and Discussion of Mitigation

The alternative would eliminate approximately 67% of the proposed project area, would not require an upgraded transmission line, and would consist of less SunCatchers. The Reduced Acreage Alternative would require less construction with the above mentioned infrastructure and operation of the solar facility. The alternative would create a smaller fiscal impact than the proposed project, with less need of housing, school, parks and recreation, law enforcement and emergency medical services. The alternative would have a smaller impact than the proposed project on substantial population growth, impact housing supply, displace existing housing or substantial numbers of people or result in substantial physical impacts to government facilities. In addition, the alternative would have a smaller impact than the proposed project with smaller project cost, payroll, and local construction materials/supplies.

C.10.5.3 CEQA Level of Significance

Similar to the proposed project, the Reduced Acreage Alternative would not cause an adverse significant impact from construction or operation. The benefits of the project to the local economy would be reduced because of the smaller acreage which would cause less construction time, and less socioeconomic resources. Similar to the proposed 850 MW project, the Reduced Acreage Alternative would not require Socioeconomic conditions of certification.

C.10.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

Due to the reduction in project size and impacts associated with the northern portion of the originally proposed project layout, the Avoidance of Donated and Acquired Lands

Alternative shown in **Alternatives Figure 2** will be addressed in the **Alternatives** section of this SSA.

C.10.7 NO PROJECT / NO ACTION ALTERNATIVE

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

NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on the Calico Solar Project application and on CDCA land use plan amendment

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

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

NO PROJECT/NO ACTION ALTERNATIVE #2:

No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

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

Because the CDCA Plan would be amended, it is possible that the site would be developed with a different solar technology. As a result, construction and operation of the solar technology would likely result in impacts to socioeconomics or environmental justice. Different solar technologies require varying numbers of personnel for construction and operation; however, all solar technologies in this area would require such personnel. As such, this No Project/No Action Alternative could result in impacts to socioeconomics or environmental justice similar to under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3:

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

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

C.10.8 PROJECT-RELATED FUTURE ACTIONS – SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios:

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.10.8.1 Environmental Setting

The environmental setting incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection

upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

The potential social and economic impacts associated with the SCE upgrades include effects to population, housing, public services (fire protection, emergency medical response services, law enforcement, and schools), utilities, and government tax revenue, as well as economic benefits that would arise from the project's investment and payroll. The potential affected area would be San Bernardino County, specifically the northeast portion of the county near the cities of Barstow and Hesperia.

This preliminary analysis of socioeconomic effects for the SCE Lugo-Pisgah No. 2 line uses baseline socioeconomic data compiled for the Calico Solar AFC. Both projects have the same affected area (San Bernardino County) for socioeconomic impacts and would be constructed on similar schedules. Therefore the population, housing, employment, income, and fiscal revenue data used in the Calico Solar Project AFC would be relevant to this analysis with the addition of the southwestern parts of the transmission line, near Lugo Substation, particularly for the City of Hesperia. The forecasted growth rate for the affected area is approximately 40,000 people per year. There are estimated to be about 5,000 housing units and more than 3,400 hotel rooms or other temporary housing available in the surrounding communities (36, Calico, Appendix EE Section 2.11.2.1).

C.10.8.2 Environmental Impacts

Because few, if any, workers are expected to relocate to the area, no new housing would be needed for the project, no housing would be displaced, and no new competition for existing housing would likely occur. Construction employees would likely already live within commuting distance to the project area in San Bernardino County. Should construction or operation workers choose to relocate to the cities of Barstow, Riverside, San Bernardino, or Ontario, there is sufficient housing in these areas to not adversely affect the housing market. Temporary accommodations may also be needed during construction, but with numerous hotels and motels in the area, impacts are expected to be less than significant, and mitigation measures are not required.

The addition of project-related children to schools that are at or over capacity may increase costs in terms of supplies, equipment, and/or teachers but the impact would be minimal. Even so, this worst-case scenario is unlikely to occur since any non-local construction workers would not likely relocate family members for the relatively short duration of construction and very few if any new permanent employees would be hired by SCE for operation of the project.

Likewise impacts to law enforcement and public utilities would be minimal. Water and wastewater discharge is discussed in the **Soil and Water Resources** section of this Staff Assessment/EIS and solid waste removal is discussed in the **Waste Management** section of this Staff Assessment/EIS. Because of staff's socioeconomic analysis of the proposed project, and the on-site security and safety procedures for construction and operation as described in the **Worker Safety and Fire Protection** section of this SA/EIS, staff concludes that the emergency medical services resources would be

adequate to meet the needs of the proposed upgrades project during construction and operation.

The construction or operation workforces are not expected to have a significant adverse impact on parks and recreation because of the number and variety of parks within the regional project area. In addition, construction workers are unlikely to bring their families to a work site, and therefore, impacts to existing park services would be less than significant.

Environmental Justice. EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires each federal agency to make the achievement of environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low income populations. Guidelines provided by the Council on Environmental Quality (CEQ) (1997) and USEPA (1998) indicate that a minority community may be defined as one where the minority population comprises more than 50% of the total population or comprises a meaningfully greater share than the share in the general population. In 2006, the percentage of San Bernardino County's population reporting non-White race was about 20%, about the same as the state of California. The percentage of San Bernardino County's population reporting Hispanic or Latino ethnicity was 46% compared to about 36% for the state in 2006. In 2007, approximately 11.8% of San Bernardino County's population was living below poverty level compared to 12.4% statewide (37, Calico, Appendix EE Section 2.11.2.1). Therefore, staff concludes that the SCE proposed upgrades would not disproportionately or adversely impact minority or low income populations in the affected area.

C.10.8.3 Mitigation

Compliance with LORS discussed in the **Soil and Water Resources**, **Worker Safety and Fire Protection**, **Waste Management**, and **Reliability** sections of this Staff Assessment/EIS would ensure that impacts from SCE upgrades would be less than significant. No additional mitigation is recommended.

C.10.9 CUMULATIVE IMPACTS

A project may result in significant adverse cumulative impacts when its effects are "cumulatively considerable." Cumulatively considerable means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, or the effects of probable future projects (Title 14, California Code of Regulations, section 15130). Cumulative socioeconomics impacts could occur when more than one project has an overlapping construction schedule that creates a demand for workers that cannot be met by the local labor force, resulting in an influx of non-local workers and their dependents. Operational cumulative socioeconomic impacts could occur when the development of multiple projects significantly impacts the population of an area thus resulting in a housing shortage, change in local employment conditions, and an increased demand on public services.

Section B.3-1, 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 form 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 Figure 1 and 2** and in **Cumulative Tables 3 and 4.** 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 Newberry Springs/Ludlow area, as shown on **Cumulative Impacts Figure 3**.

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 document.

Geographic Extent of Cumulative Impact Analysis

The area of cumulative effect for socioeconomic resources is Riverside and San Bernardino Counties, CA. The analysis of cumulative effects considers a number of variables including geographic (spatial) limits, time (temporal) limits, and the characteristics of the resource being evaluated. The geographic scope of cumulative impact analysis is based on the workforce boundaries of the cumulative development projects. While it is possible that the geographic scope of cumulative effects will extend beyond these two counties, with some workers potentially coming from adjacent counties beyond a two-hour commute radius of the proposed CSP site, due to the similar nature of skill set required by the workforce during construction activities, as well as the number of proposed cumulative renewable energy projects, it is not anticipated that the geographic scope for cumulative impact analysis extends beyond the scope of the direct and indirect effects of the proposed action.

Effects of Past and Present Projects

A wide variety of past and present development projects contribute to the cumulative conditions for socioeconomics. As noted above in the “Setting and Existing Conditions” subsection, past development has further urbanized the area and increased population, housing, and employment conditions. As shown in the AFC, from 2000 to 2008 the population of Riverside County increased by 21% and 17%, respectively (5.10-3, Calico, AFC). This is an example of the steady growth rate that has occurred throughout the regional study area. As a result, past and present residential, commercial, and industrial development has contributed to the overall socioeconomic growth within the study area.

Effects of Foreseeable Projects

Reasonably foreseeable projects that could contribute to the cumulative effects scenario depend on the extent of resource effects, but could include projects in the immediate Ludlow area as well as other large renewable projects in the California, Nevada, and Arizona desert regions. The projects in California are illustrated in **Cumulative**

Figures 1, 2, and 3. As shown in the map and table, there are a number of projects in the immediate area around Calico Solar Project whose impacts could combine with those of the proposed project. As shown on **Cumulative Figure 1** and in **Table 1**, solar and wind development applications for use of BLM land have been submitted for approximately 1 million acres of the California Desert Conservation Area.

Contribution of the Calico Solar 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 CSP. As a result, there is the potential for short-term cumulative impacts during construction of those cumulative projects related to socioeconomics. As discussed above, the CSP would result in less than significant impacts regarding the potential for construction workers to seek temporary housing within the local study area. Therefore, the CSP direct contribution to cumulative population and housing need impacts during construction is considered by staff to not be adverse. Foreseeable development in the project area includes primarily renewable energy electrical generation and transmission infrastructure projects. With the large number of renewable energy projects occurring within the BSPP regional study area, it is possible that some overlap of construction phasing could occur between the CSP and the cumulative development projects. **Socioeconomics and Environmental Justice Table 3** presents the most recently published data (Year 2006-2016 projections) on labor force characteristics for the cumulative regional study area pertaining to electrical energy project construction labor skill sets and compares those to major cumulative projects located near the CSP along the I-10 corridor, including the Palen Solar Power Project (PSPP), Genesis Solar Energy Project (GSEP), and the Rice Solar Energy Project (RSEP.

All cumulative projects identified in **Socioeconomics and Environmental Justice Table 3** would be expected to draw on the large regional construction workforce in and Riverside/San Bernardino/Ontario MSA, and as shown the MSA offers sufficient regional labor by skill set to staff all projects from within the regional study area. As indicated by **Socioeconomics and Environmental Justice Table 3**, cumulative development of these projects in a worst-case scenario of overlapping peak period months could result in the influx of 1,777 construction workers seeking local lodging within the area as a result of the large renewable energy projects being constructed. Staff finds this scenario unlikely due to construction scheduling and time requirements, and notes that this assumption does not account for workers doubling up in local lodging situations. The 1,777 construction workers seeking local lodging could impact the 49 motels with a total of approximately 3,400 rooms located within a one-hour drive of the project site. The 49 motels include 27 motels with a total of 1,900 rooms in Barstow. A total of 321 hotels and approximately 21,500 hotel rooms were identified within a two hour drive of the project site (Table 5.10-4, Calico, AFC). Based on the average annual motel and hotel occupancy rate in San Bernardino and Riverside Counties in 2008, on average, approximately 500 unoccupied motel and hotel rooms are available for rent in Barstow, with an additional 400 unoccupied motel and hotel rooms available elsewhere within a one hour drive of the site (primarily Victorville) (5.10-23, Calico, AFC). While staff acknowledges that cumulatively workers seeking

Socioeconomics and Environmental Justice Table 3
Cumulative Project Construction Employment Needs

Trade	BSPP Total # of Workers for Project Construction by Craft – Peak Month (Month 16)	PSPP Total # of Workers for Project Construction by Craft – Peak Month (Month 17)	GSEP Total # of Workers for Project Construction by Craft – Peak Month (Month 16)	RSEP Total # of Workers for Project Construction by Craft – Peak Month (Month 12)	DSPV Total # of Workers for Project Construction by Craft – Peak Month (Month 6-8)	CSP Total # of Workers for Project Construction by Craft – Peak Month	*TOTAL*	Riverside/ San Bernardino/ Ontario MSA 2006	Riverside/ San Bernardino/ Ontario MSA 2016
Surveyor	16	12	0	0	N/A	0	28	1,420	1,670
Operator	94	90	0	0	N/A	97[10]	281	4,790	5,460
Laborer	229	185	96	52	N/A	152[10]	1472	27,930[1]	32,080[1]
Truck Driver	28	35	0	0	N/A	0	63	27,930[1]	32,080[1]
Oiler	4	4	0	0	N/A	0	8	27,930[1]	32,080[1]
Carpenter	77	100	44	50	N/A	41	341	28,850	32,390
Boilermaker	9	11	0	0	N/A	0	20	4,630[2]	5,330[2]
Paving Crew	0	0	0	0	N/A	0	0	630	720
Pipe Fitter	290	326	200	80	N/A	0	968	4,630	5,330
Electrician	81	150	105	56	N/A	83[10]	532	6,740	7,600
Cement Finisher	80	100	4	6	N/A	49	246	4,110	4,690
Ironworker	42	59	70	32	N/A	69[10]	315	19,460	20,800
Millwright	18	25	22	16	N/A	0	153	2,630[3]	2,960[3]
Tradesman	8	10	382[6]	105[7]	N/A	0	544	27,930[1]	32,080[1]
Project Manager	2	3	0	0	N/A	0	5	10,990[4]	12,380[4]
Construction Mgr	2	3	0	5	N/A	0	10	4,380	5,110
PM Assistant	2	4	0	0	N/A	0	6	10,990[4]	12,380[4]
Support	2	4	0	0	N/A	0	6	120[5]	130[5]
Support Assistant	2	4	0	0	N/A	0	6	120[5]	130[5]
Engineer	7	10	60	36	N/A	0	127	1,370	1,600
Timekeeper	2	3	0	0	N/A	0	5	10,990[4]	12,380[4]
Administrator	5	6	0	0	N/A	0	11	10,990[4]	12,380[4]
Welder	1	1	0	0	N/A	0	2	3,960	4,640
Total Peak Month	*1,001*	*1,145*	*983*	*438*	*622*	*419*	***4,608***	—	—
Local Housing Need[8]	*501*	*573*	*492*	*55[9]*	*93*	*63*	***1,777***	—	—

1 - The "Construction Laborers" category was used.
2 - The "Plumbers, Pipefitters, and Steamfitters" category was used.
3 - The "Machinists" category was used.
4 - The "Supervisors, Construction and Extraction Workers" category was used
5 - The "Helpers – Construction Trades" category was used.
6 - Includes: insulators, painters, teamsters, and 'Solar Field Craft". The solar field craft workers include an estimated five solar field installation crews, with each crew including a Foreman, Equipment Operators, Laborers, Electricians, Ironworkers, Carpenters, Masons, and Pipefitter/Welders.
7 - Includes Teamsters, Heliostat Assembly Craft, Construction Staff, Subcontractors, and Technical Advisors.
8 - Assumes 50% of workers will chose to stay locally.
9 - On-site worker camp is provided for RSEP, providing housing for up to 300 trailers. It is assumed that 75% of the 219 workers seeking local lodging will chose to stay within the local work camp.
10 - The Calico Solar Project AFC, Table 5.10-10 has the following disciplines as Electricians, Ironworkers, Laborers and Operators and Sun Catcher Electricians, Sun Catcher Ironworkers, Sun Catcher Laborers and Sun Catcher Operators. For purpose of the above table, the two disciplines have been added together.
Source: Solar Millennium 2009a, b, c, d, and e.

Socioeconomics and Environmental Justice Table 4
Cumulative Project Operational Employment Needs

Trade	BSPP Total # of Workers for Project Operation	PSPP Total # of Workers for Project Operation	GSEP Total # of Workers for Project Operation	RSEP Total # of Workers for Project Operation	DSPV Total # of Workers for Project Operation	CSP Total # of Workers for Project Operation	*TOTAL*	Riverside/ San Bernardino/ Ontario MSA 2006	Riverside/ San Bernardino/ Ontario MSA 2016
Plant and System Operators	—	—	—	—	—		—	2,030	2,380
Power Plant Operators	—	—	—	—	—		—	310	370
Total	*221*	*134*	*50*	*47*	*15*	***180***	***647***	*2,340*	*2,750*
Local Housing Need[1]	*111*	*67*	*25*	*24*	*4*	***90***	***321***	—	—

[1] Assumes 50% of operational employees will permanently relocate to the cumulative project area.
Source: Solar Millennium 2009a, b, c, d, and e.

short-term temporary housing during the workweek to avoid commuting from their homes in the regional study area could increase housing demand and population in the local area, the extent of these impacts is unknown and speculative.

Based on the availability of local housing, it is assumed that ample temporary short-term housing is available for these workers from a cumulative perspective. Therefore, staff concludes that cumulative project construction within the CSP local study area would not significantly impact the population projections or require the need for new or expanded housing within the local study area. Furthermore, as staff concludes that all workers would come from within the regional study area, with up to 15% of these workers potentially seeking short-term temporary housing during the workweek locally, cumulative construction activities would not require the need for new or expanded public services (police, schools, recreation, hospitals) serving the local study area as no permanent population increase would occur. Staff concludes construction of the CSP would not contribute to adverse cumulative socioeconomic impacts.

In addition, short-term construction-related spending activities of the CSP project are expected to have cumulative economic benefits for the study area (refer below to **Socioeconomics and Environmental Justice Table 3**). The cumulative benefits would increase when revenues accrued as a result of the proposed CSP are combined with spending, and any local revenues accrued as a result of current and future reasonably foreseeable cumulative development projects.

Operation. Operation of the CSP is expected to result in the potential permanent relocation of up to 20 workers into the local study area. **Socioeconomics and Environmental Justice Table 4** presents the most recently published data (Year 2006-2016 projections) on labor force characteristics for the cumulative regional study area pertaining to electrical energy project operational labor skill sets and compares those to major cumulative projects located near the CSP along the I-10 corridor, including the PSPP, GSEP, and the RSEP. As shown in **Socioeconomics and Environmental Justice Table 4**, these cumulative projects are expected to result in a total of 321 workers permanently relocating to the local study area..

Based on the most recently published vacancy rates for the local study area (refer to **Socioeconomics and Environmental Justice Table 3**), adequate permanent housing units are available to these operational employees who may choose to relocate locally to proposed cumulative development projects. Therefore, the CSP is not expected to contribute cumulatively to a required need for new housing in the area. The BSPP, PSPP and RSEP would not pay a school impact fee; however, the GSEP would pay a school impact fee. Staff concludes that any new cumulative demand on schools by permanent relocations to the local study area would be met through the payment of property taxes, which contribute to local public safety, school, and recreational facility funding. As hospitals are private supply and demand based facilities, it is assumed that the cumulative increase in local population can be adequately served by local study area emergency medical facilities. Based on these conclusions, staff finds that operation of the proposed CSP would not contribute cumulatively to an increase in the local population or require the need for new or expanded law enforcement, school, recreational, or emergency medical facilities or staff levels within the CSP regional or local study areas.

Please refer to the **Worker Safety and Fire Protection** section of this report for a detailed discussion of cumulative impacts to fire protection services. Please refer to the **Land Use, Recreation, and Wilderness** section of this document for further analysis of cumulative recreation impacts.

In addition, the long-term operation-related spending activities of the CSP project are expected to have cumulative economic benefits for the study area (refer below to **Socioeconomics and Environmental Justice Table 3**). The cumulative benefits would increase when revenues accrued as a result of the proposed CSP are combined with spending, and any local revenues accrued as a result of current and future reasonably foreseeable cumulative development projects.

C.10.10 NOTEWORTHY PUBLIC BENEFITS

Noteworthy public benefits include the direct, indirect, and induced impacts of a proposed power plant. For example, the dollars spent on or resulting from the construction and operation of the Calico Solar Project would have a ripple effect on the local economy. This ripple effect is measured by an input-output economic model. The model relies on a series of multipliers to provide estimates of the number of times each dollar of input or direct spending cycles through the economy in terms of indirect and induced output, or additional spending, personal income, and employment. The typical input-output model used by economists and the one used for this analysis by the applicant is the IMPLAN model. IMPLAN multipliers indicate the ratio of direct impacts to indirect and induced impacts.

Staff reviewed the results of the IMPLAN model and found them to be reasonable considering data provided by the applicant as well as data obtained by staff from governmental agencies, trade associations, and public interest research groups. The proposed project site would be owned and operated by Stirling Energy Systems and would employ workers and purchase supplies and services for the life of the project.

Employees would use salaries and wages to purchase goods and services from other businesses. Those businesses make their own purchases and hire employees, who also spend their salaries and wages throughout the local and regional economy. This effect of indirect (local spending by businesses that provide goods and services to the project) 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.

Indirect and induced economic impacts from construction would take place over a 41-month period. All estimated construction and operation impacts would take place within San Bernardino County. The economic benefits of the proposed project, as required by the Energy Commission regulations and resulting from the IMPLAN model are shown above in **Socioeconomics Table 5.**

Socioeconomics and Environmental Justice Table 5
Calico Solar Economic Benefits (2008 dollars)

Fiscal Benefits	
Estimated annual property taxes	$220,000 (on property components)
State and local sales taxes: Construction	$700,000
State and local sales taxes: Operation	$650,000
School Impact Fee	N/A
Non-Fiscal Benefits	
Total capital costs	$1 billion
Construction payroll	$159 million
Annual Operations and Maintenance	
Construction materials and supplies	$9.1 million
Operations and maintenance supplies	$8.4 million
Direct, Indirect, and Induced Benefits	
Estimated Direct	
Construction	393 jobs
Operation	180 full-time positions
Estimated Indirect	
Construction Jobs	99
Construction Income	$10.3 million
Operation Jobs	97
Operation Income	$2.2 million
Estimated Induced	
Construction Jobs	145
Construction Income	$10.8 million
Operation Jobs	146
Operation Income	$2.6 million

Source: Calico Solar AFC.

C.10.11 COMPLIANCE WITH LORS

Staff has considered the Federal and State laws, ordinances, regulations and standards as identified in **Socioeconomics Figure 1** and has found no potential significant adverse impacts regarding the Emergency Economic Stabilization Act of 2008, California Education Code 17620, California Government Code Section 65996-65997 and the California Revenue and Taxation Code Section 70-74.7.

Staff concludes that construction and operation of the Calico Solar Project would be in compliance with all applicable LORS regarding long-term and short-term project impacts in the area of **Socioeconomics and Environmental Justice.**

C.10.12 FACILITY CLOSURE AND DECOMMISSIONING

According to Section 3.12 of the applicant's project description, the solar generating facility is expected to have a lifespan of 40 years. At any point during this time, temporary or permanent closure of the solar facility could occur. Temporary closure would be a result of necessary maintenance, hazardous weather conditions, or damage due to a natural disaster. Permanent closure would be a result of damage that is beyond repair, adverse economic conditions, or other significant reasons.

Both temporary and permanent closures would require the applicant to submit to the Energy Commission a contingency plan or a decommissioning plan. A decommissioning plan would be implemented to ensure compliance with applicable socioeconomic LORS, removal of equipment and shutdown procedures, site restoration, potential decommissioning alternatives, and the costs and source of funds associated with decommissioning activities.

Upon closure of the facility or decommissioning, it is likely that the applicant would be required to restore lands affected by the project to their pre-project state. Given the fact that the proposed project site is located on undeveloped land with current evidence of high levels of disturbance (due to OHV use), staff anticipates that project decommissioning would have impacts similar in nature to proposed project construction activities. Therefore, given the temporary nature of decommissioning activities and the eventual return of the lands to their current state, staff concludes the effects of decommissioning on socioeconomic resources would not be adverse.

C.10.13 RESPONSE TO COMMENTS

Staff received comments on the Socioeconomics section of the Preliminary Staff Assessment (PSA) from the following party:

Land Use Services Department (LUSD), County of San Bernardino, letter dated June 4, 2010

Energy Commission staff has summarized only the comments in the LUSD letter that relate to Socioeconomics and has provided a response below. All references to "staff" indicate Energy Commission staff.

LUSD Comment. The County of San Bernardino identified key issues for large scale renewable energy projects as follows: mitigation for infrastructure impacts; county service impacts, operation costs, and the loss of recreation/tourism revenue. The County states that it is developing a fiscal impact analysis to determine project-specific cost impacts that will be sought from project proponents. The analysis is ongoing at this time. The LUSD letter states the County supports the creation of 393 construction jobs and the 180 full-time new permanent jobs created by the Project. The SA/DEIS Section C.10.10 discusses the estimated economic benefits from the Project: $220 million in annual property taxes; $159 million in construction wages; and an additional $25.9 million in indirect and induced effects related to supplies, services and household spending. Annual direct spending is estimated at $17.5 million for the 30-year life of the Project (SA/DEIS page C.10-19).

Staff Response. Staff acknowledges the county is developing a fiscal impact analysis regarding the energy/solar projects within their jurisdiction. The county of San Bernardino service impacts have been analyzed above, in the C.10 Socioeconomic and Environmental Justice, sub-section, Result in Substantial Physical Impacts to Government Facilities. In addition, further analysis can be found in the C.15 Worker Safety & Fire Protection section of this Final Staff Assessment.

Staff acknowledges the county supports the creation of construction and full-time new permanent jobs, and the economic benefits that would be created from the Calico Solar Project.

Staff acknowledges the county's comment on the loss of recreation/tourism revenue. As discussed in section Noteworthy Public Benefits section of this document, the Calico Solar project would provide jobs and wages that would induce spending from other businesses. Those businesses would make their own purchases and hire employees, who would spend their salaries and wages throughout the local and regional economy. Staff concludes the indirect and induced spending from the Calico Solar project would likely contribute to spending in the recreation and tourism sectors in San Bernardino County.

C.10.14 PROPOSED CONDITONS OF CERTIFICATION/MITIGATION MEASURES

The proposed project does not require any socioeconomic conditions of certification or mitigation measures.

C.10.15 CONCLUSIONS

Staff concludes that construction, operation, and demolition of the proposed Calico Solar Project would not cause, under CEQA, a significant direct, indirect, or cumulative adverse socioeconomic impact on the study area's housing, schools, parks and recreation, law enforcement, and emergency medical services. Socioeconomic impacts of the Calico Solar Project would not combine with impacts of any past, present, or reasonably foreseeable local projects to result in cumulatively considerable local impacts. Hence, there are no socioeconomic environmental justice issues related to this project. The Calico Solar Project, as proposed, is consistent with applicable Socioeconomic LORS.

Estimated gross public benefits from the Calico Solar Project include increases in sales, employment, and income in San Bernardino County and the surrounding region during construction and operation. There would be an estimated average of 393 direct project-related construction jobs for the 41 months of construction. The Calico Solar Project would have an estimated total capital cost of $1 billion and a construction payroll of $159 million annually. Total sales and use taxes during construction are estimated to be approximately $700,000 each year for the life of the construction project; during operation the local sales tax is estimated to be $650,000 annually. An estimated $9.1

million would be spent locally for materials and equipment during construction, and an additional $8.4 million would be spent annually for the project's local operation and maintenance budget.

C.10.16 REFERENCES

California Department of Education, Data and Statistics, Student Demographics, School Year: 2006-07. http://www.cde.ca.gov/ds/

California Highway Patrol, http://www.chp.ca.gov

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GSEP 2009a. Genesis Solar Energy Project/T. Bernhardt (tn:53083) Application for Certification for the Genesis Solar Energy Project. 08/31/2009.

San Bernardino County Regional Parks. http://www.sbcounty.gov/parks

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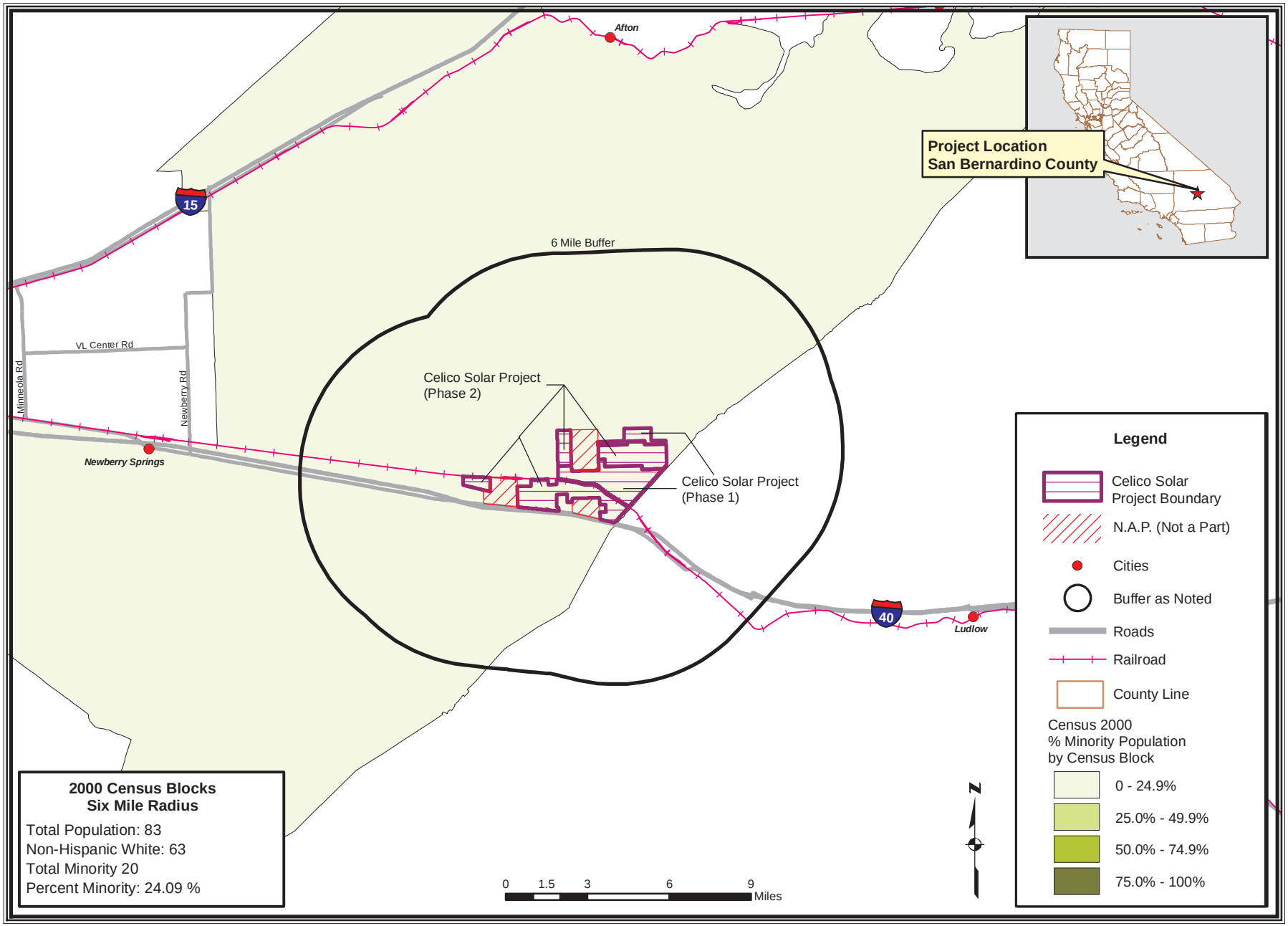
U.S. Census Bureau, Average Household Size: 2000, California by Country. http://factfinder.census.gov/servlet/ThematicMapFramesetServlet?_bm=y&-geo_id=04000US06&-tm_name=DEC_2000_SF1_U_M00001&-ds_name=DEC_2000_SF1_U&-tree_id=400#?342,268

SOCIOECONOMICS - FIGURE 1

Calico Solar Project - Census 2000 Minority Population by Census Block - Six Mile Buffer



CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

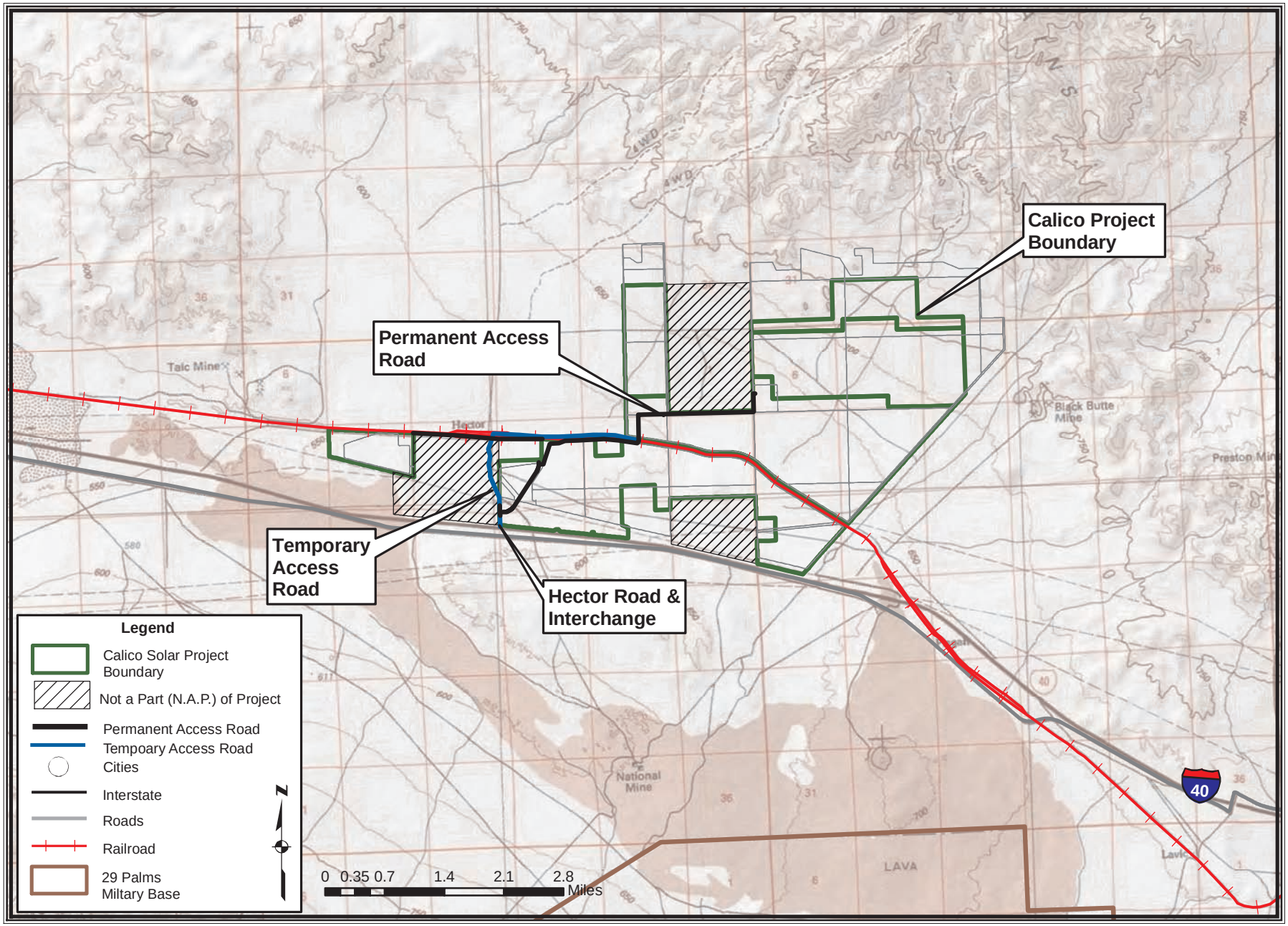
SOURCE: ESRI and Tele Atlas Data California Energy Commission Statewide Power Plant Maps 2009 and URS - Census 2000 PL 94-171 Data

C.11 – TRAFFIC AND TRANSPORTATION

The Traffic and Transportation section of the Supplemental Staff Assessment will be filed subsequently and is not included in this document.

TRAFFIC AND TRANSPORTATION - FIGURE 1

Calico Solar Project - Local Transportation Network



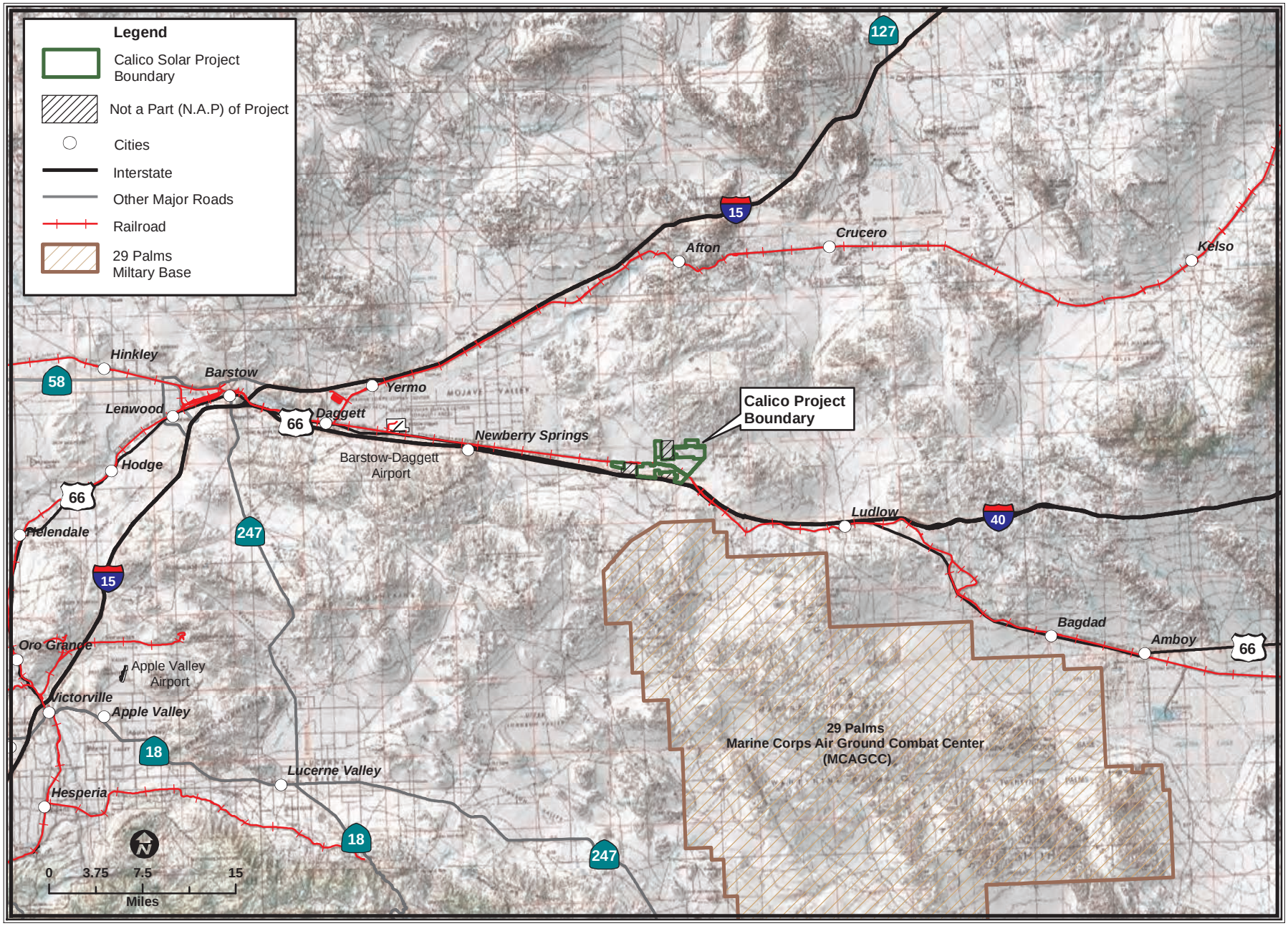
TRAFFIC AND TRANSPORTATION

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

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

TRAFFIC AND TRANSPORTATION - FIGURE 2

Calico Solar Project - Regional Transportation Network



TRAFFIC AND TRANSPORTATION

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

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

C.12 – TRANSMISSION LINE SAFETY AND NUISANCE

Testimony of Obed Odoemelam, Ph.D.

C.12.1 SUMMARY OF CONCLUSIONS

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

C.12.2 INTRODUCTION

The purpose of this staff assessment is to assess the proposed Calico Solar Project's transmission line design and operational plan to determine whether its related field and non-field impacts would constitute a significant environmental hazard in the areas around the proposed route. All related health and safety laws, ordinances, regulations, and standards (LORS) are currently aimed at minimizing such hazards. Staff's analysis focuses on the following issues taking into account both the physical presence of the line and the physical interactions of its electric and magnetic fields:

- aviation safety;
- interference with radio-frequency communication;
- audible noise;
- fire hazards;
- hazardous shocks;
- nuisance shocks; and
- electric and magnetic field (EMF) exposure.

The federal, state, and local laws and policies in the next section apply to the control of the field and nonfield impacts of electric power lines. Staff's analysis examines the project's compliance with these requirements.

C.12.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The potential magnitude of the line impacts of concern in this staff analysis depends on compliance with the listed design-related LORS and industry practices. These LORS and practices have been established to maintain impacts below levels of potential significance. Thus, if staff determines that the project would comply with applicable LORS, we would conclude that any transmission line-related safety and nuisance impacts would be less than significant. The nature of these individual impacts is discussed below together with the potential for compliance with the LORS that apply.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

TRANSMISSION LINE SAFETY AND NUISANCE (TLSN) TABLE 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Aviation Safety	
Federal	
Title 14, Part 77 of the Code of Federal Regulations (CFR),"Objects Affecting the Navigable Air Space"	Describes the criteria used to determine the need for a Federal Aviation Administration (FAA) "Notice of Proposed Construction or Alteration" in cases of potential obstruction hazards.
FAA Advisory Circular No. 70/7460-1G, "Proposed Construction and/or Alteration of Objects that May Affect the Navigation Space"	Addresses the need to file the "Notice of Proposed Construction or Alteration" (Form 7640) with the FAA in cases of potential for an obstruction hazard.
FAA Advisory Circular 70/460-1G, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting objects that may pose a navigation hazard as established using the criteria in Title 14, Part 77 of the CFR.
Interference with Radio Frequency Communication	
Federal	
Title 47, CFR, section 15.2524, Federal Communications Commission (FCC)	Prohibits operation of devices that can interfere with radio-frequency communication.
State	
California Public Utilities Commission (CPUC) General Order 52 (GO-52)	Governs the construction and operation of power and communications lines to prevent or mitigate interference.
Audible Noise	
Local	
San Bernardino County General Plan, Noise Element	References the county's Ordinance Code for noise limits.
San Bernardino County Noise Ordinance	Establishes performance standards for planned residential or other noise-sensitive land uses.

Applicable LORS	Description
Hazardous and Nuisance Shocks	
State	
CPUC GO-95, "Rules for Overhead Electric Line Construction"	Governs clearance requirements to prevent hazardous shocks, grounding techniques to minimize nuisance shocks, and maintenance and inspection requirements.
Title 8, California Code of Regulations (CCR) section 2700 et seq. "High Voltage Safety Orders"	Specifies requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment.
National Electrical Safety Code	Specifies grounding procedures to limit nuisance shocks. Also specifies minimum conductor ground clearances.
Industry Standards	
Institute of Electrical and Electronics Engineers (IEEE) 1119, "IEEE Guide for Fence Safety Clearances in Electric-Supply Stations"	Specifies the guidelines for grounding-related practices within the right-of-way and substations.
Electric and Magnetic Fields	
State	
GO-131-D, CPUC "Rules for Planning and Construction of Electric Generation Line and Substation Facilities in California"	Specifies application and noticing requirements for new line construction including EMF reduction.
CPUC Decision 93-11-013	Specifies CPUC requirements for reducing power frequency electric and magnetic fields.
Industry Standards	
American National Standards Institute (ANSI/IEEE) 644-1944 Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines	Specifies standard procedures for measuring electric and magnetic fields from an operating electric line.
Fire Hazards	
State	
14 CCR sections 1250-1258, "Fire Prevention Standards for Electric Utilities"	Provides specific exemptions from electric pole and tower firebreak and conductor clearance standards and specifies when and where standards apply.

C.12.4 PROPOSED PROJECT

C.12.4.1 SETTING AND EXISTING CONDITIONS

As discussed by the applicant, Calico Solar, LLC, the proposed Calico Solar Project would be developed in two phases. Phase 1 would have a generating capacity of 275 megawatts (MW) while Phase 2 would have a capacity of 575 MW. The total area required for the two phases would be approximately 6,215 acres of federal land in San Bernardino Country currently managed by the Bureau of Land Management (BLM). The project site is approximately 37 miles east of Barstow, 17 miles east of Newberry Springs and 57 miles northeast of Victorville. Each phase of the proposed facility would

consist of a solar field and related electric power generating equipment from which the generated power would be transmitted to the Southern California Edison's Pisgah Substation (near the southeastern corner of the site) for delivery to the California Independent Operator (CAISO)-operated power grid. The tie-in line for Phase 1 would be an overhead 2-mile long, single-circuit, 230-kV line extending from the project's on-site substation to SCE's Pisgah Substation (SES 2008a pp.1-3, and 3-30 through 3-33).

The proposed project and related transmission line are in an uninhabited open desert area traversed by several underground and overhead transmission lines. The route of the proposed line would extend over generally uninhabited desert land were the nearest residence is approximately 9,000 feet east of the Pisgah Substation (SES 2008a 5.12-6), meaning that there would not be the type of residential field exposure that has been of health concern in recent years.

C.12.4.2 PROJECT DESCRIPTION

The proposed tie-in line system for the two project phases would consist of the following individual segments:

- A new, single-circuit 230-kV overhead transmission line extending 2 miles from the on-site project switchyard to SCE's Pisgah Substation; and
- The project's on-site 230-kV switchyard from which the conductors would extend to the SCE Pisgah Substation.

The on-site segment of the proposed project line would be located within its own unshared right-of-way as it extends from the on-site substation, crossing over three SCE transmission lines of 230 kV and 500 kV as it extends to the connection point within the Pisgah Substation. The proposed routing scheme was chosen to minimize the length of the required line and to locate the line within existing line corridors to the extent possible. To accommodate the power from Phase 1 and later Phase 2, SCE has proposed expanding and upgrading the 230–kV Pisgah Substation to 500 kV, looping the Eldorado-Lugo 500-kV line into the Pisgah Substation and upgrading 65 miles of the existing Lugo-Pisgah No 2 230 line to 500 kV. Modifications within SCE's El Dorado and Lugo Substations would also be necessary. These project-related line modifications would be under CPUC and BLM jurisdiction and would thus be made according to CPUC guidelines ensuring compliance with existing health and safety LORS (SES 2008a pp. 3-27 through 3-36).

The conductors for the proposed project Phase I line would be aluminum steel-reinforced cables supported on steel towers or steel poles as typical of similar SCE lines. The applicant provided the details of the proposed H-Frame or Lattice-Tower support structures as related to line safety, maintainability, and field reduction efficiency. These support structures would be spaced between 650 feet and 850 feet apart (SES 2008a, page 3-28, and Figures 3.4-39).

C.12.4.3 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Direct Impacts and Mitigation Methods

Aviation Safety

Any potential hazard to area aircraft would relate to the potential for collision in the navigable airspace. The requirements in the LORS listed on **TLSN Table 1** establish the standards for assessing the potential for obstruction hazards within the navigable space and establish the criteria for determining when to notify the FAA about such hazards. These regulations require FAA notification in cases of structures over 200 feet from the ground, or if the structure is less than 200 feet in height but would be located within the restricted airspace in the approaches to public or military airports. For airports with runways longer than 3,200 feet, the restricted space is defined by the FAA as an area extending 20,000 feet from the runway. For airports with runways of 3,200 feet or less, the restricted airspace would be an area that extends 10,000 feet from this runway. For heliports, the restricted space is an area that extends 5,000 feet.

The closest area airports are too far from the proposed project and related facilities pose a collision hazard to utilizing aircraft according to FAA criteria. Furthermore, the maximum height of 110 feet for the proposed line support structures (SES 2008a p. 3-31 and Figure 3.4-39) would be much less than the 200-foot height that triggers the concern over aviation hazard according to FAA requirements.

Interference with Radio-Frequency Communication

Transmission line-related radio-frequency interference is one of the indirect effects of line operation and is produced by the physical interactions of line electric fields. Such interference is due to the radio noise produced by the action of the electric fields on the surface of the energized conductor. The process involved is known as *corona discharge*, but is referred to as *spark gap electric discharge* when it occurs within gaps between the conductor and insulators or metal fittings. When generated, such noise manifests itself as perceivable interference with radio or television signal reception or interference with other forms of radio communication. Since the level of interference depends on factors such as line voltage, distance from the line to the receiving device, orientation of the antenna, signal level, line configuration and weather conditions, maximum interference levels are not specified as design criteria for modern transmission lines. The level of any such interference usually depends on the magnitude of the electric fields involved and the distance from the line. The potential for such impacts is therefore minimized by reducing the line electric fields and locating the line away from inhabited areas.

The proposed project lines would be built and maintained in keeping with standard SCE practices that minimize surface irregularities and discontinuities. Moreover, the potential for such corona-related interference is usually of concern for lines of 345 kV and above, and not for 230-kV lines such as the proposed lines. The line's proposed low-corona designs are used for all SCE lines of similar voltage rating to reduce surface-field strengths and the related potential for corona effects. Since the proposed lines would traverse uninhabited open space, staff does not expect any corona-related radio-

frequency interference or related complaints and does not recommend any related condition of certification.

Audible Noise

The noise-reducing designs related to electric field intensity are not specifically mandated by federal or state regulations in terms of specific noise limits. As with radio noise, such noise is limited instead through design, construction, or maintenance practices established from industry research and experience as effective without significant impacts on line safety, efficiency, maintainability, and reliability. Audible noise usually results from the action of the electric field at the surface of the line conductor and could be perceived as a characteristic crackling, frying, or hissing sound or hum, especially in wet weather. Since the noise level depends on the strength of the line electric field, the potential for perception can be assessed from estimates of the field strengths expected during operation. Such noise is usually generated during rainfall, but mainly from overhead lines of 345 kV or higher. It is, therefore, not generally expected at significant levels from lines of less than 345 kV as proposed for the Calico Solar Project. Research by the Electric Power Research Institute (EPRI 1982) has validated this by showing the fair-weather audible noise from modern transmission lines to be generally indistinguishable from background noise at the edge of a right-of-way of 100 feet or more. Since the low-corona designs are also aimed at minimizing field strengths, staff does not expect the proposed line operation to add significantly to current background noise levels in the project area. For an assessment of the noise from the proposed line and related facilities, please refer to staff's analysis in the **Noise and Vibration** section.

Fire Hazards

The fire hazards addressed through the related LORS in **TLSN Table 1** are those that could be caused by sparks from conductors of overhead lines, or that could result from direct contact between the line and nearby trees and other combustible objects.

Standard fire prevention and suppression measures for similar SCE lines would be implemented for the proposed project lines (SES 2008a, p. 3-29). The applicant's intention to ensure compliance with the clearance-related aspects of GO-95 would be an important part of this mitigation approach. Condition of Certification **TLSN-3** is recommended to ensure compliance with important aspects of the fire prevention measures.

Hazardous Shocks

Hazardous shocks are those that could result from direct or indirect contact between an individual and the energized line, whether overhead or underground. Such shocks are capable of serious physiological harm or death and remain a driving force in the design and operation of transmission and other high-voltage lines.

No design-specific federal regulations have been established to prevent hazardous shocks from overhead power lines. Safety is assured within the industry from compliance with the requirements specifying the minimum national safe operating clearances applicable in areas where the line might be accessible to the public.

The applicant's stated intention to implement the GO-95-related measures against direct contact with the energized line (SES 2008a, p.3-29) would serve to minimize the risk of hazardous shocks. Staff's recommended Condition of Certification **TLSN-1** would be adequate to ensure implementation of the necessary mitigation measures.

Nuisance Shocks

Nuisance shocks are caused by current flow at levels generally incapable of causing significant physiological harm. They result mostly from direct contact with metal objects electrically charged by fields from the energized line. Such electric charges are induced in different ways by the line's electric and magnetic fields.

There are no design-specific federal or state regulations to limit nuisance shocks in the transmission line environment. For modern overhead high-voltage lines, such shocks are effectively minimized through grounding procedures specified in the National Electrical Safety Code (NESC) and the joint guidelines of the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers (IEEE). For the proposed project line, the project owner will be responsible in all cases for ensuring compliance with these grounding-related practices within the right-of-way.

The potential for nuisance shocks around the proposed line would be minimized through standard industry grounding practices (SES 2008a, p. 3-31). Staff recommends Condition of Certification **TLSN-4** to ensure such grounding for the proposed project.

Electric and Magnetic Field Exposure

The possibility of deleterious health effects from EMF exposure has increased public concern in recent years about living near high-voltage lines. Both electric and magnetic fields occur together whenever electricity flows, and exposure to them together is generally referred to as *EMF exposure*. The available evidence as evaluated by the CPUC, other regulatory agencies, and staff has not established that such fields pose a significant health hazard to exposed humans. There are no health-based federal regulations or industry codes specifying environmental limits on the strengths of fields from power lines. Most regulatory agencies believe, as staff does, that health-based limits are inappropriate at this time. They also believe that the present knowledge of the issue does not justify any retrofit of existing lines.

Staff considers it important, as does the CPUC, to note that while such a hazard has not been established from the available evidence, the same evidence does not serve as proof of a definite lack of a hazard. Staff therefore considers it appropriate, in light of present uncertainty, to recommend feasible reduction of such fields without affecting safety, efficiency, reliability, and maintainability.

While there is considerable uncertainty about EMF health effects, the following facts have been established from the available information and have been used to establish existing policies:

- Any exposure-related health risk to the exposed individual will likely be small.
- The most biologically significant types of exposures have not been established.
- Most health concerns are about the magnetic field.

- There are measures that can be employed for field reduction, but they can affect line safety, reliability, efficiency, and maintainability, depending on the type and extent of such measures.

State's Approach to Regulating Field Exposures

In California, the CPUC (which regulates the installation and operation of many high-voltage lines owned and operated by investor-owned utilities) has determined that only no-cost or low-cost measures are presently justified in any effort to reduce power line fields beyond levels existing before the present health concern arose. The CPUC has further determined that such reduction should be made only in connection with new or modified lines. It requires each utility within its jurisdiction to establish EMF-reducing measures and incorporate such measures into the designs for all new or upgraded power lines and related facilities within their respective service areas. The CPUC further established specific limits on the resources to be used in each case for field reduction. Such limitations were intended by the CPUC to apply to the cost of any redesign to reduce field strength or relocation to reduce exposure. Publicly owned utilities, which are not within the jurisdiction of the CPUC, voluntarily comply with these CPUC requirements. This CPUC policy resulted from assessments made to implement CPUC Decision 93-11-013.

The CPUC has recently revisited the EMF management issue to assess the need for policy changes to reflect the available information on possible health impacts. The findings specified in Decision D.06-1-42 of January 2006, did not point to a need for significant changes to existing field management policies. Since there are no residences in the immediate vicinity of the proposed project line, there would not be the long-term residential EMF exposures mostly responsible for the health concern of recent years. The only project-related EMF exposures of potential significance would be the short-term exposures of plant workers, regulatory inspectors, maintenance personnel, visitors, or individuals in the vicinity of the line. These types of exposures are short term and well understood as not significantly related to the health concern.

In keeping with this CPUC policy, staff requires a showing that each proposed overhead line would be designed according to the EMF-reducing design guidelines applicable to the utility service area involved. These field-reducing measures can impact line operation if applied without appropriate regard for environmental and other local factors bearing on safety, reliability, efficiency, and maintainability. Therefore, it is up to each applicant to ensure that such measures are applied in ways that prevent significant impacts on line operation and safety. The extent of such applications would be reflected by ground-level field strengths as measured during operation. When estimated or measured for lines of similar voltage and current-carrying capacity, such field strength values can be used by staff and other regulatory agencies to assess the effectiveness of the applied reduction measures. These field strengths can be estimated for any given design using established procedures. Estimates are specified for a height of one meter above the ground, in units of kilovolts per meter (kV/m), for the electric field, and milligauss (mG) for the companion magnetic field. Their magnitude depends on line voltage (in the case of electric fields), the geometry of the support structures, degree of cancellation from nearby conductors, distance between conductors, and, in the case of magnetic fields, amount of current in the line.

Since the CPUC currently requires that most new lines in California be designed according to the EMF-reducing guidelines of the electric utility in the service area involved, their fields are required under this CPUC policy to be similar to fields from similar lines in that service area. Designing the proposed project line according to existing SCE field strength-reducing guidelines would constitute compliance with the CPUC requirements for line field management.

Industry's and Applicant's Approach to Reducing Field Exposures

The present focus is on the magnetic field because unlike electric fields, it can penetrate the soil, buildings, and other materials to produce the types of human exposures at the root of the health concern of recent years. The industry seeks to reduce exposure, not by setting specific exposure limits, but through design guidelines that minimize exposure in each given case. As one focuses on the strong magnetic fields from the more visible high-voltage power lines, staff considers it important, for perspective, to note that an individual in a home could be exposed to much stronger fields while using some common household appliances than from high-voltage lines (National Institute of Environmental Health Services and the U.S. Department of Energy, 1998). The difference between these types of field exposures is that the higher-level, appliance-related exposures are short term, while the exposures from power lines are lower level, but long term. Scientists have not established which of these types of exposures would be more biologically meaningful in the individual. Staff notes such exposure differences only to show that high-level magnetic field exposures regularly occur in areas other than around high-voltage power lines.

As with similar SCE lines, specific field strength-reducing measures would be incorporated into the proposed line's design to ensure the field strength minimization currently required by the CPUC in light of the concern over EMF exposure and health.

The field reduction measures to be applied include the following:

1. increasing the distance between the conductors and the ground to an optimal level;
2. reducing the spacing between the conductors to an optimal level;
3. minimizing the current in the line; and
4. arranging current flow to maximize the cancellation effects from interacting of conductor fields.

Since the routes of the proposed project lines would have no nearby residences, the long-term residential field exposures at the root of the health concern of recent years would not be a significant concern. The field strengths of most significance in this regard would be as encountered at the edge of the line's right-of-way. These field intensities would depend on the effectiveness of the applied field-reducing measures. The applicant (SES 2008a, p. 3-34 and Appendix I) calculated the maximum electric and magnetic field intensities expected along the proposed route. The maximum electric field strength was calculated as 0.2 kV/m at the edge of the 200-foot right-of-way while the maximum magnetic field strength was calculated as 25 mG at the same location. These field strength values are similar to those of similar SCE lines (as required under current CPUC regulations) but, in the case of the magnetic field, the estimate is much less than the 200 mG currently specified by the few states with regulatory limits. The

requirements in Condition of Certification **TLSN-2** for field strength measurements are intended to validate the applicant's assumed field reduction efficiency.

C.12.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be a 275 MW solar facility located within the central portion of the proposed 850 MW project. This alternative is analyzed because it could be constructed without upgrading the SCE Lugo-Pisgah transmission line. These alternative's boundaries reflect the revisions to the locations of the transmission line, substation, laydown area, and control facilities as shown in **Alternatives Figure 1**.

C.12.5.1 SETTING AND EXISTING CONDITIONS

As with the proposed project, the Reduced Acreage Alternative would include numerous groups of 60 solar collectors connected by underground electrical cables. It is after aggregation at the project substation that the generated power would be transmitted to SCE's existing 230-kV Pisgah Substation. There would be fewer solar collector groups in this alternative but the system of aggregation and method of power transmission would be the same as the proposed project. Please see the discussion of existing conditions within the potentially affected BLM lands under Section C.12.4.1

C.12.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff's analysis focuses on the transmission line required to serve the generation facility, and addresses the following issues taking into account both the physical presence of the line and the physical interactions of its electric and magnetic fields:

- aviation safety;
- interference with radio-frequency communication;
- audible noise;
- fire hazards;
- hazardous shocks;
- nuisance shocks; and
- electric and magnetic field (EMF) exposure.

As with the proposed project, the power from the proposed Reduced Acreage Alternative would be transmitted to the SCE power grid through the Pisgah Substation using the same 230-kV as proposed; the field impacts on the line would be proportionately smaller. Since the line would be designed and operated according to the applicable SCE guidelines, the magnitude of the field and nonfield impacts of concern in this analysis would be as expected for SCE lines of the same voltage and current-carrying capacity. These impacts would manifest themselves as the noted effects on radio frequency communication, audible noise, hazardous and nuisance shocks, electric and magnetic field levels, fire hazards and aviation safety.

C.12.5.3 CEQA LEVEL SIGNIFICANCE

Since staff finds the impacts of line operations to be potentially less than significant for the proposed SCE design, staff would expect the design's implementation for the Reduced Acreage Alternative (as required by the four recommended conditions for certification) to result in impacts that would be less than significant.

C.12.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

Due to the reduction in project size and impacts associated with the northern portion of the originally proposed project layout, the Avoidance of Donated and Acquired Lands Alternative shown in **Alternatives Figure 2** will be addressed in the **Alternatives** section of this SSA.

C.12.7 NO PROJECT/NO ACTION ALTERNATIVE

There are three No Project/No Action Alternatives evaluated as follows:

NO PROJECT/NO ACTION ALTERNATIVE #1

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

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

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

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

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

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or

operated on the site and no new transmission system construction or upgrades. As a result, no impacts to transmission line safety and nuisance from construction or operation of the proposed project would occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

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

NO PROJECT/NO ACTION ALTERNATIVE #2

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

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

Because the CDCA Plan would be amended, it is possible that the site would be developed with a different solar technology. As a result, the construction of new transmission lines or upgrades to the existing system would result from the construction and operation of another renewable facility and would likely result in impacts to transmission line safety and nuisance similar to those of the proposed project. As such, this No Project/No Action Alternative could result in impacts to transmission line safety and nuisance similar to the impacts under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3

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

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

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no

corresponding land disturbance. As a result, the transmission system impacts are not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in impacts to transmission line safety and nuisance. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.12.8 PROJECT-RELATED FUTURE ACTIONS - TRANSMISSION LINE SAFETY AND NUISANCE

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.12.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

The 275 MW Early Interconnection would consist of construction of approximately one to two new 220 kV structures within SCE's existing 220 kV ROW and/or within the expanded Pisgah Substation fence line to support the gen-tie line coming from the Calico Solar Project to facilitate the 220 kV service drop from the last Calico Solar Project's gen-tie structure into the Pisgah Substation.

The 850 MW Full Build-Out would consist of the construction of a single-circuit 500 kV transmission lines on approximately 57.1 miles of existing ROW and approximately 9.8 miles of new ROW. The existing 220 kV Lugo-Pisgah No. 2 transmission line would be rebuilt with 500 kV single circuit structures. The completed project would result in a new single circuit transmission line built to 500 kV standards on both existing and new ROW from the Pisgah Substation to the Lugo Substation. The upgrades also involves looping the existing 500 kV Eldorado-Lugo single circuit transmission line into the Pisgah Substation. The new 500 kV line would cross over the existing 220 kV Cima–Eldorado No. 1 and No. 2 circuits. All portions of the transmission lines would be designed to CPUC General Order 95 standards.

C.12.8.2 ENVIRONMENTAL IMPACTS

The potential safety and nuisance issues associated with the proposed upgrades include public health effects from EMF exposure, noise, communications interference, aviation, fire, and electric shock hazard. The proposed transmission line would be built to meet specifications by the CPUC General Order 95, SCE, other regulatory agencies, and local governments designed to minimize these potential nuisances and hazards.

Electromagnetic Field. Since the upgraded 500 kV line would be operated at a higher voltage than the existing 220 kV line, the magnitude of the electric field along the line route would increase. The magnetic field may also change, because its intensity depends directly on current levels, however, phasing with the other existing lines in the corridor can actually reduce magnetic fields in some instances. SCE would prepare an Electric and Magnetic Field (EMF) Management Plan as part of its project application to the CPUC that would include changes in EMF levels associated with the upgrades.

There remains a lack of consensus in the scientific community in regard to public health impacts due to EMF at the levels expected from electric power facilities. Since the work would largely be within existing corridors, the upgrade-related increases in EMF intensity would lead to corresponding increases in human exposure to the line's magnetic fields. The nearest residences may be adjacent to the new ROW near the City of Hesperia and Lugo Substation. Line workers would also be exposed to EMF in close proximity to the lines; however, this type of short-term exposure is not significantly related to the present health concern.

There are no federal or State standards limiting human exposure to EMFs from transmission lines or substation facilities in California. For those reasons, EMF is not considered in this analysis as a CEQA/NEPA issue and no impact significance is presented.

Other potential impacts related to electric power facility projects, are both safety and nuisance issues, and include: radio/television/electronic equipment interference; induced currents and shock hazards and potential effects on cardiac pacemakers.

Noise and Communications Interference. Audible noise can be produced by a transmission line and is related to the corona which is a function of line voltage, diameter, and condition. Corona noise is discussed in the **Noise and Vibration** section. Corona can also cause interference with radio and television reception. The project would be designed to minimize corona noise and interference by proper selection of the conductor and associated hardware.

Induced Electric Fields. A conducting object, such as a vehicle or person in an electric field, would experience induced voltages and currents. The strength of the induced current depends on the electric field strength, the size and shape of the conducting object, and the object-to ground resistance. When a conducting object is isolated from the ground and a grounded person touches the object, a perceptible current or shock may occur as the current flows to the ground. Proper design standards would be implemented to prevent hazardous and nuisance shocks by ensuring that metallic objects on or near the ROW are grounded and that sufficient clearances are provided at roadways and parking lots to keep electric fields at these locations low enough to prevent vehicle short-circuit currents from exceeding 5 milliamperes (mA).

Electric Shock Hazards. Magnetic fields can also induce voltages and currents in conducting objects. Typically, this requires a long metallic object, such as a wire fence or above-ground pipeline that is grounded at only one location. A person who closes an electrical loop by grounding the object at a different location would experience a shock similar to that described above for an ungrounded object. Design standards for managing this issue dictate multiple grounds on fences or pipelines, especially those that are oriented parallel to the transmission line. The SCE upgrades would be constructed in conformance with CPUC GO 95 and Title 8 CCR 2700 requirements. These regulations require sufficient grounding to ensure that hazardous shocks do not occur. Therefore, hazardous shocks are unlikely as a result of project construction, operation, or maintenance. A shield wire would be installed as a feature of the project.

Aviation Safety. Standards for determining obstructions in navigable airspace such as a transmission line are determined by the Federal Aviation Administration (FAA). The upgrades would be built in conformance with FAA requirements to protect aviation safety.

Fire Hazard. The CPUC has established clearances for transmission lines from other man-made and natural structures as well as tree-trimming requirements to avoid fire hazards. SCE would maintain the transmission line corridor and immediate area in accordance with existing regulations and accepted industry practices that would include identification and abatement of any fire hazards.

C.12.8.3 MITIGATION

Because there is no agreement among scientists that exposure to EMF creates any potential health risk, and because CEQA and NEPA do not define or adopt any standards to address the potential health risk impacts of possible exposure to EMFs, this analysis does not consider magnetic fields in the context of CEQA/NEPA and determination of environmental impacts.

However, recognizing that public concern remains, the CPUC does require, pursuant to GO 131-D, Section X.A, that all applications for a Certificate of Public Convenience and Necessity (CPCN) include a description of the measures taken or proposed by the utility to reduce the potential for exposure to EMFs generated by the project. The CPUC has developed an interim policy that requires utilities, among other things, to identify the no-cost measures undertaken, and the low-cost measures implemented, to reduce the potential EMF impacts. The benchmark established for low-cost measures is 4% of the total budgeted project cost that results in an EMF reduction of at least 15% (as measured at the edge of the utility ROW). Therefore, SCE would need to incorporate specific field-reducing measures into the design of the 500 kV upgraded line prior of its submittal of its CPCN application to the CPUC.

Other public concerns related to electric power facility projects, are both safety and nuisance issues, and include: radio/television/electronic equipment interference; induced currents and shock hazards and potential effects on cardiac pacemakers. SCE is under jurisdiction of the CPUC and the upgraded facilities would be designed and operated according to CPUC General Order 95 in California. CPUC General Order 95 also addresses shock hazards to the public by providing guidelines on minimum clearances to be maintained for practical safeguarding of persons during the installation, operation, or maintenance of overhead transmission lines and their associated equipment.

The Conditions of Certification in the Calico Solar Project Staff Assessment/EIS are intended to ensure compliance with CPUC policy as related to field strengths, perceivable field effects, electric shocks, and human exposure. The line would be operated according to SCE's guidelines, which would be in compliance with the applicable (non-EMF) health and safety LORS.

C.12.8.4 CONCLUSION

The upgraded 500 kV transmission line would be designed, built and operated (largely within the existing ROW) according to SCE's requirements, reflecting compliance with the health and safety (non-EMF) LORS. Therefore, its operation is not expected to pose a significant health and safety hazard to individuals in the area.

C.12.9 CUMULATIVE IMPACTS

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

When field intensities are measured or calculated for a specific location, they reflect the interactive, and therefore, cumulative effects of fields from all contributing conductors. This interaction could be additive or subtractive depending on prevailing conditions. Since the proposed project's transmission line would be designed, built, and operated

according to applicable field-reducing SCE guidelines (as currently required by the CPUC for effective field management), any contribution to cumulative area exposures should be at levels expected for SCE lines of similar voltage and current-carrying capacity. It is this similarity in intensity that constitutes compliance with current CPUC requirements on EMF management. The actual field strengths and contribution levels for the proposed line design would be assessed from the results of the field strength measurements specified in Condition of Certification **TLSN-2**. Therefore, no cumulative impacts related to transmission line safety or nuisance are expected.

C.12.10 COMPLIANCE WITH LORS

As previously noted, current CPUC policy on safe EMF management requires that any high-voltage line within a given area be designed to incorporate the field strength-reducing guidelines of the main area utility lines to be interconnected. The utility in the case of the Calico Solar Project is SCE. Since the proposed project's 230-kV line and related switchyards would be designed according to the respective requirements of the LORS listed in **TLSN Table 1**, and operated and maintained according to current SCE guidelines on line safety and field strength management, staff considers the proposed design and operational plan to be in compliance with the health and safety requirements of concern in this analysis. The actual contribution to the area's field exposure levels would be assessed from results of the field strength measurements required in Condition of Certification **TLSN-2**.

C.12.11 NOTEWORTHY PUBLIC BENEFITS

Since the proposed tie-in line would pose specific, although insignificant risks of the field and nonfield effects of concern in this analysis, its building and operation would not yield any public benefits regarding the effort to minimize any human risks from these impacts.

C.12.12 FACILITY CLOSURE

If the proposed Calico Solar Project were to be closed and decommissioned, and all related structures are removed as described in the **Project Description** section, the minimal electric shocks and fire hazards from the physical presence of this tie-in line would be eliminated. Decommissioning and removal would also eliminate the line's field impacts assessed in this analysis in terms of nuisance shocks, radio-frequency impacts, audible noise, and electric and magnetic field exposure. Since the line would be designed and operated according existing SCE guidelines, these impacts would be as expected for SCE lines of the same voltage and current-carrying capacity and therefore, at levels reflecting compliance with existing health and safety LORS.

C.12.13 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

TLSN-1 The project owner shall construct the proposed transmission line (anywhere along the area identified by the applicant as available for its routing) according to the requirements of California Public Utility Commission's

GO-95, GO-52, GO-131-D, Title 8, and Group 2, High Voltage Electrical Safety Orders, sections 2700 through 2974 of the California Code of Regulations, and Southern California Edison's EMF reduction guidelines.

Verification: At least 30 days before starting the transmission line or related structures and facilities, the project owner shall submit to the Compliance Project Manager (CPM) a letter signed by a California registered electrical engineer affirming that the lines will be constructed according to the requirements stated in the condition.

TLSN-2 The project owner shall use a qualified individual to measure the strengths of the electric and magnetic fields from the line at the points of maximum intensity along the route for which the applicant provided specific estimates. The measurements shall be made before and after energization according to the American National Standard Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) standard procedures. These measurements shall be completed no later than 6 months after the start of operations.

Verification: The project owner shall file copies of the pre-and post-energization measurements with the CPM within 60 days after completion of the measurements.

TLSN-3 The project owner shall ensure that the rights-of-way of the proposed transmission line are kept free of combustible material, as required under the provisions of section 4292 of the Public Resources Code and section 1250 of Title 14 of the California Code of Regulations.

Verification: During the first 5 years of plant operation, the project owner shall provide a summary of inspection results and any fire prevention activities carried out along the right-of-way and provide such summaries in the Annual Compliance Report on transmission line safety and nuisance-related requirements.

TLSN-4 The project owner shall ensure that all permanent metallic objects within the right-of-way of the project-related lines are grounded according to industry standards regardless of ownership.

Verification: At least 30 days before the lines are energized, the project owner shall transmit to the CPM a letter confirming compliance with this condition.

C.12.14 CONCLUSIONS

Since staff does not expect the proposed 230-kV transmission tie-in line to pose an aviation hazard according to current FAA criteria, we do not consider it necessary to recommend specific location changes on the basis of a potential hazard to area aviation.

The potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current SCE guidelines (reflecting standard industry practices). These field-reducing measures would maintain the generated fields within levels not associated with radio-frequency interference or audible noise.

The potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route.

Since electric or magnetic field health effects have neither been established nor ruled out for the proposed Calico Solar Project and similar transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed line's design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information. The long-term, mostly residential magnetic exposure of health concern in recent years would be insignificant for the proposed line given the absence of residences along the proposed route. On-site worker or public exposure would be short term and at levels expected for SCE lines of similar design and current-carrying capacity. Such exposure is well understood and has not been established as posing a significant human health hazard.

Since the proposed project's line would be operated to minimize the health, safety, and nuisance impacts of concern to staff and would be routed through an area with no nearby residences, staff considers the proposed design, maintenance, and construction plan as complying with the applicable LORS. With implementation of the four recommended conditions of certification, any such impacts would be less than significant.

C.12.15 REFERENCES

EPRI — Electric Power Research Institute 1982. Transmission Line Reference Book: 345 kV and Above.

National Institute of Environmental Health Services 1998. *An Assessment of the Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields*. A

Working Group Report. August 1998.

SES 2008a – Stirling Energy Systems/R. Liden (tn 49181). Application for Certification, dated December 1, 2008. Submitted to CEC/Docket Unit on December 1, 2008.

C.13 – VISUAL RESOURCES

Testimony of William Kanemoto, Alan Lindsley, and James Jewell

C.13.1 SUMMARY OF CONCLUSIONS

California Energy Commission staff (hereafter referred to as Staff) have analyzed visual resource-related information pertaining to the proposed Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) and conclude that both the proposed project and Avoidance of Donated Lands Alternative would substantially degrade the existing visual character and quality of the site and its surroundings, resulting in potentially significant impacts to motorists on Highway Interstate 40 and National Trails Highway/Route 66. With staff-recommended mitigation measures, these impacts could be greatly reduced, but would remain significant and unavoidable. The Bureau of Land Management (BLM) is in the process of establishing visual resource management classifications for the proposed project and surrounding areas.

Staff concludes that under the proposed project, the character and quality of some views from foreground and near-middle-ground areas of the Cady Mountains Wilderness Study Area would be adversely affected, but the overall effect on views from the Cady Mountains Wilderness Study Area is considered to be less-than-significant.

Impacts of the Reduced Acreage Alternative would be substantially less than the proposed project. Based on further analysis and in light of additional information available to staff since publication of the SA/DEIS, impacts under this alternative are considered to remain significant.

The anticipated visual impacts of both the Calico Solar Project and the reduced acreage alternative, in combination with past and foreseeable future local projects in the immediate project viewshed, and past and foreseeable future region-wide projects in the southern California desert, are considered cumulatively considerable, potentially significant, and unavoidable.

C.13.2 INTRODUCTION

The following analysis evaluates potential visual impacts of the Calico Solar Project; its consistency with applicable Laws, Ordinances, Regulations and Standards (LORS); and the California Environmental Quality Act (CEQA).

In order to provide a consistent framework for the analysis, a standard visual assessment methodology developed by the California Energy Commission (Energy Commission) staff and applied to numerous siting cases in the past was employed in this study. A description of this methodology is provided in **Appendix VR-1.** The BLM and the Energy Commission have agreed that this methodology is the most appropriate for this site, as described in Section C.13.3.

As noted above, the project has been evaluated for conformance with applicable LORS. Adopted expressions of local public policy pertaining to visual resources are also given great weight in determining levels of viewer concern. In accordance with staff's procedure, conditions of certification are proposed as needed to reduce potentially

significant impacts to less than significant levels, and to ensure LORS conformance, if feasible.

C.13.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

To determine whether there is a potentially significant visual resources impact generated by a project, Energy Commission staff reviews the project using the CEQA Guidelines Appendix G Environmental Checklist pertaining to "Aesthetics." The checklist questions include the following:

A. Would the project have a substantial adverse effect on a scenic vista?

B. Would the project substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?

C. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

D. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

In addition, staff evaluates potential impacts in relation to standard criteria described in detail in Appendix VR-1. Staff evaluates both the existing visible physical environmental setting, and the anticipated visual change introduced by the proposed project to the view, from representative, fixed vantage points called "Key Observation Points" (KOPs). KOPs are selected to be representative of the most characteristic and most critical viewing groups and locations from which the project would be seen. The likelihood of a visual impact exceeding Criterion C. of the CEQA Guidelines, above, is determined in this study by two fundamental factors: the susceptibility of the setting to impact as a result of its existing characteristics (reflected in its current level of visual quality, the potential visibility of the project, and the sensitivity to scenic values of its viewers); and the degree of visual change anticipated as a result of the project. These two factors are summarized respectively as *visual sensitivity* (of the setting and viewers), and *visual change* (due to the project) in the discussions below. Briefly, KOPs with high sensitivity (due to outstanding scenic quality, high levels of viewer concern, etc.) that experience high levels of visual change from a project are more likely to experience adverse impacts.

The National Environmental Policy Act (NEPA) requires that the federal government use "all practicable means to ensure all Americans safe, healthful, productive, and *aesthetically* (emphasis added) and culturally pleasing surroundings" (42 U.S. Code 4331[b][2]).

Typically, U.S. Bureau of Land Management (BLM) evaluates visual effects of actions with the use of its Visual Resource Management (VRM) system. In this methodology BLM conducts inventories, delineating landscape units and assigning one of four visual resource inventory classes reflecting the existing scenic quality, viewer sensitivity, and distance zone to areas under its jurisdiction. These inventories are then used to assign

visual resource *management* (VRM) classes to these lands. However, in the case of the area managed under the California Desert Conservation Area (CDCA) Plan (including this project), VRM classes were not assigned under that management plan. In some areas, VR inventories have been conducted within portions of the CDCA, and Interim VRM Classes have been assigned by BLM to some portions.

However, in the case of the Calico Solar Project site, no current visual inventories by BLM are available, and no Interim VRM Classes have been assigned. The BLM is currently in the process of beginning visual inventories of areas within the CDCA that have not yet been inventoried, including this site. However, the results of those studies are not anticipated within the time frame of this project application, and delineations of scenic quality rating units or visual resource inventory classes are not available. Therefore, it was agreed by Energy Commission and BLM that this analysis would be conducted using the Energy Commission's standard visual assessment methodology.

In staff's professional opinion, despite certain differences in approach and emphasis between the two methodologies, the assessment framework and impact thresholds of the Energy Commission method used in this study are substantially consistent with those typically applied by BLM under its own procedures. Staff thus considers that the conclusions of this analysis are substantially equivalent to those that would be reached by applying BLM-specific methods of visual assessment.

Staff also reviews federal, state, and local LORS and their policies or guidelines for aesthetics or preservation and protection of sensitive visual resources that may be applicable to the project site and surrounding area. These LORS include local government land use planning documents (e.g., General Plan, zoning ordinance).

Please refer to **Appendix VR-1** for a complete description of staff's visual resources evaluation criteria.

C.13.4 PROPOSED PROJECT

C.13.4.1 SETTING AND EXISTING CONDITIONS

Regional Landscape

The originally proposed Calico Solar Project site comprised approximately 8,230 acres (12.8 square miles) of BLM land in San Bernardino County. In order to avoid environmental resources, the proposed project was reduced to approximately 6,215 acres, eliminating a northern portion of the site. The site is roughly 37 miles east of the town of Barstow and 17 miles east of Newberry Springs. It is adjacent to the north side of Interstate 40 (I-40) and near the historic Route 66/National Trails Highway that generally parallels I-40 on the south in this area. The site is on BLM-administered land and is largely bounded by BLM-administered land, although private tracts abut some portions of the site and a BNSF Railroad line traverses the site.

The 84,400-acre Cady Mountain Wilderness Study Area borders the site on the north and the Pisgah Area of Critical Environmental Concern (ACEC) is adjacent to the site's eastern/southeastern boundary. The Kelso Dunes Wilderness and Bristol Mountains

Wilderness are approximately 10 miles east of the site. Much of the Cady Mountain WSA and all of the Pisgah ACEC would be within in the Mojave Trails National Monument proposed as part of the proposed 2010 California Desert Protection Act legislation. The proposed monument would extend from the site's east boundary to near Needles. I-40 forms the southern boundary of the site. Three miles south of I-40 is the northern boundary of a closed live-fire training area on Twentynine Palms Marine Corps Base. Also south of I-40 and immediately southwest of the project site is the Ord-Rodman Desert Wildlife Management Area (DWMA). The Rodman Mountains Wilderness is 3 miles distant, also to the southwest. The west side of the site is bounded by undesignated BLM-administered land. **Visual Resources Figure 1, Project Setting**, depicts the project site in its immediate regional context in relation to these various protected areas.

The site lies within the east-west trending Mojave Valley, a broad desert valley resting between the Cady and Bristol Mountains to the north and northeast and the Bullion, Lava Bed, Rodman, and Newberry Mountains to the south and southwest. The valley floor ranges from approximately 1,800-feet to 2,200-feet in elevation; the mountains rise to between 3,000-feet and 4,400-feet in elevation.

Native vegetation cover of the region consists of sparse, low-growing green-to-tan Mojave creosote bush scrub typical of the western Mojave Desert.

Project Site

Visual Resources Figures 2a, b, and c, Character Photos of Project Area, depict views of the Calico Solar Project site and vicinity (AFC, Figures 5.13-3, -4, -5). (All figures referred to in the text may be found at the end of this section.)

The project site comprises approximately 6,215 acres of public land administered by the BLM. It does not include any private land. Although not part of the project, three adjacent tracts of private land are each surrounded on three sides by the proposed project. The most prominent man-made features at or near the site are I-40, which abuts the site on the south, and the BNSF Railroad traversing the site. These features, though evident, remain visually subordinate to the vast open expanse of the site and surroundings.

The site occupies a band of *bajada*s, or alluvial fans typical of the Mojave Desert landscape, which slope gently but noticeably southward toward the railroad and highway, from the feet of the prominently visible Cady Mountains immediately north of the site. The site is largely undisturbed and is currently managed by BLM as Multiple-Use Class (MUC) M (Moderate Use), except for a very small portion along the northern boundary of the project, which is classified as MUC Class L (Limited Use).

No communities lie within the project viewshed, which extends 5 miles from the site boundaries. The nearest rural residence is located about 2 miles east of the site.

Project Visual Setting: Viewshed, and KOPs

Project Viewshed

A feature of this desert landscape is the potential for large projects to be seen over great distances where even slightly elevated viewpoints exist, due to the large open areas of level topography and absence of intervening landscape features and screening vegetation. However, as illustrated in **Visual Resources Figure 3**, Project Viewshed, which presents a computer-generated GIS viewshed map depicting areas from which the site would be visible, the project is situated within a broadly enclosed viewshed defined by the Cady Mountains to the west, north, and east, and by Pisgah Crater, Sunshine Peak, and the Lava Bed and Rodman Mountains to the south and southwest. The site is thus largely visually isolated from the Mojave Valley to the west by topography and distance, and from the Broadwell Valley to the east by topography (SES 2008a). The project would be visible from locations throughout this contained viewshed. Intermittent views of the site extend up to 4 miles north into the Cady Mountains, and in general the project would be visible from various locations falling within a 5-mile radius, with the exception of mountainous areas to the north and east where terrain encloses views near the site boundary. As indicated in the figure, visibility within the Cady Mountains WSA is spotty and fragmented, due to rough, irregular terrain.

KOPs: Visual Quality, Viewer Concern, and Viewer Exposure

Visual Resources Figure 4 depicts Key Observation Points (KOPs) as well as locations from which photographs were taken to depict the general character of the site and vicinity. KOPs are used in the Energy Commission visual analysis method as the basis for evaluating potential project impacts, and represent the key sensitive viewer groups and viewing locations likely to be affected by the project.

In the Energy Commission assessment approach, KOPs are rated according to the visual quality of their setting, and an assessment of their level of viewer concern and viewer exposure. Those three primary attributes are summarized in a KOP's *overall visual sensitivity* rating, which reflects an assessment of the overall susceptibility to visual impact of the viewer group/receptors it represents. These sensitivity ratings serve as the environmental baseline against which potential project impacts, measured in terms of level of *visual change*, are evaluated.

KOPs used in this study include those used in the project AFC, which were selected for the AFC in consultation with Energy Commission staff. To minimize confusion, the numbering of viewpoints used in the AFC has been retained in this analysis.

In the following discussion, distance zone terminology is used in the context of the Energy Commission method, as follows: 'foreground' is used generically to refer to viewing distances under ½-mile; 'middle-ground' to distances between ½ and 5 miles; 'near middle-ground' refers to that portion of middle-ground under roughly one mile; and 'background' to distances over 5 miles.

KOP photos are selected to represent key sensitive viewer groups who would potentially be affected by the project. Project simulations are then imposed on these views to illustrate how the same view would appear with the project in place. In the

discussion that follows, the reader is referred to these 'before project' photos. The figure numbers referring to each KOP below thus appear out of sequence, but may be found along with all other figures, at the end of this section. In each case, the designation "**a**" after the figure number indicates the existing (before project) view from a KOP, while the second image is a simulation of the future condition, should the project be constructed as proposed.

KOP 1 is from a point along Route 66 looking generally northeast into the site across I-40. KOP 2 is a view looking south into the site, from an elevated position just inside the Cady Mountain WSA. KOP 3 is a view looking northwest toward the site from the vicinity of the nearest residence to the project. KOP 4 is a view north into the site from where the BNSF Railroad crosses under an existing electric transmission line about 800 feet from the eastern edge of the site. KOP 5 is a view from I-40 eastbound, looking east-northeast across westbound I-40 into the site.

Route 66/I-40 - KOP 1

KOP 1 is taken from Route 66 (National Old Trails Highway), which parallels I-40 slightly to the south in this segment. Despite its name, this portion of old Route 66 does not have Scenic Byway or other officially designated status. It is maintained by the County and is a remnant of the original National Old Trails Highway established in the early 20th century between Maryland and California. It remains the focus of efforts to preserve and maintain it by groups interested in its historic status and associated historic features. I-40 is an eligible state scenic highway but has not been officially designated. It receives relatively high levels of traffic (15,600 vehicles per day) (AFC 5.13-5) (SES 2008a). The KOP is fairly representative of motorists on both of these roadways, though it differs from typical views from I-40 in that the project is seen from Route 66 at a greater distance. **Visual Resources Figure 8a** depicts the existing view from KOP 1. The project would begin beyond I-40, seen in the foreground, directly across the median from this vantage point. As depicted in this photograph, views of the site from Route 66 would generally have I-40 and low-voltage utility lines in the immediate foreground. The landscape beyond is relatively featureless, characterized by large expanses of gently sloping fan or *bajada* topography, dissected by intermittent seasonal washes. Land cover is low-growing, nondescript bush scrub (primarily Mojave Desert creosote bush scrub) that is naturally sparse, lending a brown to green hue to the lighter tan colored soil surface. Beyond the highway and middle-ground bajada, the Cady Mountains, a Wilderness Study Area, dominate the background.

Visual Quality: Visual quality of this landscape is considered moderate. Although some visually compromising elements (including the highway, low-voltage utility lines, the BNSF rail line, and disturbance from a pipeline right-of-way) are present, these remain visually subordinate and the bajadas comprising the project site, descending from the intact and visually vivid Cady Mountains nearby, appear predominantly undisturbed and intact. The typical bajada landscape is common in the region and relatively featureless, but provides a characteristic and fairly undisturbed foreground to the rugged nearby mountains.

Viewer Concern: Viewer concern is considered moderately high; the focus of many Route 66/Historic Trails Highway users would be on the historic nature of this roadway and the encompassing landscape through which earlier travelers would have

experienced. In this context, the integrity of the view would be of high importance. Similarly, the I-40's state-eligible scenic status contributes to a higher level of viewer concern.

Viewer Exposure: Viewer exposure is high. Views of the site, which adjoins I-40, are unobstructed. The sloping of the site's fan topography, which ranges from 1,800 feet in elevation in the southern portion of the project site to approximately 2,200 feet in elevation in the northern portion of the project site, is oriented to the highway, increasing its overall exposure.

Overall visual sensitivity was thus considered to be moderately high.

Cady Mountains WSA – KOP 2

Visual Resources Figure 9a depicts the existing view from KOP 2 looking south across the project area. It provides a view of the project site from within the Cady Mountains WSA, as viewed from approximately 1,500 feet from the northern boundary of the site and somewhat elevated above the site. The WSA occupies the high ground above the project site on the north. The immediate foreground is dominated by sparse vegetation, cobbles, and the smaller landforms on the lower slopes of the Cady Mountains. Views of level open desert terrain characterized by light tan colored soils and sparse scrub vegetation occupy the visual middle-ground. The BNSF Railroad, approximately 3 miles away, and I-40, which is approximately 5 miles distant, create linear elements crossing the middle-ground, but are visually subordinate in the broad landscape. The ridges of the Rodman and Lava Bed Mountains are 12 to 14 miles away and dominate the background.

Visual Quality: While man-made intrusions and ground disturbance remain visually subordinate within the relatively intact natural landscape, landforms and vegetation of the site lack exceptional vividness. Visual quality is enhanced by the high skyline of the Lava Bed and Ordman Mountains in the distance and the panoramic views of the valley floor, with Pisgah Crater and unusual, contrasting lava features visible in the middleground The visual foreground from this area, though not depicted in this particular view, would also be characterized by visually interesting contrasting patterns of rugged outcrops and ridges, and alluvial washes. Visual quality from this KOP was characterized as moderately high.

Viewer Concern: Viewer concern from this KOP is considered moderately high – wilderness areas generally would be considered to have high sensitivity, but the number of visitors at this distance to the project is believed to be very low.

Viewer Exposure: Viewer exposure at this distance is moderate; while open and unobstructed views are present within the WSA to background distances, as indicated in the viewshed map depicted in **Visual Resources Figure 3**, visibility is intermittent, often obstructed by intervening rock outcrops in the very rough terrain, characterized by highly irregular rocky peaks and ridges separated by lower alluvial washes. In addition, increasing viewing distance diminishes visibility and prominence of the project and the background mountains are a dominant feature in all southward views. Finally, viewer

numbers are believed to be very low because of the remoteness and difficulty of the location, although the area has experienced increasing OHV activity in recent years.

Overall visual sensitivity is considered to be moderately high.

Eastside View – KOP 3

KOP 3 is a view from the nearest residence to the proposed project site. **Visual Resources Figure 10a** depicts the existing view from this location. The project's eastern boundary would be at the existing transmission line visible in the middle-ground at a distance of approximately 1-1/2 mile. This KOP is at approximately the same elevation as much of the project site. As with most of the KOPs, views of level, relatively featureless open desert characterized by light tan colored soils and sparse scrub vegetation occupy the visual foreground and middle-ground. The existing transmission line, visible at a distance of about 1-1/2 miles, detracts from the intactness of the landscape setting, but remains visually subordinate at this distance. Ridges of the westernmost Cady Mountains are visible at a distance of roughly 9 miles; the taller, distant Calico Mountains can be seen on the horizon at background distances of 25 miles or more.

Visual Quality: Visual quality is moderate. The level, open fore- and middle-ground is typified by characteristic non-descript creosote scrub vegetation, with moderate levels of existing visual intrusion by existing transmission lines. The existing power line, an existing electric substation, the BNSF Railroad, and I-40, which are approximately one mile south and west of this point, intrude into views from this location and detract from their intactness. The openness of the landscape, and the background mountain ridges are the principal distinctive features.

Viewer Concern: Viewer concern is considered moderately low due to the absence of other similar viewers. This residence may the only one within the project viewshed and is not representative of a typical viewer group.

Viewer Exposure: Views within this landscape are open and largely unobstructed; however, viewer exposure to the project is considered moderate. The project would occupy the level middle-ground at a similar elevation as the viewpoint, thereby occupying a narrow portion of the overall field of view due to the oblique viewing angle. This narrow band thus tends to be dominated by the foreground, which has variety in color and texture, and the background ridges, which break the horizon and dominate attention. This moderation of exposure due to oblique viewing angle is somewhat off-set however by the vast horizontal extent of the project from viewpoints at this distance, and high contrast of anticipated mirror brightness under many typical conditions.

Overall visual sensitivity of this KOP is thus considered to be moderate.

BNSF Railroad/I-40 West – KOP 4

Visual Resources Figure 11a depicts the view from the BNSF rail line, looking northwest into the project's eastern boundary at a distance of roughly 800 feet. KOP 4 was included in the AFC analysis because the AMTRAK Southwest Chief route from Los Angeles to Chicago travels on the BNSF rail line through the middle of the project

site. However, the Southwest Chief passenger train travels through the site only at night in both directions. For that reason, train passengers are not considered to be a potentially sensitive viewer group within the project viewshed, and will not be analyzed further in this discussion.

However, KOP 4 closely resembles viewing conditions of I-40 motorists in close proximity to the project boundaries and, particularly, the SunCatcher units, as they could be along much of the I-40 project frontage, and as they would be at the project's eastern boundary a short distance (approximately ½-mile) to the south of this viewpoint. Particularly because the simulation of this viewpoint is very useful in visualizing the potential effects of the project on motorists when seen at close distance, this KOP has been retained in this discussion to address effects on that viewer group.

Because the KOP is being discussed in relation to viewing conditions on I-40, the setting/sensitivity discussion applicable to this KOP is essentially the same as that under KOP 5, below.

Interstate 40 East – KOP 5

KOP 5 is a view northeastward from eastbound I-40 across the opposite lanes of I-40. **Visual Resources Figure 12a** depicts the existing view from KOP 5. The view is similar to that from KOP 1, also facing northeastward. The visual foreground consists of the median of the highway and opposite westbound lanes and the utility poles along the highway.

Visual Quality: Visual quality is moderate. The middleground consists of the relatively intact, sloping bajadas descending from the Cady Mountains, characterized by light tan soils and sparse scrub vegetation. The alignment of the BNSF Railroad forms a relatively inconspicuous linear element across the near-middleground. Hills and ridges of the Cady and Bristol Mountains at middleground distance are vivid features, with interesting patterns of contrast between dark, rugged rock outcrops and ridges against lighter–colored strata and alluvial washes. At this middleground distance, the mountains enclose and dominate the view, strongly enhancing an otherwise fairly featureless landscape, elevating visual quality for eastbound travelers.

Viewer Concern: Viewer concern is considered moderately high, due to an elevated level of concern with scenic values presumed within the CDCA in general, and a relatively high proportion of motorists on I-40 concerned with those scenic values.

Viewer Exposure: Viewer exposure is high; views are predominantly open and unobstructed over an extensive area, and the project site is viewed at foreground and middle-ground distance, with terrain sloping downward toward the viewer along a highway frontage of roughly 4 miles. The view from KOP 5 is of the project site seen at a distance of a little over 1 mile across a privately held tract of land not in the project. Viewer numbers on I-40 are relatively high (15,600 vehicles per day) (cite: AFC 5.13-5).

Overall visual sensitivity of this KOP is thus considered to be moderately high.

C.13.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Significance Criteria

The following regulatory criteria were considered in determining whether a visual impact would be significant.

Federal

Significance under NEPA is defined in terms of a) context and b) intensity. Context means that the significance of an action must be analyzed in several circumstances or situations, such as society, the affected region, affected interests, and locale. Intensity refers to the severity of impact, and includes a variety factors to be considered (40 CFR 1508.27).

Some of the intensity factors potentially relevant to visual impacts include 'unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands . . . ,' degree of controversy, degree of uncertainty about possible effects, degree to which an action may establish a precedent for future actions, and potential for cumulatively significant impacts.

State

The CEQA *Guidelines* define a "significant effect" on the environment to mean a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including . . . objects of historic or aesthetic significance." (Cal. Code Regs., tit.14, § 15382.) Appendix G of the *Guidelines*, under Aesthetics, lists the following four questions to be addressed regarding whether the potential impacts of a project are significant:

1. Would the project have a substantial adverse effect on a scenic vista?
2. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?
3. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?
4. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Local

Energy Commission staff considers any local goals, policies, or designations regarding visual resources. Conflicts with such laws, ordinances, regulations, and standards can constitute significant visual impacts. See the section on Applicable **Laws, Ordinances,Regulations, and Standards (LORS)**.

Project Visual Description

Power Plant

Visual Resources Figure 5 depicts the layout of the two proposed project phases. **Visual Resources Figure 6** depicts architectural elevations of the Calico Solar Project Main Services Complex, (AFC). **Visual Resources Figure 7** depicts elevations of the proposed mirrored solar dish units (Data Response #125) (SES 2009p).

The proposed project includes approximately 34,000, 40-foot solar dish Stirling systems (i.e., SunCatchers) and associated equipment and infrastructure within a fenced boundary, occupying approximately 6,215 acres (roughly 10 square miles) of undeveloped land. Associated proposed facilities on the site include:

- Main Services Complex located generally in the center of the site for administration and maintenance activities, which would include buildings up to 78 feet in height, parking and access roads;
- Staging Area adjacent to the Main Services Complex for use during construction
- Staging Area adjacent to the eastern site boundary, near the existing power line and railroad
- 220 kV Substation located generally in the center of the site, south of the Main Services Complex.

Site Layout

A specific detailed site layout of the SunCatcher units is not provided in the AFC. However, large-scale schematic layouts such as AFC Figure 3-4 suggest that the rows of SunCatchers under Phase 2 could abut the Highway I-40 right-of-way in the western portions of the project. AFC Figure 3-4 also suggests that in the eastern portion of the I-40 frontage, the southernmost SunCatchers would be located immediately north of the existing pipeline right-of-way (SES 2008a).

Construction Staging Area

One construction staging/lay-down area is proposed. The 14-acre laydown area will be provided adjacent to the Main Services Complex.

Site Grading

Site grading would potentially represent a significant visual component of the proposed project during construction. Surface disturbance of the proposed site, as in most desert landscapes of the region, can often result in high contrast between the disturbed area and surroundings, due to high contrast between the disturbed soil color and solar reflection (albedo), and the color and albedo of the existing undisturbed, vegetated surface. Furthermore, effectiveness of revegetation in this arid environment is difficult, of limited effectiveness, and capable of recovery only over a very long-term time frame.

Plant Night Lighting

According to the AFC, night lighting of the Main Services Complex would consist of 400-watt high-pressure sodium lights, with illumination falling to 0.0 foot-candles on the ground a short distance from the facility (AFC, Figure 3-20, -21)(SES 2008a).

Parking and roadway lighting would consist of full cut-off luminaires to minimize night sky light pollution. Preliminary photometric studies provided in the AFC depict illumination from these fixtures falling to 0.0 foot-candles a short distance from each roadway intersection (AFC Figure 3-23) (SES 2008a).

Linear Facilities

- a 1.7-mile 730-MW/220-kV transmission line intended to connect to the existing Southern California Edison (SCE) Pisgah Substation located at the southeast boundary of the project site
- three overhead 34.5 kV collection circuits to convey power to the substation within the project. The height and length of these lines is not described in the AFC, but are visible in some of the AFC visual simulations
- approximately 38 miles of treated roads, approximately 587 miles of unpaved access roads.

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 applicant's AFC visual analysis. That is, the AFC concluded that potential project visual impacts from KOPs 1, 2, 4, and 5 are potentially significant. The visual impact assessment below provides staff's independent analysis of visual resource impacts, and includes staff comments on the applicant's AFC visual analysis where appropriate. Visual simulations provided in the AFC are utilized to support or complement staff's analysis. The KOP analysis below is staff's own.

Direct Project Impacts

Project Operation Impacts

Impacts of Structures on Key Observation Points

KOP 1 – Route 66/I-40. ***Visual Resources Figures 8A and 8B.***

As described in Section C.13.4.1, above, overall visual sensitivity of this KOP, and much of the viewshed generally, is considered to be moderately high. Overall, existing scenic quality of this landscape is considered moderate. However, viewer concern is considered moderately high; the focus of many Route 66/National Trails Highway users would be on the historic nature of this roadway and the encompassing landscape which earlier travelers would have experienced. Viewer concern is also elevated by the I-40's state eligible scenic highway status. Viewer exposure is high.

Staff also notes that internal project transmission lines, depicted in the other simulations, are not included in the applicant's simulation of KOP 1. These features would add a contrasting vertical visual element that would detract somewhat from the visual unity of the mirror field and contribute to a more industrial overall visual character.

According to information provided in Data Response #124 (SES 2009p), the project condition depicted in the simulation of KOP 1 contradicts the layout indicated in the AFC project description as shown in AFC Figure 3-2 (SES 2008a). It does, however, correspond roughly to the assumption that SunCatchers would be located only north of the existing pipeline right-of-way. As discussed further, below, these differences are critical to the accuracy of both the simulated view, and the impact analyses presented in this study.

Figures 8A and 8B depict a view northward from Route 66 (National Trail Highway), at a foreground distance of less than 1,000 feet to the site. However, as discussed further below, the nearest SunCatcher units depicted in this simulation are located over 1,700 feet away. Staff considers this to be a reasonably representative viewpoint. The range of actual view of the project would extend from foreground, throughout the middle-ground, to the background 5-miles distant. The project would appear very prominent, dominating the view from foreground locations on Route 66 and I-40. From such viewpoints near the project site, the project would strongly dominate the vista.

Project visual contrast would be very strong. Texture and form contrast with the existing landscape of the vast rows of SunCatchers at this distance would be strong, lending a distinctly man-made, industrial character to the location. Color contrast with the existing natural environment would also be strong, and although the field could at times resemble a vast lake surface, reflecting the sky, at other times the mirrors are expected to appear very bright, to the point of representing a strong nuisance or distraction, though not a hazard to navigation. In addition, the long, linear, bright SunCatcher rows, which are oriented perpendicularly to the highway, would rapidly alternate with the darker-colored land between each row, introducing a large-scale flickering effect at the highway frontage that would compound the nuisance and distraction of glare for some viewers. From some viewpoints, the taller buildings of the Main Services Complex (up to 77 feet tall) could be visible in the middle of the site, exhibiting some vertical form and line contrast and attracting attention, although at this distance they appear relatively inconspicuous. Likewise, poles for the electric collection system, though not depicted in the simulation of KOP 1, would be visible throughout the site and introduce vertical and horizontal elements of visual complexity that would detract from the visual unity of the scene and add to the overall industrial character. However, these features generally would be dwarfed by the vast scale and dominance of the SunCatcher fields.

The project would exert extraordinary horizontal scale and spatial dominance, occupying a vast expanse of the landscape along nearly 5 miles of highway frontage, not including the view when approaching the project on the highway. As depicted in the simulation, the overall proportion of the view occupied by the project would be extensive compared to the foreground terrain, background mountains, and sky, due to the sloping terrain and resulting site exposure.

As depicted in the simulation of KOP 1, the project does not physically block scenic views of the Cady Mountains in the distance from viewpoints along the highway. This

feature of the simulation is discussed further, below. Overall visual change to viewers from Route 66 is considered high. The project would demand attention, could not be overlooked, and would be dominant in the landscape.

Impact Significance - In the context of moderately high overall visual sensitivity, the high level of visual change experienced by the majority of Route 66 and I-40 viewers – those within foreground and near-middle-ground distance from the project – would be regarded as significant.

As depicted in the applicant's simulation of KOP 1, the SunCatchers would not physically block scenic views of the Cady Mountains in the distance. Because the SunCatcher units are approximately 38 feet in height, this appears somewhat counter-intuitive. According to information provided in Data Response #124, this phenomenon would occur in large portions of the highway frontage, apparently for two principal reasons: first, Highway I-40 is elevated up to 8 feet above the adjacent plain, and up to 20 feet above the elevation of the nearest simulated SunCatchers, based on assumed siting depicted in the simulations. Elevation of the plain adjoining the highway continues to decline in relation to the highway until the BNSF rail line, over 1 mile from the highway, which generally represents a low point. Second, the simulations depict the site boundary as at least *1,200 feet from the edge of the roadway*, and the nearest SunCatchers set back an additional 500 feet from the site boundary. In the simulation of KOP 1, as depicted in the AFC, the nearest SunCatchers are thus assumed to be at least 1,700 feet from the edge of the roadway and 2,634 feet from the camera viewpoint on Route 66. The drop-off in elevation from the road at that set-back distance apparently accounts for the fact that the SunCatchers do not block views of the mountains behind them, as well as for the diminished visual scale and height of the units within the view, and the fact that the entire field to background distance remains visible Data Response Set 1 Part 2 # 124) (SES 2009p). The siting assumptions depicted in the simulation of KOP 1 and Data Response 124 thus contradict those depicted in AFC Project Description Figure 3-2. They do, however, appear to correspond roughly to the assumption that the project perimeter fencing and SunCatchers would be located *only north of the existing pipeline right-of-way*.

These discrepancies are relevant to this discussion because staff believes that the visual conditions as seen by motorists on I-40 and Route 66 would differ substantially under the siting assumptions presented in AFC Figure 3-2 and in Data Response #124, respectively. Under the assumptions depicted in AFC Figure 3-2, SunCatchers would be sited south of the pipeline ROW within a short distance of the highway. Under those conditions, the mirror units would not only have considerably greater visual magnitude individually, but would be higher in relation to the roadway and would begin to block views of the mountains in the background. At sufficiently close distance, they could completely enclose northward views from the highway. Closer siting would also exacerbate potential nuisance glare effects on motorists, which would be reduced by distance.

However, with the siting assumptions embodied in the simulation of KOP 1 and depicted in Data Response #124 – i.e., setbacks from the roadway to the nearest SunCatchers of 1,700 feet or more – the potential visual effects to motorists would be substantially reduced when compared to potential effects of the project with a much smaller set-back.

Potential glare effects, visual scale of the units, and potential view blockage would all be substantially reduced. For these reasons, staff endorses the siting assumptions represented in the simulation of KOP 1, and recommends adoption of a similar approach as part of **Condition of Certification VIS-3**.

Mitigation – Staff recommends **Condition of Certification VIS-3, Set-Back of SunCatchers from Highway I-40**, which proposes siting of the SunCatchers to the north of the existing pipeline ROW, with a minimum set-back of the SunCatchers from the highway of 360 feet.

With this measure, as depicted in the simulation, project effects would remain substantial and continue to dominate the landscape. However, they would be considerably less than a project without these set-backs, retaining views of mountains and reducing potential nuisance glare impacts.

In addition, in order to reduce the contrast of non-mirror project features as seen from all off-site viewpoints, **Condition of Certification VIS-1, Surface Treatment of Non-Mirror Project Structures** is recommended.

With these measures, visual contrast and dominance of the project would be considerably reduced. However, visual contrast and dominance of the projects would remain strong, and impacts would remain significant.

Staff discussion of landscape screening measures: In the AFC, the applicant has suggested possible landscape screening measures as a potential mitigation measure to address project visual impacts. Staff has not recommended landscape screening measures, for the following reasons:

a) the amount of water that would be needed in this desert landscape to make such screening viable would be very substantial, and it is unclear that the resulting screening would represent a visual mitigation commensurate with its high social, monetary, and environmental cost.

b) any such screening would be nearly as out-of-character with the existing native landscape of the Mojave Desert as the project itself. Although many people may indeed prefer tree rows or other tall vegetation to the view of mechanical devices, the degree of visual change from the native landscape of miles of tall, non-native vegetation would be nearly as high as from the proposed project.

KOP 2 - Cady Mountains WSA. ***Visual Resources Figures 9A and 9B.***

KOP 2 represents a view of the project site from within the Cady Mountains WSA, as viewed from slightly over ¼-mile from the northern boundary of the site, at an elevation of roughly 300 feet above the base of the nearest SunCatchers, and 500 feet above the BNSF rail line visible in the view.

The location of the KOP as indicated in AFC Figure 5.13-2 may be inaccurate, or the accompanying information for the KOP may be inaccurate. According to Figure 5.13.6, the viewpoint faces into a portion of the project area that is ‘not a part’ (NAP) of the project. In Figure 5.13-14, the simulated view is described as a ‘worst-case view.’

However, if the mapped KOP location is correct and the ‘notch’ in the SunCatcher layout visible toward the center of the simulation represents the southwestern corner of the southern excluded (‘not a part of project ‘ (NAP)) area (Section 01, T09N R05E), then far from being a ‘worst case’ view from the Cady Mountains, this view would represent a ‘least case’ view, depicting roughly an area of less than two sections of units at a nearest distance of roughly 2.4 miles. The nearest depicted SunCatchers would thus be those at the northern edge of the large NAP area roughly ½ mile north of the BNSF rail line (Section 12). However, if this interpretation is correct, then the KOP location map clearly indicates that a slight rotation to the left from this or a similar nearby viewpoint within the Cady Mountains would potentially reveal an area of over 8 sections of units, at a closest distance of roughly 1,500 feet or .28 mile. Obviously, if this interpretation is correct, the visual effect of such a view (i.e., directed over the totality of the eastern portions of the project from an elevated position) would be dramatically greater than depicted in this simulation.

The simulation from Cady Mountain is accurately representative in one sense. According to the viewshed mapping depicted in **Visual Resources Figure 3**, visibility of the plain below from the south face of Cady Mountain is highly spotty and fragmented, due to the very rough terrain, so that views may often be hidden by intervening rocky topography, while nearby high points would have clear panoramic views.

As represented in the simulation from KOP 2, project contrast at this distance would generally be moderate. Color and texture contrast with the existing landscape at this distance would be strong, lending a conspicuous, distinctly man-made character to the view. Form and line contrast, however, would be relatively weak, blending with the broad horizontal lines of the level terrain.

In general, at this distance the project would exert strong horizontal scale and spatial dominance, occupying a vast extent of the landscape. Due to the viewshed characteristics in the Cady Mountains described above, however, visual dominance would vary considerably, as a function of visual exposure due to terrain. In the most exposed conditions, for example in the areas north of the proposed project area, viewers could overlook a panorama of up to 8 square miles of SunCatchers or 4 times the area depicted in the simulation, with the nearest of these seen at foreground distance. From such viewpoints, project dominance would be very strong, occupying the largest part of the overall view and overshadowing all other elements. In other cases, as in the simulated view, where the preponderance of the project is hidden by terrain, contrast and dominance could be moderate, and the project would appear to be visually co-dominant with the background mountains.

The project would not block scenic views, occupying the visual foreground of the background mountains, although it would block view of the natural valley floor.

Visual change from KOP 2 and similar middle-ground viewpoints would thus range from moderate to strong depending on location and distance. However, according to viewshed mapping, from the majority of locations at distances approaching a mile or more, visual exposure would decline due to intervening terrain, as would visual dominance due to distance. In view of the very scattered and intermittent visibility of the project predicted by viewshed mapping within the one- and 2-mile distance zones, the

relatively low levels of visitation, the small proportion of the WSA that would be affected, and correspondingly limited view durations, overall visual change from the Cady Mountains is considered to be moderate.

Impact Significance - In the context of moderately high overall visual sensitivity, the moderate level of visual change experienced by visitors to Cady Mountains WSA at distances of over roughly one mile would be somewhat adverse. However, in view of the small proportion of the Cady Mountains WSA potentially affected at closer distances, overall impacts to viewers in the WSA are considered to be less than significant.

Mitigation – No mitigation measures are considered necessary at distances of over roughly one mile. No measures are available for nearer viewpoints. Those nearer viewpoints are sufficiently intermittent and represent so small a proportion of the WSA, however, as not to require mitigation.

KOP 3 - Eastside View, ***Visual Resources Figures 10A and 10B.***

KOP 3 represents the view from the nearest residence to the project, situated approximately 1.5 miles to the east of the site. As noted in Section C.13.4.1, above, this viewpoint may be the only residence within the project viewshed and may thus be unique, and not representative of a larger viewer group. It is, however, informative of the appearance of the project at this distance. In staff's opinion, however, the simulation does not accurately convey the level of brightness expected from the face of the mirrors under typical conditions.

As illustrated in the simulation, at this distance the existing SCE 500 kV and 230 kV transmission line towers and poles are evident, though visually subordinate within the view. The line and towers do not intrude into the skyline due to the mountains in the background. The project would begin at the transmission line and extend away from the viewer. However, numerous towers and poles required by the project internal to the site would increase the degree of vertical form and line contrast with the horizontal landscape. The contrast of the combined transmission lines could attract attention and begin to dominate the characteristic landscape. Due to the relatively level grade/elevation relationship between the project and viewpoint, at this distance the project occupies a narrow portion of the overall field of view due to the oblique viewing angle. The reduced dominance due to oblique viewing angle is somewhat off-set however by the vast horizontal extent of the project from viewpoints at this distance, resulting in high spatial dominance; and by high contrast of anticipated mirror brightness under many extended, typical conditions. Although not obstructing views of the distant background, the extensive array of regularly spaced solar units along the project boundary would completely dominate the middle-ground. Accounting for the anticipated brightness of the mirror field for extended periods, and the strong horizontal spatial dominance of the project, overall visual change at this distance would be strong. The project would demand attention, could not be overlooked, and would be dominant in the landscape.

Impact Significance - In the context of moderate overall visual sensitivity from this and similar locations, due to low visual magnitude and very low viewer numbers, the

moderately high level of anticipated visual change of the project is considered adverse but less than significant.

Mitigation – No mitigation measures are considered necessary from KOP 3

KOP 4 - BNSF Railroad/I-40 West., ***Visual Resources Figures 11A*** *and* ***11B.***

As discussed in Section C.13.4.1, above, Amtrak passengers on the BNSF rail line were determined not to be sensitive receptors. However, KOP 4 is retained to help convey the appearance of the project at foreground distance from similar viewpoints on I-40.

According to the photo location depicted in the AFC, the camera position is very roughly 700 - 800 feet from the project boundary. When compared to other simulations in which the SunCatchers are located at distances of ½ mile or more, the difference in level of impact as a function of distance is apparent. In addition, KOP 4 illustrates the effect of foreground views where grade relationships are relatively level. In such situations, the mirror units are likely to block and enclose views, as suggested by the simulation.

For most of the frontage of the project, I-40 is elevated in relation to the adjoining ground. However, that amount of elevation is not sufficient by itself to prevent the 38-foot-tall mirror units from blocking views and being highly dominant. Based on USGS topographic maps, however, elevations of the adjoining plain northward from the road edge tend to decrease along much of the highway frontage until the point of the BNSF rail line, which generally represents a low point. Thus, as indicated in simulations of KOP 1, above, and KOP 5, below, sufficient set-backs from the highway are a critical factor in reducing the visual height and magnitude of the mirror units, and for preventing view blockage or enclosure from the highway by the mirror units. Consequently, staff recommends **Condition of Certification VIS-3,** which proposes siting of the SunCatchers to the north of the existing pipeline ROW, with a minimum set-back of the SunCatchers from the highway of 500 feet.

KOP 5 – Interstate 40 Eastbound, ***Visual Resources Figures 12A and 12B.***

Staff Comments on Applicant's Simulation: KOP 5 represents near-middleground views of the project by motorists on I-40 eastbound. Because this view looks across foreground that is not a part of the project, it is not fully representative of what a viewer would experience while travelling on I-40, but depicts views along the roughly 1 mile section of excluded highway frontage. The viewpoint appears from the applicant's KOP map to be roughly 1 mile from the site. The simulation of KOP 5 primarily depicts the south-easternmost corner of project Phase 2, covering an area of roughly two sections (square miles).

At this set-back distance, the contrast and dominance of the project is substantially reduced when compared to KOP 1 and, especially, to KOP 4. Similarly, the spatial dominance of the project appears much less than in KOP 1 because the area depicted is considerably smaller. Based solely on this image one could conclude that the project could appear co-dominant with the surrounding landscape.

However, in order to fully understand the visual effect of the project from this or other viewpoints on I-40, it is important to recall that for approximately 5 miles the project fronts on I-40. In addition, the project would be visible for roughly 3 miles to the east of

the project and for roughly 5 miles to the west of the project, particularly during morning and afternoon hours when diffuse reflection could be strongest. (KOP 3 depicts the appearance of the project from a distance of roughly 2 miles). The view in the KOP 5 simulation represents the greatest distance between the highway and the project at any point in the 5 miles of frontage. Over 80% of the frontage on I-40 could be as little as a few yards from the highway right-of-way. Thus, in staff's opinion, a closer approximation of the I-40 experience is provided in KOPs 1 and 4, although as discussed, this would only be true assuming adoption of recommended **Condition of Certification VIS-3**. Without that measure, the project could potentially appear more prominent than depicted in KOP 4 for a considerable portion of the I-40 frontage, because it could be located at a closer distance. Similarly, although spatial dominance of the project in this image appears moderate, a rotation to the left from this same viewpoint would depict a view of most of the 8 square miles of the proposed project behind the BNSF rail line, where the project would extend to its highest elevations at the foot of the Cady Mountains (up to an elevation of approximately 2,200 feet). At that angle, or in views from locations throughout the I-40 frontage directed toward the project, the view would resemble the simulation of KOP 1. Although the simulation is not necessarily inaccurate, staff also understands that the diffuse reflective brightness of the mirror fields could be substantially greater than depicted in this view for a substantial proportion of the day, increasing overall contrast accordingly.

Staff Analysis: For the reasons cited above, staff considers the simulations of KOPs 1 and 4 to be more representative of the I-40 motorist's experience than KOP 5, and together, more representative of the salient aspects of the project's visual characteristics. That is, with sufficient set-backs from the highway, most views from I-40 would resemble KOP 1, exposing the vast area of the mirror fields due to the sloping topography and exhibiting a highly unusual level of character contrast and spatial dominance. Without sufficient set-backs from the highway, the project would resemble the simulation of KOP 4. That is, visual height and magnitude of the individual SunCatchers would be great, collective diffuse glare could be strong, and there would be a potential for scenic view blockage and enclosure by the tall mirror units. Consequently, staff's analysis of impacts to motorists on I-40 (and Route 66) is as discussed under KOPs 1 and 4. KOP 5 provides useful supplemental understanding of the NAP portion of the highway frontage, but is atypical and does not alter staff's conclusions on the overall project effects to motorists. That is, overall visual change to viewers from Route 66 is considered high. The project would demand attention, could not be overlooked, and would be dominant in the landscape.

Impact Significance: In the context of moderately high overall visual sensitivity, the high level of visual change experienced by the majority of Route 66 and I-40 viewers – those within foreground and near-middle-ground distance from the project – would be regarded as significant.

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.

Staff accepts the Applicant's assertion that the SunCatcher mirror reflections would not produce retinal damage. However staff, on the basis of available information including review of the project AFC and a Glint and Glare Study produced by the applicant that included third-party field photometric measurements of the pilot SunCatcher test site in Maricopa, Arizona, believes that from 5% to 6% of the visible spectrum is not redirected to the PCU by the mirrors, and has the potential to make the mirrors appear as very bright objects through diffuse reflection when the mirrors are tracking in normal operational mode. Staff concluded that the bright intrusive glare is a very real hazard to motorists and pilots near the facility. The most prevalent condition that occurs is 'Flash Blindness' or the after-image in the visual field caused by saturation of the rods and cones of the retina.

Based on calculations by staff and others, however, staff concluded that a minimum safe setback distance to minimize potential hazards from flash blindness from the SunCatchers is approximately 223 feet. In order to provide additional margin of error, staff recommends that the minimum setback to public roadways of any SunCatcher be maintained at 360 feet or greater, as specified in recommended Condition of Certification **VIS-3**. In addition, based upon new photometric data obtained subsequent to publication of the Staff Assessment, staff has added a new Condition of Certification **TRANS-9** to address potential reflective glare impacts.

Nighttime light pollution as a result of the project is a concern. The project viewshed is now largely dark at night. The pristine, unlit night sky is an important part of the desert experience for many visitors to remote areas such as this. Unmitigated night lighting of the project could represent an adverse impact to the experience of campers in the nearby WSAs and other visitors to the area at night.

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, there is concern that night roadway lighting from tall light standards could be reflected into the SunCatchers in stow position at night, reflecting bright illumination skyward and causing night light pollution.

To avoid this effect and ensure acceptable levels of night lighting performance, including potential impacts from construction lighting, staff has revised Condition of Certification **VIS-2,** Temporary and Permanent Exterior Lighting**.** .

Indirect Impacts

The proposed Calico project is sited within a limited and largely enclosed viewshed in which there are few other likely sites for solar energy development. In addition, the site is largely surrounded by various protected areas. However, the likelihood of implementation of a renewable energy project immediately to the northwest, adjacent to the Calico Solar Project, seems high if the proposed project is approved. The potential cumulative impacts of the combined projects are discussed under Section C.13.9, below. Potential indirect impacts from proposed 275 MW Early Interconnection and 850 MW Full Build-Out options are discussed below in Section C.13.8.

Closure and Decommissioning Impacts and Mitigation

Permanent closures would require the applicant to submit to the Energy Commission a contingency plan or a decommissioning plan. A decommissioning plan would be implemented to ensure compliance with applicable LORS, removal of equipment and shutdown procedures, site restoration, potential decommissioning alternatives, and the costs and source of funds associated with decommissioning activities.

The removal of the existing facility would leave a very prominent visual impact over the entire site due to color contrast created between graded or disturbed soil areas and undisturbed areas in the region of the project site. This color contrast is due particularly to the dark color element contributed by normal scrub vegetation, and the light color of underlying soils in the area. At present, despite some surface disturbance from the railroad and utility rights of way, the site retains a predominantly natural character. However, unlike these rights-of-way, the disturbed area of the site would be highly visible to motorists traveling on 1-40 and Route 66. Revegetation of areas in this desert region is difficult, but has been implemented with success in some cases over time. Thus, visual recovery from land disturbance after closure and decommissioning could take place, although only over a long period of time, with implementation of an active and comprehensive revegetation program for the site. With Condition of Certification BIO-10 in the Biological Resources section of this SSA, visual recovery could be accomplished and impacts would be reduced to less-than-significant levels in the long term.

C.13.4.3 CEQA LEVEL OF SIGNIFICANCE AND ADVERSE EFFECTS UNDER NEPA

The BLM is in the process of establishing visual resource management classifications for the proposed project and surrounding areas.

Appendix G of the CEQA Guidelines includes four significance criteria for evaluating aesthetic impacts, as follows:

A. Would the project have a substantial adverse effect on a scenic vista?

No specific designated scenic vista locations were identified in the project viewshed. However, as described above, a higher level of viewer concern for scenic values was associated with the project viewshed as seen from the highway due to the eligible State Scenic Highway status of I-40 and the historic interest of Route 66. Views of the background mountains are the most scenic element of views from the highways in the

project area, and these could potentially be blocked by the project, if the mirror units are sited sufficiently close to the highway. With recommended **Condition of Certification VIS-3,** those views would be preserved, though the foreground would be strongly altered by the vast array of mirror units, strongly attracting attention. With this measure, views would not be blocked, but the project's effect on the quality of those views would be strongly adverse and significant. This alteration of visual quality of the surroundings is discussed further under item C, below.

B. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?

The project is adjacent to Highway I-40 and Route 66, which are not listed as State Scenic Highways. I-40 has been identified as eligible for such a listing. No notable scenic features or resources are present on-site. The project would not directly damage any specific scenic resources located within the project site. Potential effects on scenic quality within the project viewshed in general are discussed under Item C, below.

C. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

As described in the main analysis above, the project would substantially degrade the existing visual character and quality of the site and its surroundings. Under the proposed project, an area of almost 10 square miles, including a roughly 5-mile segment of I-40 and Route 66, would experience a dramatic visual transformation from a predominantly natural desert landscape to one of a highly industrial character. The character and quality of views from these transportation facilities would be strongly affected. In the context of a moderately high level of viewer sensitivity of these affected viewpoints, project impacts are considered significant.

D. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Nuisance glare is a major issue of concern for the Calico Solar Project, primarily for aesthetic and comfort reasons.

Potentially affected receptors would include motorists on the highways; and hikers, climbers and other visitors in Cady Mountains WSA and associated open trails.

Staff conducted an independent review of potential glare impacts based on field data of the SunCatcher test site in Maricopa, Arizona provided by the applicant. With recommended **Condition of Certification VIS- 3** and **TRANS-9**, impacts would be adverse, but could be reduced to less-than-significant levels.

C.13.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the central portion of the proposed 850 MW project. It was developed because it can be constructed. This alternative's boundaries and the revised locations of the

transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

C.13.5.1 SETTING AND EXISTING CONDITIONS

Regionally, the setting and existing conditions for the Reduced Acreage alternative would not differ substantially from the proposed project. However, the setting at the boundary of the alternative would differ substantially from the proposed project. Under the alternative, substantially fewer solar dishes would be deployed and the project would be farther from the boundary of Cady Mountain WSA and nearby ACECs. It would also be farther from the proposed Mojave Trails National Monument.

C.13.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The reduced area alternative is 31% the size of the proposed project. Under this alternative, the project site would be set back approximately a mile from the highway, substantially reducing the visual prominence of the mirror field. Because both the proximity to the highway and extent of the mirror fields would be greatly reduced, overall visual change due to this alternative would be substantially less than under the proposed project. Coincidentally, the overall appearance would be somewhat similar to the AFC simulation of KOP 5, which depicts the project at a similar distance to the Reduced Acreage Alternative, and depicts a similarly reduced overall scale. With this setback and reduced area, overall visual change could be considered moderate.

Due to the large set-back, nuisance glare in the eyes of approaching motorists would be substantially reduced due to the much lower proportion of the field of view occupied by the mirrors. Motorists approaching on I-40 from the east in the morning could still be subject to bright glare from the front row of solar units on the eastern edge of the site for a considerable distance approaching the site, since the units would be directly ahead of the motorist. However, except for such short-lived events, overall nuisance glare effects would be substantially reduced due to distance. The reduced acreage alternative would not reduce potential glare impacts on train operators, as the railroad would still pass through the site.

C.13.5.3 CEQA LEVEL OF SIGNIFICANCE AND ADVERSE EFFECTS UNDER NEPA

The reduced acreage alternative would set back the project boundary approximately 1 mile from the highway, and in most instances, nearly 2 miles from the Cady Mountains WSA. This would eliminate the foreground impacts as seen from these two locations. Middle-ground impacts would be reduced, as less of the landscape in the middle-ground would be occupied. Likewise, the increased setback of this alternative would eliminate the possibility of obstructing scenic views of the background mountains. Given the moderate level of existing scenic quality of the viewshed, although the level of overall viewer sensitivity of these viewpoints is considered to be moderately high, the moderate level of overall visual change and the greatly reduced level of nuisance glare of the Reduced Acreage Alternative could be considered acceptable, and less-than-significant. The BLM is in the process of establishing visual resource management classifications for the proposed project and surrounding areas.

C.13.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The analysis of the Donated and Acquired Lands Alternative has been moved to Section B.2 (**Alternatives**) of this document.

C.13.7 NO PROJECT / NO ACTION ALTERNATIVE

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

NO PROJECT/NO ACTION ALTERNATIVE #1

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

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

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

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

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

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

renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

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

NO PROJECT/NO ACTION ALTERNATIVE #2

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

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

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

NO PROJECT/NO ACTION ALTERNATIVE #3

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

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

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

State and Federal mandates, and those projects would have similar impacts in other locations.

If this project is not approved, renewable projects would likely be developed on other sites in the California Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are large solar and wind projects proposed on BLM land along the Interstate 40 corridor within a few miles of the Calico Solar Project site. In addition, there are currently over 70 applications for solar projects covering over 650,000 acres pending with BLM in California. If the No Project/No Action Alternative #2 is approved, impacts to visual resources on the project site could still occur as a result of approval of another renewable energy project proposal.

C.13.8 PROJECT-RELATED FUTURE ACTIONS - VISUAL RESOURCES

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios:

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.13.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

The transmission line construction project as proposed would be an upgrade of an existing transmission line. For approximately 57 miles the transmission line would replace an existing 220 kV line, within the existing ROW area for that line. For the remaining approximately 10 miles of the route, the proposed line would be constructed within a new ROW area in the vicinity of Hesperia.

The visual environment associated with the project area is generally natural and not highly altered from predevelopment conditions; however, there are existing and proposed transmission line and other linear features in the area, including the proposed ROW area. Visual resources in the area of the upgrades have been affected along portions of the routes by past and present actions, including highway/roadway construction, and residential and commercial development. The transmission route would pass through BLM lands and run adjacent to wilderness areas and ACECs, including the Ord-Rodman DWMA. The project area includes broad expanses of Basin and Range topography of the Mohave Desert region, and the ROWs generally traverse between alluvial valley debris flows and rugged mountain ranges. Views are generally expansive through this portion of the project area.

No specific Visual Resource Management (VRM) designations have yet been identified for BLM lands crossed by the SCE upgrades; however, based upon the minimal alterations to the existing environment, it is assumed that most of the lands, especially at the northeastern end would have a Class II or III designation with wilderness areas, ACECs and DWMAs classified as Class I. No qualitative evaluations of the project area scenic quality were completed for this study.

C.13.8.2 ENVIRONMENTAL IMPACTS

For the proposed 500 kV route, new dulled galvanized 500 kV LST structures would be installed in the existing and new ROW. Single-circuit LSTs generally range in height between 91 feet and 194 feet. Most of the structure sites would likely require minor to substantial grading and new or re-developed access and spur roads.

The project would require temporary staging areas for equipment and materials storage along the transmission line route. Generally these yards range in size from a few acres to up to approximately 30 acres. Construction of the expanded Pisgah Substation would likely require a temporary laydown area located at or near the existing roadway at the site.

Conductor pulling and tensioning equipment would be located at various sites along the transmission line ROW. Depending on the terrain and the number of angles and dead-end sites, numerous pull sites would likely be needed.

The project would be visible from foreground, middle ground, and distant views from sensitive viewpoints (e.g., highways, residences, trail heads, wilderness areas, and scenic overlooks) located along the proposed ROW. The project would be visible from travelers along I-40 and Highway 66; however, two existing 220 kV transmission lines are currently located within the proposed ROW in these areas. I-40 is currently classified as an eligible state scenic highway, not officially designated (Caltrans 2010). Construction equipment and activities would also be visible to motorists other local roadways and to residents living near the construction activities in Hesperia. Although a BLM visual resource contrast rating analysis has not been completed, due to temporary duration of the project construction, the adverse visual impacts that would occur during construction would not likely be significant. This conclusion assumes that construction areas and the ROW would be restored to their pre-project conditions, as discussed below.

During project operation, the upgrades would include the construction of new permanent spur and access roads to the individual structure sites and Pisgah Substation, which could create permanent visual scars across the undeveloped landscape.

Construction of the 500 kV line would be largely within an existing ROW across undeveloped BLM lands, and would parallel a major existing utility corridor with up to three other existing transmission lines for its length. Because the existing transmission lines and towers are an established part of the setting and the project would include removal of the existing 220 kV line and poles, the adverse visual impacts that would occur due to installation of the new line, and any incremental changes in tower height or design, would likely not be significant. This conclusion assumes that the new wires and towers would incorporate typical measures to mitigate potentially significant adverse visual impacts, such as those listed below.

In locations with no previously existing transmission line corridors, the degree of change may be more evident, particularly if poles or towers are placed in visually sensitive locations, such as near residences, against a skyline, or adjacent to highly traveled roadways. Visual resource contrast rating analysis would be required to be completed for BLM-managed lands and sensitive viewshed locations, such as wilderness areas, crossed by or lying adjacent to the project, to determine the degree of change to visual resources in those areas, particularly in areas where no transmission lines currently exist. Expansion to the Pisgah Substation under both options would be noticeable from travelers along I-40, but for only short periods (e.g., less than 1 minute) and the visual change would be reduced under the 275 MW Early Interconnection which would be within a 270 feet by 100 feet area directly adjacent to the existing substation. Upgrades to the Lugo Substation would occur within the existing footprint and are also not expected to result in significant changes to current conditions.

C.13.8.3 MITIGATION

With the inclusion of mitigation measures similar to those listed below, visual impacts from construction activities related to the upgrades for both options would likely not be significant:

- During project construction, the work site should be kept clean of debris and construction waste. Material and construction storage areas should be selected to minimize views from public roads, trails, and nearby residences.
- For areas where excavated materials would be visible from sensitive viewing locations, excavated materials should be disposed of in a manner that is not visually evident and does not create visual contrasts.
- Maintenance operations work should be conducted in a manner that limits unnecessary scarring or defacing of the natural surroundings to preserve the natural landscape to the extent possible.
- The project owner should revegetate disturbed soil areas to the greatest practical extent. In particular, the area of disturbed soils used for laydown, project construction, and siting of the substation and other ancillary operations and support structures should be revegetated.

The following mitigation measures are associated with the siting and design of the new transmission structures under the 850 MW Full Build-Out option that would help to reduce impacts to visual resources:

- Complete visual resource impact analysis on BLM lands and for other sensitive viewshed locations.
- Attempt to place transmission lines within existing corridors and match tower locations with existing transmission structures.
- Do not place structures against a skyline view or within drainages wherever possible.
- Avoid perpendicular or “straight-line” placement along hillsides wherever possible.
- Non-specular and non-reflective conductors should be used in order to reduce conductor visibility and visual contrast.
- Insulators should be non-reflective and non-refractive.
- Any surface coatings on structures should be applied to new or replacement structures that are visible from sensitive viewing locations with appropriate colors, finishes, and textures to most effectively blend the structures with the visible backdrop landscape. For structures that are visible from more than one sensitive viewing location, if backdrops are substantially different when viewed from different vantage points, the darker color shall be selected, because dark colors tend to blend into landscape backdrops more effectively than lighter colors, which may contrast and produce glare.

C.13.8.4 CONCLUSION

Construction of the SCE upgrades project would require temporary disturbance during construction (i.e., heavy equipment, tensioning, and pull sites). After rehabilitation of temporary construction yards and pulling sites, as required by the suggested mitigation, the portion of the transmission line within the existing corridor would appear largely as it does now, except for the construction of new and permanent spur and access roads, which would permanently scar the fragile desert landscape.

The SCE upgrades would have the potential to cause adverse long-term visual impacts, such as through the use of reflective conductors and/or insulators that would make existing or new structures more dominant in the existing viewshed, and through the construction of new and larger structures. However, project design features and feasible mitigation measures would be available that would ensure that visual impacts of the project would be reduced. With use of non-specular conductors and non-reflective and non-refractive insulators, potential long-term impacts associated with this activity would be reduced as well.

Because the upgrades would be in a largely undeveloped area on BLM land, would parallel an existing utility corridor or be on/within existing facilities, and would include removal of the existing line, it is expected that visual impacts would be reduced to less than significant along most of the line, but a BLM visual resource contrast rating analysis is required to confirm the analysis. In addition, a portion of the 500 kV transmission line route under the 850 MW Full Build-Out would be within a new 500 kV ROW. Even if the upgrades work complies with all applicable laws, ordinances, regulations and standards (LORS), absent a viewshed analysis from sensitive viewpoints, this Staff Assessment/EIS conservatively concludes that the SCE upgrades may create significant and unmitigable impacts to visual resources due to the construction of 10 miles of new ROW from the Mojave River to the Lugo Substation.

C.13.9 CUMULATIVE IMPACTS

C.13.9.1 GEOGRAPHIC EXTENT

Cumulative impacts could occur if implementation of the Calico Solar Project would combine with those of other local or regional projects. The Calico Solar Project is potentially associated with two types of cumulative impact:

1. cumulative impacts within the immediate project viewshed, essentially comprising foreseeable future projects in the Mojave Desert area of San Bernardino County;
2. cumulative impacts of foreseeable future solar and other renewable energy projects within the southern California Desert, or other broad basin of the project's affected landscape type. The widest applicable basin of cumulative effect would include all of the southern California Desert landscapes extending into neighboring states.

Local Projects (Project Viewshed)

Calico Solar Project and Past Projects

Past and present projects occurring in the viewshed of the proposed project site and affecting its existing visual quality include recreational activities managed by the BLM, SCE transmission lines, the Pisgah substation, utility lines, and the I-40 and Route 66 highways.

Calico Solar Project and Foreseeable Future Projects

Past and foreseeable future projects in the vicinity of the Calico Solar Project are depicted in **Cumulative Impacts Figure 3**, and listed in **Cumulative Impacts Table 2.** As discussed in Section C.13.4.1 above analyzing the setting of the proposed project,

the Calico Solar Project is situated within a fairly limited local viewshed, enclosed by nearby mountains. The area within which it could interact with other future projects is thus somewhat limited. Potential projects listed in Figure 3 and Table 3 include the Pisgah-Lugo transmission upgrade described elsewhere in this report, the Pisgah Substation Expansion, the renewable project next in line for the withdrawn SES Solar 3, Oak Creek Wind Energy, and possibly the Power Partners wind project. These are the projects that appear to have the potential to directly interact with the Calico Solar Project visually.

At this level of direct visual interaction, it is difficult to evaluate the cumulative effects of these projects without some further foreseeable project detail, but because staff already finds that the effects of the Calico Solar Project alone would have substantial visual impacts, potential cumulative impacts would also be substantial taken as a whole.

Within the slightly broader Newberry Springs-Ludlow area of potential cumulative effect, the project in combination with foreseeable projects could have the effect of substantially degrading the overall visual quality of a slightly broader segment of Highway I-40. The segment of I-40 west of the Calico Solar Project site however is already considered by staff to be visually compromised by development. The listed projects however have the potential to further degrade a currently intact segment of I-40, which is listed as an eligible State Scenic Highway, from the Calico Solar Project site eastward. This effect could be cumulatively substantial, depending upon the details of the specific projects.

Regional Solar/Renewable Development Projects

Calico Solar Project and Past Regional Projects

The Calico Solar Project is among the first of a large number of existing solar project applications in the CDD. As such, past and present projects have had a negligible region-wide cumulative impact.

Calico Solar Project and Foreseeable Future Projects

The analysis of cumulative impacts is not necessarily restricted to the immediate viewshed of a project, and the need for cumulative analysis over a broad geographic area may often be determined by the affected resource itself. In this case the affected resource is the unique and highly valued landscape type of which the project site forms a small part – the landscape of the Mojave Desert.

The Mojave Desert and California Desert Conservation Area (CDCA) within which the Calico Solar Project is located are a unique and highly valued scenic resource of national importance, as reflected by the presence of three national parks and numerous Wilderness Areas within its boundaries. Cumulative Impacts Table 1 identifies 72 solar projects and 61 wind project applications with a total overall area of over one million acres within the CDCA, which is indicative of the interest in public lands for renewable energy generation at a regional level.

This figure does not include renewable projects within the Nevada and Arizona portions of the Mojave Desert. Of the 61 wind applications in the California Desert District, only five of the applications are for wind development; the remaining proposals are for site

testing and monitoring. BLM's experience is that a small percentage of applications for site testing have resulted in wind development proposals. In regards to the solar applications filed with BLM in California, only approximately 10% of the proponents have prepared acceptable detailed Plans of Development required by BLM to begin a NEPA analysis.

Although it is unlikely that all of the future solar and wind development projects proposed in the region would be constructed, it is reasonable to assume that some of them will be constructed, in light of the state and federal mandates for renewable energy development. With this very high number of renewable energy applications currently filed with BLM, the potential for profound widespread cumulative impacts to scenic resources within the southern California is clear.

These cumulative impacts could include a substantial decline in the overall number and extent of scenically intact, undisturbed desert landscapes, and a substantially more urbanized character in the overall southern California desert landscape. In particular, the number of current renewable applications before the BLM and Energy Commission that could potentially be prominently visible from the desert region's major highways is proportionally high, and the proportion of those highways that could be affected is also high. Because these highways are the location from which the vast majority of viewers experience the California desert, this potential effect is of concern to staff. Viewed in the cumulative context of the Southern California desert as a whole, potential visual impacts of renewable energy projects are considered to be cumulatively considerable and potentially significant.

C.13.9.2 CUMULATIVE IMPACT CONCLUSION

The anticipated visual impacts of the Calico Solar Project in combination with past and foreseeable future local projects in the Mohave Desert region, and past and foreseeable future region-wide projects in the southern California desert are considered cumulatively considerable, and potentially significant.

C.13.10 COMPLIANCE WITH LORS

Visual Resources Table 3
Project Compliance with Laws, Ordinances, Regulations, and Standards (LORS)

LORS		Consistency with Staff-Recommended Conditions of Certification (Project)
Federal		
National Environmental Policy Act (NEPA)	As discussed above, applicable federal requirements for visual impact assessment are enacted through application of the BLM VRM methodology, discussed below.	
Federal Land Policy and Management Act of 1976 (FLPMA)	Section 102 (a) of the Federal Land Policy and Management Act of 1976 (FLPMA) states that " . . . . the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values …. " Section 103 (c) identifies "scenic values" as one of the resources for which public land should be managed. Section 201 (a) states that "The Secretary shall prepare and maintain on a continuing basis an inventory of all public lands and their resources and other values (including ... scenic values) ...." Section 505 (a) requires that "Each right-of-way shall contain terms and conditions which will... minimize damage to the scenic and esthetic values...."	Refer to CDCA discussion, below.

LORS		Consistency with Staff-Recommended Conditions of Certification (Project)
California Desert Conservation Area Plan (CDCA Plan)	The CDCA Plan represents the Resource Management Plan (RMP) for the area required under FLPMA. The CDCA Plan did not contain VRM mapping as in most RMPs. The Calico site is classified in the CDCA Plan as Multiple-Use Class (MUC) M (Moderate Use). MUC M lands are managed to provide a wider variety of uses such as mining, grazing, recreation, utilities, and energy development, while conserving desert resources and mitigating damages permitted uses may cause. Under the CDCA Plan Electrical Power Generation Facilities, including Wind/Solar facilities, may be allowed within MUC Class M if NEPA requirements are met.	Consistent. Solar electrical generation plants are specifically allowed for under the MUC Class M Guidelines if NEPA requirements are met. Disclosure of potential visual project effects under NEPA has been conducted through the analysis in this study.
National Historic Preservation Act (NHPA)	Under regulations of the NHPA, visual impacts to a listed or eligible National Register property that may diminish the integrity of the property's ". . . setting . . .(or) feeling . . . ." in a way that affects the property's eligibility for listing, may result in a potentially significant adverse effect. "Examples of adverse effects . . . include . . .: Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features . . . . " (36 CFR Part 800.5)	These potential impacts are addressed in the **Cultural Resources** section of this SA/DEIS.

LORS		Consistency with Staff-Recommended Conditions of Certification (Project)
State		
State Scenic Highway Program (CA. Streets and Highways Code, Section 260 et seq.)	The State Scenic Highway Program promotes protection of designated State scenic highways through certification and adoption of local scenic corridor protection programs that conform to requirements of the State program.	Consistent. Interstate 40 within the project viewshed is eligible to be State scenic highway, but has not been designated as such.
Local		
San Bernardino County General Plan (2007) Applicable Conservation Element Goals, Objectives, Programs	***CONSERVATION ELEMENT*** *GOAL CO 1*. The County will maintain to the greatest extent possible natural resources that contribute to the quality of life within the County. Policy CO 1.2 The preservation of some natural resources requires the establishment of a buffer area between the resource and developed areas. The County will continue the review of the Land Use Designations for unincorporated areas within one mile of any state or federally designated scenic area, national forest, national monument, or similar area, to ensure that sufficiently low development densities and building controls are applied to protect the visual and natural qualities of these areas.	None of the project site is under county jurisdiction; however State and Federal agencies endeavor to conform to local goals, policies, objectives, and ordinances where practicable. County policy is to minimize development density within a mile buffer around designated federal resources in order to preserve visual and natural qualities. The project would not conform to this goal.

LORS		Consistency with Staff-Recommended Conditions of Certification (Project)
San Bernardino County General Plan (2007) Applicable Conservation Element Goals, Objectives, Programs (continued)	Policy CO 8.1 Maximize the beneficial effects and minimize the adverse effects associated with the siting of major energy facilities. The County will site energy facilities equitably in order to minimize net energy use and consumption of natural resources, and avoid inappropriately burdening certain communities. Energy planning should conserve energy and reduce peak load demands, reduce natural resource consumption, minimize environmental impacts, and treat local communities fairly. 4. The County will consult with electric utilities during the construction of their major transmission line towers to ensure that they are aesthetically compatible with the surrounding environment. 8. The County shall consult with electric utilities during the planning construction of their major transmission lines towers to ensure that they are aesthetically compatible with the surrounding environment. ***OPEN SPACE ELEMENT*** *GOAL OS 4.* The County will preserve and protect cultural resources throughout the County, including parks, areas of regional significance, and scenic, cultural and historic sites that contribute to a distinctive visual experience	While adverse effects will be minimized to the degree feasible, they still will be adverse and significant. There are no communities within the project vicinity. The project would not be consistent with the goal to preserve and protect scenic sites “that contribute to a distinctive visual experience.”

LORS		Consistency with Staff-Recommended Conditions of Certification (Project)
San Bernardino County General Plan (2007) Applicable Conservation Element Goals, Objectives, Programs (continued)	*GOAL OS 5*. The County will maintain and enhance the visual character of scenic routes in the County. Scenic Route: Interstate 40 from Ludlow northeast to Needles. (p. 223) ***LAND USE ELEMENT*** GOAL D/LU 1. Maintain land use patterns in the Desert Region that enhance the rural environment and preserve the quality of life of the residents of the region. ***CONSERVATION ELEMENT*** GOAL D/CO 3. Preserve the dark night sky as a natural resource in the Desert Region communities. POLICIES D/CO 3.1 Protect the Night Sky by providing information about and enforcing existing ordinances: a. Provide information about the Night Sky ordinance and lighting restrictions with each land use or building permit application. b. Review exterior lighting as part of the design review process. D/CO 3.2 All outdoor lighting, including street lighting, shall be provided in accordance with the Night Sky Protection Ordinance and shall only be provided as necessary to meet safety standards. D/CO 3.3 Allow for desert communities' input on the need for, and placement of, new street lights.	Interstate 40 from Ludlow northeast to Needles is designated by the County as a scenic route. The project site is west of and not visible from this designated section of I-40, therefore the project is consistent with this Goal. Consistent. With recommended Condition of Certification VIS-2, upward illumination would be shielded, and outdoor illumination in general would be minimized. Consistent. Under recommended Condition of Certification VIS-2, the required project lighting plan would be provided to the County for review prior to project construction. Potential for nighttime light pollution would be minimized through shielding, downward-directed lighting, and minimum lighting consistent with safety. Lit areas not occupied on a continuous basis would operate only when the area is occupied. With this condition, the project would conform with these policies.

LORS		Consistency with Staff-Recommended Conditions of Certification (Project)
San Bernardino Development Code Chapter 83.07.040 Glare and Outdoor Lighting - Mountain and Desert Regions.	Sets various standards and conditions for external lighting in residential and commercial situations. Exempts facilities on Federal Property	With staff-recommended Condition of Certification VIS-2, the project would meet the standards set in this Chapter of the Code.

C.13.11 NOTEWORTHY PUBLIC BENEFITS

No noteworthy public benefits in the area of visual resources were identified.

C.13.12 FACILITY CLOSURE

Staff has addressed facility closure and decommissioning impacts to Visual Resource under individual headings in Assessment of Impacts and Discussion of Mitigation above.

C.13.13 RESPONSE TO PUBLIC AND AGENCY COMMENTS

Staff received comments from Basin and Range Watch and the applicant on the **Visual Resources** section of the SA/DEIS. Staff's responses are outlined below and have been incorporated in the appropriate areas of this section. Specific Final Environmental Impact Statement (FEIS)-related comments will be responded to by the BLM in the FEIS for this project.

C.13.13.1 PUBLIC COMMENTS

A comment on the SA/DEIS **Visual Resources** section was provided by intervenor Basin and Range Watch.

Comment: Following participation in the April 16, 2010 Workshop in Barstow, Basin and Range Watch would like to submit suggestions for additional Key Observation Points for Visual Resources analysis. A map [included in project docket as TN 56409] is included showing two potential viewpoints from the Rodman Mountains Wilderness southwest of the Project site. The area can be accessed from Interstate 40 by Box Canyon Road.

Response: Simulations were not prepared from the suggested KOPs referred to in the comment. However, staff studied virtual views from similar viewpoints in the Rodman WA using Google Earth as a means to visualize the degree of project visibility that would be expected. The two suggested KOPs are located respectively on bajadas within the WA at a distance of roughly four miles; and on ridges overlooking the valley at a distance of roughly 6 miles, or background distance. Based on those studies, staff concluded that the project could present a moderate level of visual change from both viewpoints, and decline further with increased distance. From bajadas in the WA within

the middle-ground distance zone, a moderate to strong level of visual change, depending upon distance, could be observed despite the oblique vertical viewing angle, partly because of the project site's marked south-facing slope. From background distance in the Rodman Mountains, visual change could be moderate at five to six miles due to increased visibility from the more acute vertical viewing angle, but would decline further with distance. Similar to the Cady Mountains WSA, viewer sensitivity is considered moderately high in the Rodman Mountains WA. As in the Cady Mountains WSA, the anticipated number of viewers would be very low. Unlike the Cady Mountains WSA, the area of project visibility within the Rodman WA would be widespread, and a substantial area of both bajada and mountain ridge landscapes would have unobstructed views of the project. In light of the greater proportion of potentially affected area in the WA, including substantial areas of elevated views, impacts are considered potentially significant.

C.13.13.2 APPLICANT'S COMMENTS

General Comment: The Visual Resources Section of the SA/DEIS includes some of the BLM Visual Resources Management (VRM) methodology, but does not include a complete VRM analysis. The Applicant believes that the SA/DEIS document would be more complete from a NEPA perspective if it built upon the BLM VRM methodology already present in the report by more clearly establishing the interim VRM Class III for the BLM lands within the Project area and utilizing the Visual Contrast Rating system for determining impacts.

Response: The comment refers to interim VRM (IVRM) Classes in the study area, however no IVRM Classes currently exist, and no Visual Resource Inventory (VRI) mapping by BLM existed at the time of this analysis. BLM is currently in the process of conducting VRI and VRM mapping of the California Desert District, but that study has not yet been completed. Consequently, as stated on page C.13.3, above, it was agreed between BLM and CEC staff that the customary CEC analysis method would be used for this study.

Comment: On page C.13-1, C.13-22 and 23 of the SA/DEIS, staff states "Impacts of the Reduced Acreage Alternative would be substantially less than the Proposed Project and the Avoidance of Donated Lands Alternative under NEPA, and are considered less-than-significant under CEQA."

In the assessment of the Reduced Acreage Alternative, staff makes the case that the impacts to visual resources associated with the Reduced Acreage Alternative would amount to less-than-significant impacts. Staff makes this determination based on the smaller size of the alternative. "Regionally, the setting and existing conditions for the Reduced Acreage alternative would not differ substantially from the proposed project. However, the setting at the boundary of the alternative would differ substantially from the proposed project. Under the alternative, substantially fewer solar dishes would be deployed and the project would be farther from the boundary of Cady Mountain WSA and nearby ACECs."

The analysis does not follow the same logic as the analysis of the Project, because the analysis of the Project considers the majority of sensitive viewers to be located along

the transportation routes to the south of the project, not within the WSA and/or nearby ACECs. The majority of impacts associated with the project as analyzed through use of the KOPs are from the I-40, Route 66 and BNSF Railway. Analysis of KOPs 1, 4 and 5 all produced a finding of significant. These KOPs represent views from the I-40 and railway. According to the assessment, views from I-40, the Railway and Route 66 would not be appreciably different. Staff states: “It would not be appreciably different for viewers on I-40, which would remain the southern boundary of the project.” Staff states: “The Reduced Acreage alternative would not reduce potential glare impacts on train operators, as the railroad would still pass through the site.”

If the impacts to the I-40 and the railway would not be “appreciably” different, then it is not the case that impacts to these areas could be reduced to less than significant. Because impacts to the WSA were analyzed in discussion of KOP 2, and were found to be less than significant for the Project, then a change to these views should not amount to a change in the overall significance level of visual impacts originating with the reduced acreage alternative when impacts to the more sensitive viewing areas remain similar.

The Applicant disagrees that impacts to visual resources caused by the Reduced Acreage Alternative should be considered less than significant. This alternative still involves the use of over 2,000 acres of desert land that will be immediately visible to the majority of highly sensitive viewers in the area. The development of the Reduced Acreage alternative would still amount to a visually dominant industrial feature and a high degree of change to the views experienced from KOPs 1, 4 and 5. Therefore, the Reduced Acreage Alternative would also cause significant adverse impacts to visual resources.

The Applicant recommends that the finding be changed to significant impact for the Reduced Acreage Alternative.

Response: The statement quoted by the applicant that the alternative ‘ would not be appreciably different for viewers on I-40, which would remain the southern boundary of the project’ was erroneous, and has been deleted from this report.

The conclusions of the analysis of impacts of this alternative were based in part on the AFC simulation of KOP 5, which depicts the project at a similar distance to the Reduced Acreage Alternative, and depicts a similarly reduced overall scale. Based on the level of contrast and visual change depicted in that view of the project at this setback distance, staff concluded that overall visual change would be moderately high. Based on further study since publication of the SA, and particularly in light of substantial new information and better understanding regarding the glare characteristics of the SunCatchers, staff concurs with the applicant that the Reduced Acreage Alternative could be considered significant by many observers. That conclusion would be even more applicable if Condition VIS-1 becomes infeasible for the backs of the SunCatcher mirrors. Staff therefore concludes that impacts of this alternative would remain significant.

Comment: On page C.13-39 of the SA/DEIS, staff proposes Condition **VIS-1**.

The Applicant requests that the condition apply to all permanent structures, *except* for SunCatchers. While the Applicant is currently investigating the feasibility of painting the backs of the SunCatcher mirror facets a color that would minimize visual intrusion, the backs of the mirror facets are currently proposed to be painted white. Any color darker than white retains more heat and could therefore be problematic. There are many surfaces on the SunCatchers that cannot be painted due to slip critical features in which the structure requires friction that could be compromised by paint, the temperatures they would reach in the production of energy, and pre-fabrication galvanization that precludes a top-coat.

Response: Applicant indicates that Condition **VIS-1** would be infeasible as applied to SunCatchers, but states that other colors are being investigated. If light colors that would blend with the background landscape are feasible, their use on the backs of mirrors is strongly recommended. If colors other than white are not feasible, staff notes that overall impacts of the project would be substantially increased due to increased brightness and contrast. The ultimate conclusion, that impacts would be significant, would remain the same.

Comment: On page C.13-34 of the SA/DEIS, staff proposes a verification for Condition **VIS-2** requiring "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."

The Applicant requests that verification of the condition be changed from 90 days prior to 30 days prior.

Response: The change from 90 days prior to 30 days is acceptable to staff and has been reflected in the verification.

Comment: On page C.13-34 of the SA/DEIS, Staff proposes Condition **VIS-3**.

According to the Revised Calico Project Layout Figure, submitted on March 8, 2010, the project is already in compliance with this condition. All SunCatchers will be located north of the existing pipeline right-of-way and at least 500 feet from Interstate 40.

Response: Comment is noted.

Comment: On page C.13-42 of the SA/DEIS, Staff proposes Condition **VIS-4**.

The construction laydown area is located adjacent to the Main Services Complex and not adjacent to I-40 (Proposed Project-Figure 2). The Applicant anticipates that SunCatchers will eventually be installed on the construction laydown area, and revegetation of the area would therefore not be appropriate. The Applicant requests the following text revision:

> "In order to minimize the visual prominence of the proposed staging area adjoining I-40 to motorists, the project owner shall provide opaque screening of the site as seen from the highway, and a set-back from the roadway of at least 250 feet. ~~In addition, the project owner shall provide a~~

~~re-vegetation plan describing how the staging site will be restored following construction. The plan shall call for beginning of restoration of the site within the shortest feasible time following completion of construction~~."

Response: Condition **VIS-4** was recommended in relation to originally-proposed laydown sites adjoining the highway. With the removal of the laydown areas adjacent to the public roadways, staff has deleted Condition of Certification **VIS-4**.

C.13.14 PROPOSED CONDITIONS OF CERTIFICATION

SURFACE TREATMENT OF NON-MIRROR PROJECT STRUCTURES AND BUILDINGS

VIS-1 The project owner shall treat all non-mirror surfaces of all project structures and buildings visible to the public such that a) their colors minimize visual intrusion and contrast by blending with the existing tan and brown color of the surrounding landscape; b) their colors and finishes do not create excessive glare; and c) their colors and finishes are consistent with local policies and ordinances. The transmission line conductors shall be non-specular and non-reflective, and the insulators shall be non-reflective and non-refractive. This measure shall include coloring of security fencing with vinyl or other non-reflective coating; or with slats or similar semi-opaque, non-reflective material, to blend to the greatest feasible extent with the background soil.

The project owner shall submit for CPM review and approval, a specific Surface Treatment Plan that will satisfy these requirements. The treatment plan shall include:

A. A description of the overall rationale for the proposed surface treatment, including the selection of the proposed color(s) and finishes;

B. A list of each major project structure, building, tank, pipe, and wall; the transmission line towers and/or poles; and fencing, specifying the color(s) and finish proposed for each. Colors must be identified by vendor, name, and number; or according to a universal designation system;

C. One set of color brochures or color chips showing each proposed color and finish;

D. A specific schedule for completion of the treatment; and

E. A procedure to ensure proper treatment maintenance for the life of the project.

The project owner shall not specify to the vendors the treatment of any buildings or structures treated during manufacture, or perform the final treatment on any buildings or structures treated in the field, until the project owner receives notification of approval of the treatment plan by the CPM. Subsequent modifications to the treatment plan are prohibited without 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 the CPM for review and approval and simultaneously to San Bernardino County for review and comment. If the CPM determines that the plan requires revision, the project owner shall provide to the CPM a plan with the specified revision(s) for review and approval by the CPM before any treatment is applied. Any modifications to the treatment plan must be submitted to the CPM for review and approval.

Prior to the start of commercial operation, the project owner shall notify 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 and consistent with safety and security considerations, the project owner shall design and install all temporary and permanent exterior lighting so that:

a) lighting does not cause excessive reflected glare;

b) lighting does not illuminate the nighttime sky;

c) mounting heights and locations of all lighting fixtures, including roadway lighting, will not allow light to fall on the mirror surfaces of the SunCatchers in the stowed position,

d) illumination of the project and its immediate vicinity is minimized as to times of use and extent, and;

e) lighting on the exhaust stacks shall be the minimum needed to satisfy safety and security concerns.

Permanent night lighting shall comply with all applicable standards, practices, and regulations including, and specifically, the following Illuminating Engineering Society documents:

- RP-33-99 Lighting for Exterior Environments
- DG-13-99 Outdoor Lighting
- TM-10-00 Addressing Obtrusive Light (Urban Sky Glow and Light Trespass) in Conjunction with Roadway Lighting
- TM-15-07 Luminaire Classification System for Outdoor Luminaires

Verification: At least 90 days prior to ordering any exterior lighting, the project owner shall contact the CPM to show compliance with all of the above requirements. This shall include, but not be limited to, final lighting plans,

fixture and control schedules, fixture and control cut sheets and specifications, a photometric plan showing vertical and horizontal footcandles at all property lines to a height of 20 feet, and the proposed time clock schedule.

Prior to construction and prior to commercial operation, the project owner shall notify the CPM that the installation of the temporary and permanent lighting has been completed and is ready for inspection. If after inspection the CPM notifies the project owner that modifications to the lighting are needed, within 30 days after receiving the notification the project owner shall implement the modifications and notify the CPM when the modifications are competed and ready for inspection.

Within 48 hours of receiving a lighting complaint, the project owner shall provide the CPM with a complaint resolution form as specified in the Compliance General Conditions, including a proposal to resolve the complaint, and a schedule for implementation of the proposed resolution. The project owner shall notify the CPM within 48 hours after completing the resolution of the complaint. A copy of the complaint resolution form report shall be submitted to the CPM within 30 days and included in the Annual Report.

SETBACK OF SUNCATCHERS FROM HIGHWAY I-40

VIS-3 To reduce the visual dominance and glare effects of the SunCatchers to motorists on Highway I-40, the applicant shall set back the nearest units to the area north of the existing pipeline right-of-way, and at a minimum distance of 360 feet from the edge of the roadway, whichever is greater.

Verification: At least 90 days prior to start of construction, the project owner shall present to BLM's Authorized Officer and the CPM a revised plan depicting how the proposed SunCatchers will be set back from the highway. If the CPM determines that the plan requires revision, the project owner shall provide to the CPM a revised plan for review and approval by the CPM.

The project owner shall not begin construction until receiving CPM approval of the revised plan.

C.13.15 CONCLUSIONS

The proposed project would substantially degrade the existing visual character and quality of the site and its surroundings. Under the proposed project, an area of almost 10 square miles, including approximately 5 miles of frontage on I-40, would experience a dramatic visual transformation from a predominantly natural desert landscape to one of a highly industrial character, strongly affecting motorists on the highway. Given the moderately high level of viewer sensitivity of these affected viewpoints, project impacts are considered significant. With staff-recommended mitigation measures, these impacts could be greatly reduced, but would remain significant and unavoidable.

Under the proposed project, the character and quality of some views from foreground and near-middle-ground areas of the Cady Mountains WSA would be adversely affected, but the overall effect on views from the Cady Mountains WSA is considered to be less-than-significant.

Impacts of the Reduced Acreage Alternative would be substantially less than the proposed project. Based on further analysis and in light of additional information available to staff since publication of the SA/DEIS, impacts under this alternative are considered to remain significant.

The anticipated visual impacts of the Calico Solar Project and alternatives, in combination with past and foreseeable future local projects in the Mojave Desert region, and past and foreseeable future region-wide projects in the southern California desert are considered cumulatively considerable and potentially significant.

In response to a review of photometric data provided by the applicant, staff believes that diffuse reflection from the SunCatchers could be an intrusive and distracting nuisance to motorists under at least certain conditions, particularly when an entire row of units could be visible in a near-vertical position to approaching motorists at hours near sunrise and sunset. However, with staff-recommended **Condition of Certification VIS-3,** and recommended **Condition of Certification TRANS-9,** potential glare/reflection impacts could be reduced to less-than-significant levels.

C.13.16 REFERENCES

NPS 2009, 2010 California Desert Protect Act Overview (map), December 21, 2009. http://feinstein.senate.gov/public/index.cfm?FuseAction=NewsRoom.PressReleases&ContentRecord_id=B3A780D4-5056-8059-7606-3936A2F7945F , [Map link in Related Resources menu.] Accessed 1/6/2010.

NPS 2008, Cady Mountains Proposed Wilderness and Existing Wilderness Study Area (map), June 24, 2008. http://www.nplnews.com/archives2008.asp [link in ‘Hot Topics’.] Accessed 1/6/2010

SES 2008a – Stirling Energy Systems/R. Liden (tn: 49181). Application for Certification, dated December 1, 2008. Submitted to CEC/Docket Unit on December 1, 2008.

SES 2009p – Stirling Energy Systems/C. Champion (tn: 52956). Applicants' Response to Energy Commission & Bureau of Land Management's Data Requests 113-127 of Data Requests Set 1, Part 2, dated August 20, 2009. Submitted to CEC/Docket Unit on August 24, 2009.

USDOI, 1995. State of California Wilderness Status Map.

Caltrans (California Department of Transportation), 2006. Scenic Highway Master Plan.

County of San Bernardino, 2007. General Plan.

ENERGY COMMISSION VISUAL RESOURCE ANALYSIS EVALUATION CRITERIA

Energy Commission staff conducts a visual resource analysis according to Appendix G, "Environmental Checklist Form—Aesthetics," California Environmental Quality Act (CEQA). The CEQA analysis requires that commission staff make a determination of impact ranging from "Adverse and Significant" to "Not Significant."

Staff's analysis is based on Key Observation Points or KOPs. KOPs are photographs of locations within the project area that are highly visible to the public — for example, travel routes; recreational and residential areas; and bodies of water as well as other scenic and historic resources.

Those photographs are taken to indicate existing conditions without the project and then modified to include a simulation of the project. Consequently, staff has a visual representation of the viewshed before and after a project is introduced and makes its analysis accordingly. Information about that analytical process follows.

Visual Resource Analysis Without Project

When analyzing KOPs of existing conditions without the project, staff considers the following conditions: visual quality, viewer concern, visibility, number of viewers, duration of view. Those conditions are then factored into an overall rating of viewer exposure and viewer sensitivity. Information about each condition and rating follows.

Visual Quality

An expression of the visual impression or appeal of a given landscape and the associated public value attributed to the resource. Visual quality is rated from *high* to *low*. A high rating is generally reserved for landscapes viewers might describe as picture-perfect.

Landscapes rated high generally are memorable because of the way the components combine in a visual pattern. In addition, those landscapes are free from encroaching elements, thus retaining their visual integrity. Finally, landscapes with high visual quality are visually coherent and harmonious when each element is considered as part of the whole. On the contrary, landscapes rated *low* are often dominated by visually discordant human alterations.

Viewer Concern

Viewer concern represents the reaction of a viewer to visible changes in the viewshed — an area of land visible from a fixed vantage point. For example, viewers have a high expectation for views formally designated as a scenic area or travel corridor as well as for recreational and residential areas. Viewers generally expect that those views will be preserved. Travelers on highways and roads, including those in agricultural areas, are generally considered to have moderate viewer concerns and expectations.

However, viewers tend to have low-to-moderate viewer concern when viewing commercial buildings. And industrial uses typically have the lowest viewer concern. Regardless, the level of concern could be lower if the existing landscape contains discordant elements. In addition, some areas of lower visual quality and degraded visual character may contain particular views of substantially higher visual quality or interest to the public.

Visibility

Visibility is a measure of how well an object can be seen. Visibility depends on the angle or direction of views; extent of visual screening; and topographical relationships between the object and existing homes, streets, or parks. In that sense, visibility is determined by considering any and all obstructions that may be in the sightline—trees and other vegetation; buildings; transmission poles or towers; general air quality conditions such as haze; and general weather conditions such as fog.

Number of Viewers

Number of viewers is a measure of the number of viewers per day who would have a view of the proposed project. *Number of viewers* is organized into the following categories: residential according to the number of residences; motorist according to the number of vehicles; and recreationists.

Duration of View

Duration of view is the amount of time to view the site. For example, a high or extended view of a project site is one reached across a distance in 2 minutes or longer. In contrast, a low or brief duration of view is reached in a short amount of time—generally less than 10 seconds.

Viewer Exposure

Viewer exposure is a function of three elements previously listed, *visibility*, *number of viewers*, and *duration of view*. Viewer exposure can range from a *low* to *high*. A partially obscured and brief background view for a few motorists represents a low value; and unobstructed foreground view from a large number of residences represents a high value.

Visual Sensitivity

Visual sensitivity is comprised of three elements previous listed, *visual quality*, *viewer concern*, and *viewer exposure*. Viewer sensitivity tends to be higher for homeowners or people driving for pleasure or engaged in recreational activities and lower for people driving to and from work or as part of their work.

Visual Resource Analysis with Project

Visual resource analyses with photographic simulations of the project involve the elements of contrast, dominance, view blockage, and visual change. Information about each element follows.

Contrast

Contrast concerns the degree to which a project's visual characteristics or elements — form, line, color, and texture — differ from the same visual elements in the existing landscape. The degree of contrast can range from *low* to *high*. A landscape with forms, lines, colors, and textures similar to those of a proposed energy facility is more visually absorbent; that is, more capable of accepting those characteristics than a landscape in which those elements are absent[1]. Generally, visual absorption is inversely proportional to visual contrast.

Dominance

Dominance is a measure of (a) the proportion of the total field of view occupied by the field; (b) a feature's apparent size relative to other visible landscape features; and (c) the conspicuousness of the feature due to its location in the view.

A feature's level of dominance is lower in a panoramic setting than in an enclosed setting with a focus on the feature itself. A feature's level of dominance is higher if it is (1) near the center of the view; (2) elevated relative to the viewer; or (3) has the sky as a backdrop. As the distance between a viewer and a feature increases, its apparent size decreases; and consequently, its dominance decreases. The level of dominance ranges from *low* to *high*.

View Blockage

The extent to which any previously visible landscape features are blocked from view constitutes view disruption. The view is also disrupted when the continuity of the view is interrupted. When considering a project's features, higher quality landscape features can be disrupted by lower quality project features, thus resulting in adverse visual impacts. The degree of view disruption can range from *none* to *high*.

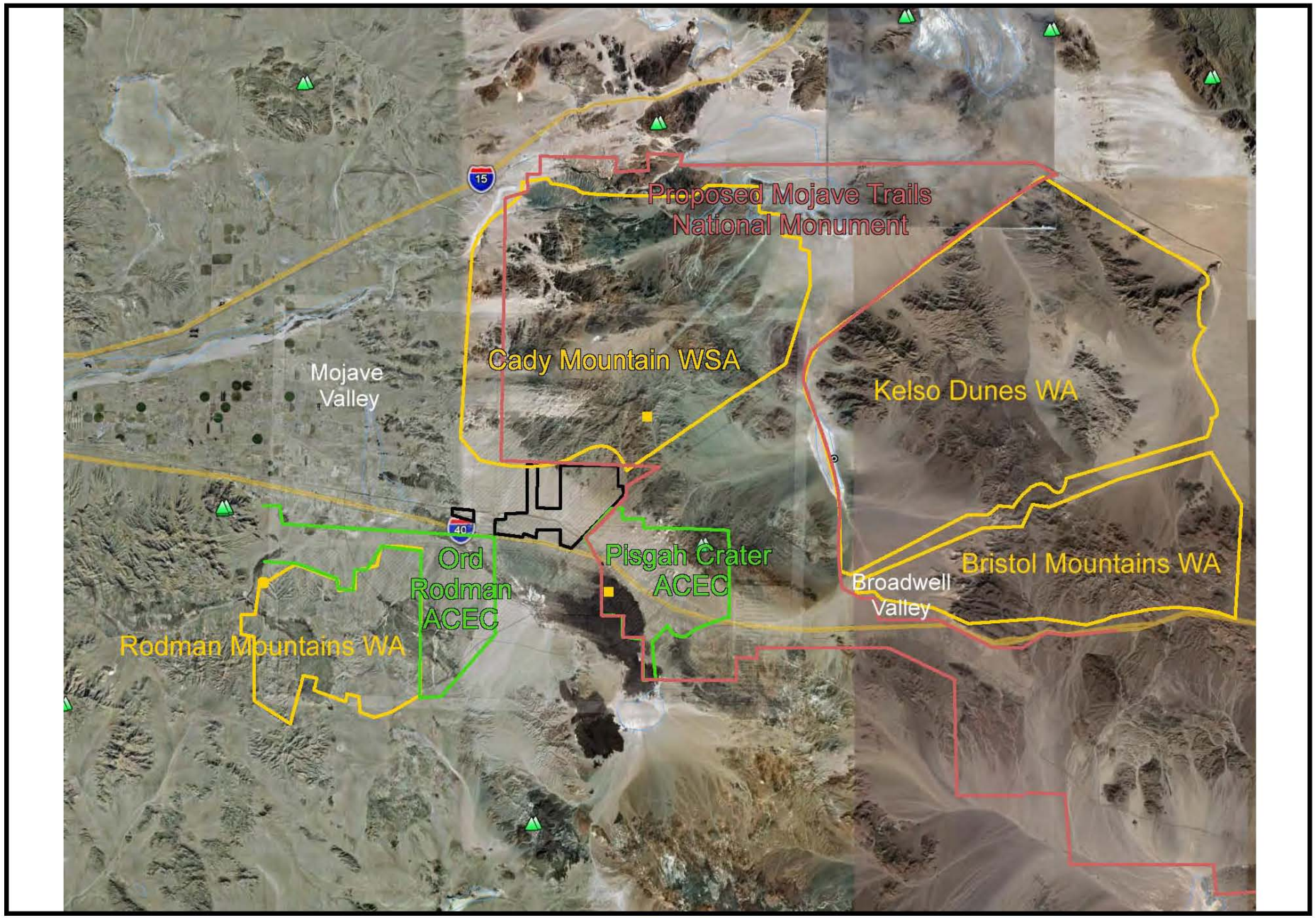
Visual Change

Visual change is a function of *contrast*, *dominance*, and *view disruption*. Generally, *contrast* and *dominance* contribute more to the degree of visual change than does *view disruption*.

[1] Typically, the Energy Commission does not consider texture in its visual analyses.

VISUAL RESOURCES - FIGURE 1

Calico Solar Project - Project Setting



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SOURCE: BLM, Google, WKA

VISUAL RESOURCES - FIGURE 2A
Calico Solar Project - Character Photos of Project Area

Character Photo Location 1
View of existing transmission lines along eastern boundary of Project site (looking northeast)

Character Photo Location 2
View of existing transmission lines and SCE Pisgah Substation along eastern boundary of Project site (looking south)

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SOURCE: AFC Figure 5.13-3

VISUAL RESOURCES - FIGURE 2B
Calico Solar Project - Character Photos of Project Area

Character Photo Location 3
View of closest residence to the Project site (approximately 2.0 miles east of site)

Character Photo Location 4
View of BNSF railroad (and train) which bisects the Project site (looking south from midsection of Phase I)

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SOURCE: AFC Figure 5.13-4

VISUAL RESOURCES - FIGURE 2C
Calico Solar Project - Character Photos of Project Area

Character Photo Location 5
View of Project site from BNSF Railroad

Character Photo Location 6
View of Project site from Hector Road (approximately 1.5 miles west of site)

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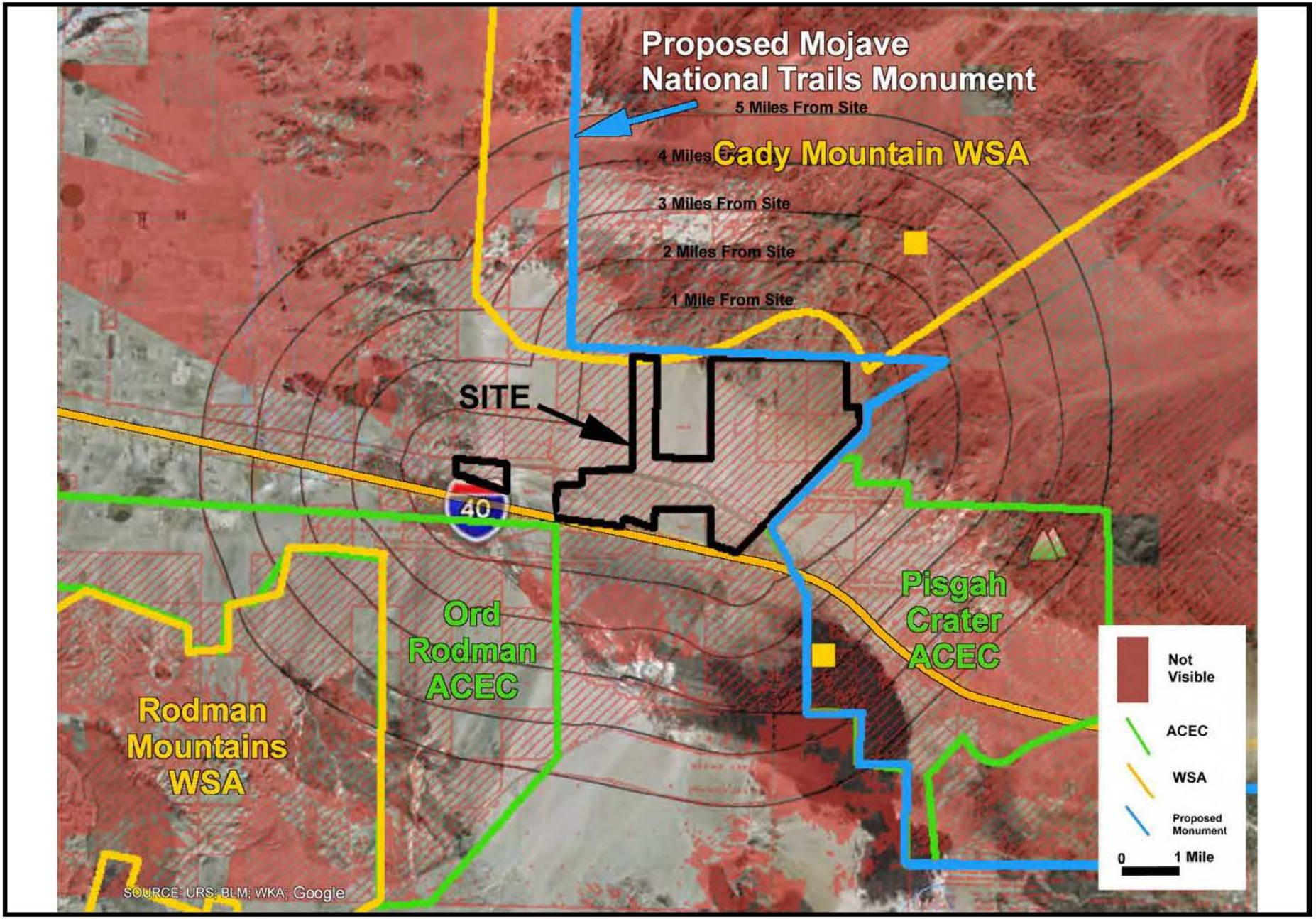
SOURCE: AFC Figure 5.13-5

VISUAL RESOURCES - FIGURE 3

Calico Solar Project - Project Viewshed



VISUAL RESOURCES

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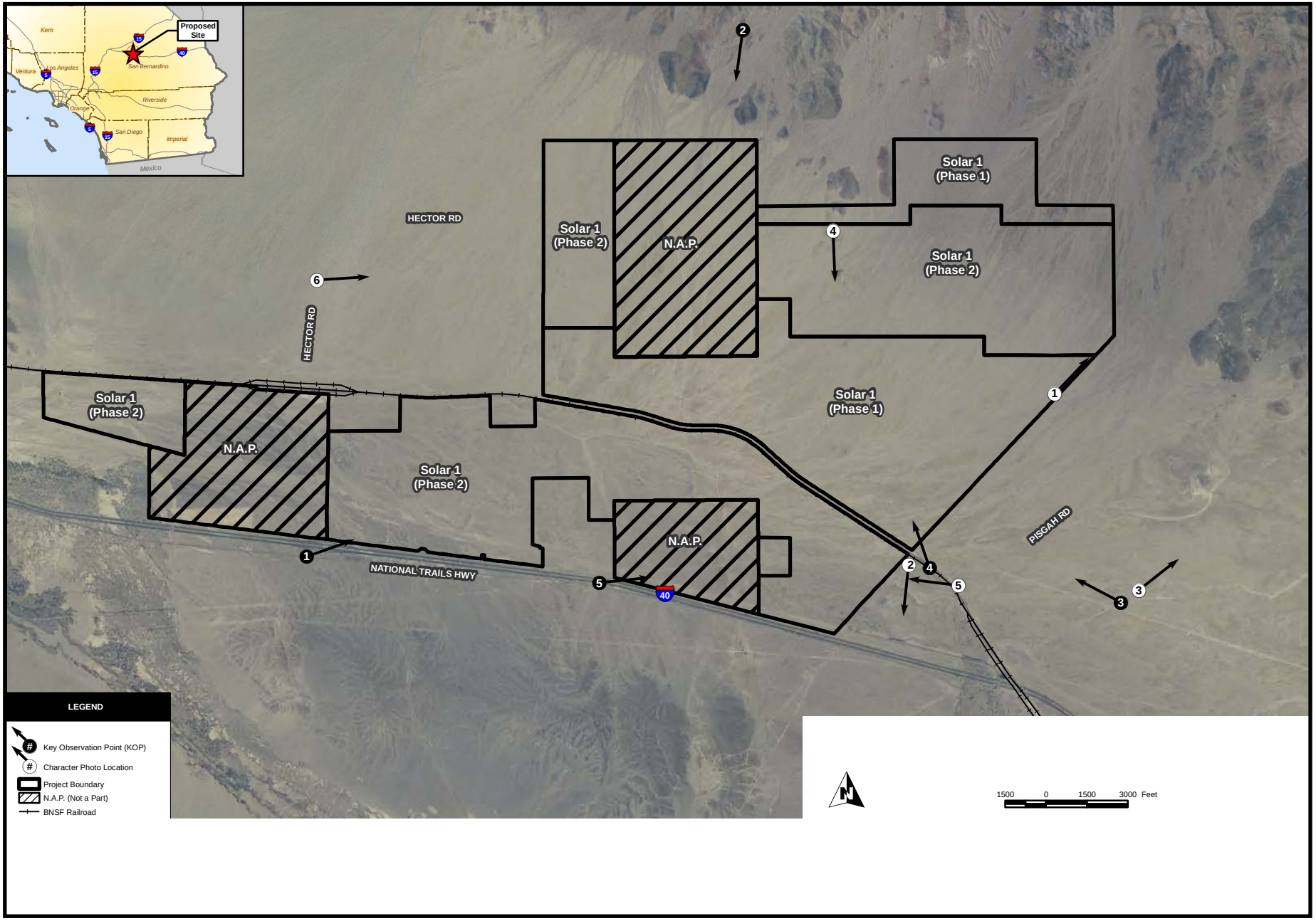
SOURCE: URS, BLM, Google, WKA

VISUAL RESOURCES - FIGURE 4

Calico Solar Project - Key Observation Points (KOPs)



VISUAL RESOURCES

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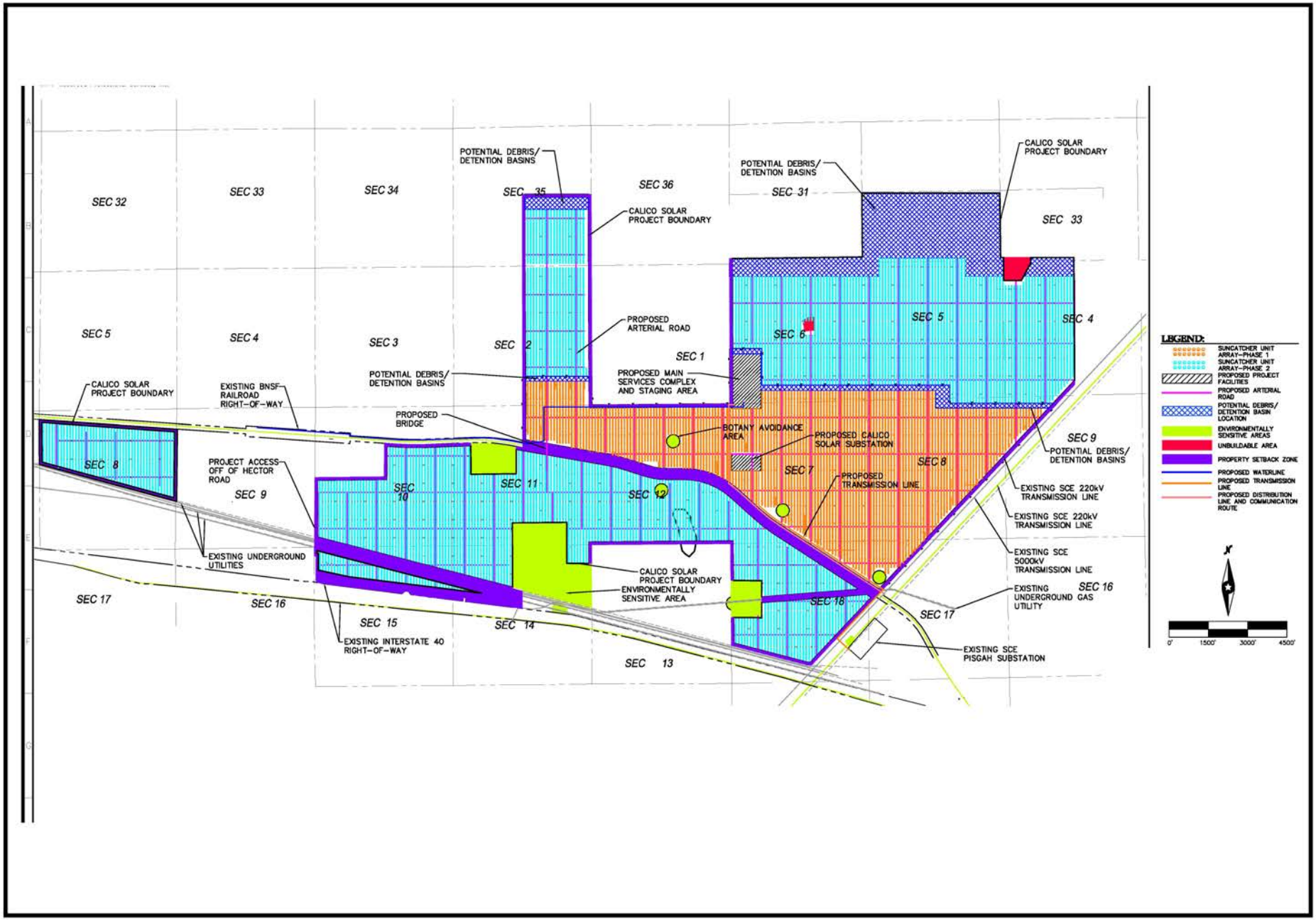
SOURCE: AFC Figure 5.13-2

VISUAL RESOURCES - FIGURE 5

Calico Solar Project - Project Layout



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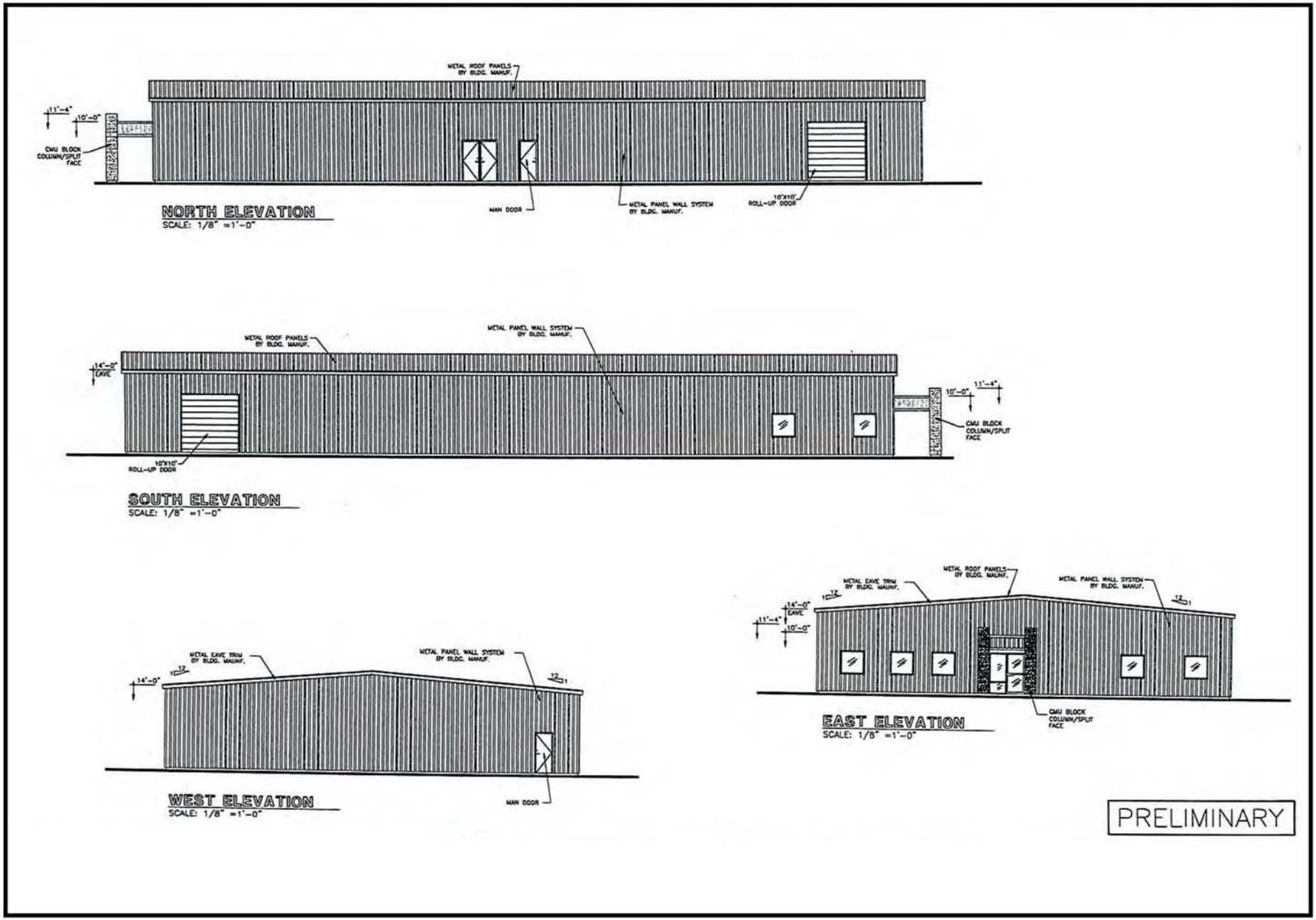
SOURCE: AFC Figure 3-3

VISUAL RESOURCES - FIGURE 6

Calico Solar Project - Elevations of Main Services Complex



VISUAL RESOURCES

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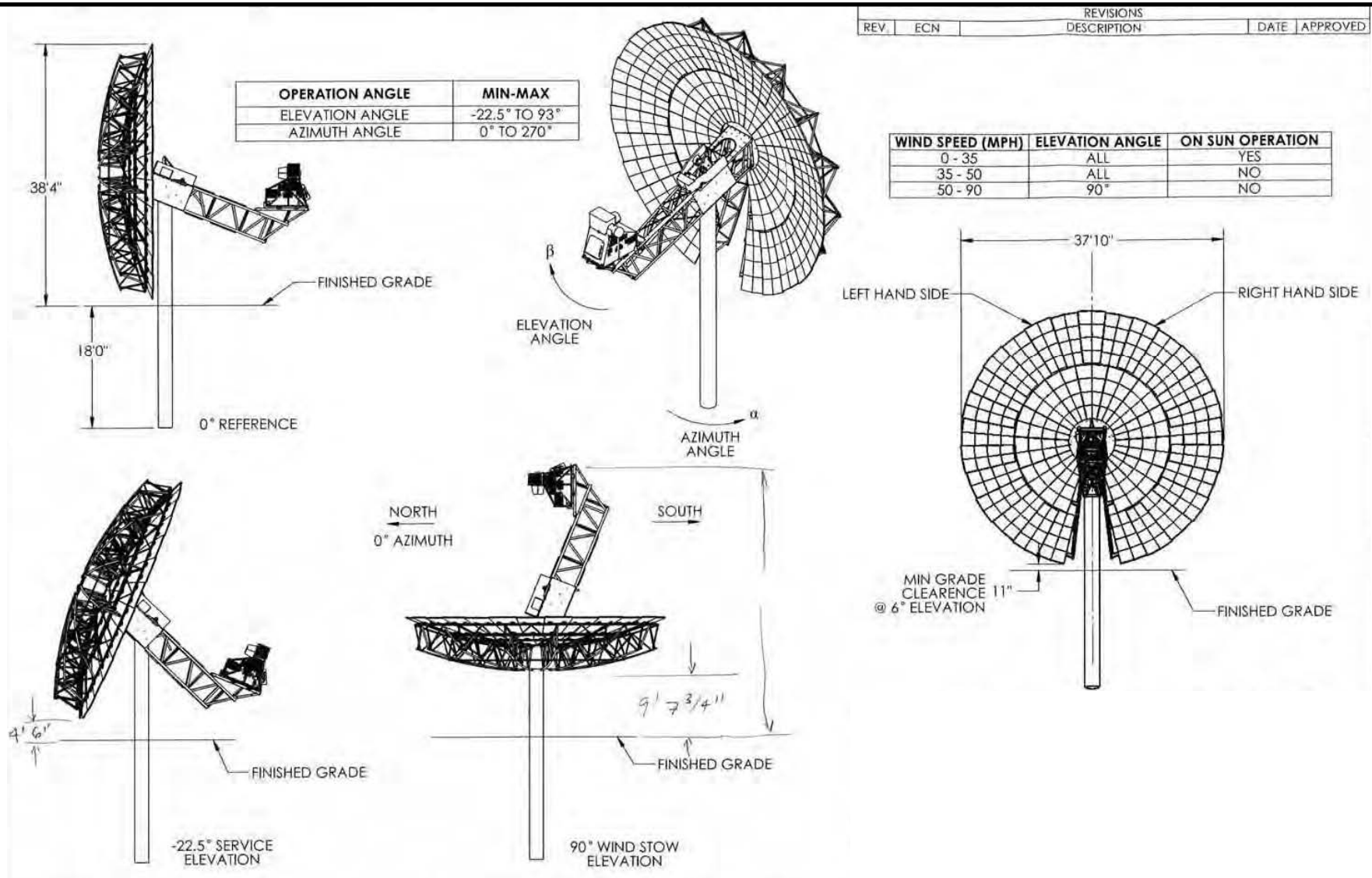
SOURCE: AFC Figure 3-26

VISUAL RESOURCES - FIGURE 7

Calico Solar Project - Elevations of Sun Catchers



VISUAL RESOURCES

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SOURCE: Calico Solar, LLC.

VISUAL RESOURCES - FIGURE 8A

Calico Solar Project - Existing View of Project Site from KOP 1 - Route 66/I-40

SOURCE: AFC Figure 5.13-11