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CALICO SOLAR POWER PROJECT

Supplemental Staff Assessment, Part II

CALIFORNIA
ENERGY COMMISSION
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CALICO SOLAR PROJECT (08-AFC-13)
SUPPLEMENTAL STAFF ASSESSMENT, PART II

EXECUTIVE SUMMARY

Christopher Meyer

INTRODUCTION

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

The applicant submitted an Application for Certification (AFC) to the California Energy Commission (Energy Commission) for the proposed project on December 2, 2008. (The application was originally submitted by SES Solar One, LLC, SES Solar Three, LLC and SES Solar Six, LLC for the SES Solar One Project. In January 2010, the above entities merged into Calico Solar, LLC, and the name of the SES Solar One Project was changed to the Calico Solar Project. The Energy Commission is the lead State agency responsible for evaluating the environmental effects of project and for complying with the California Environmental Quality Act (CEQA). The project proposes the use of land managed by the United States Department of the Interior, Bureau of Land Management (BLM); therefore the applicant has submitted a request for a right-of-way grant to the BLM. The BLM is the federal lead agency for the evaluation of project effects and compliance of the proposed project with the requirements of the National Environmental Policy Act (NEPA) related to possible BLM discretionary actions related to the right-of-way grant request.

The BLM and the Energy Commission prepared separate final documents for compliance with NEPA and CEQA, respectively. Specifically, the Energy Commission published Part I of the Supplemental Staff Assessment (SSA) on July 21, 2010 and the BLM published the Final Environmental Impact Statement (FEIS) on August 6, 2010. Additional time was necessary for the completion of the Cultural Resources and Traffic and Transportation sections of the SSA, which are being published here as the SSA, Part II.

This document is only the Cultural Resources and Traffic and Transportation sections of the SSA. All other technical areas and summaries of Energy Commission staff's analysis can be found in the July 21, 2010 Supplemental Staff Assessment.

SUMMARY OF PROJECT RELATED IMPACTS

Executive Summary Table 1 (comparable to Executive Summary Table 4 in the SSA Part I) summarizes the potential short-term, long-term and cumulative adverse impacts of the proposed Calico Project, the anticipated mitigation and conditions of certification, and the level of significance of the impacts after mitigation, under CEQA.

Executive Summary Table 1
Summary of Potential Short-Term, Long-Term, and Cumulative Adverse Impacts

Environmental Parameter	Complies with Applicable LORS	Short and Long Term Adverse Impacts	Cumulative Adverse Impacts	Mitigation and Conditions of Certification	CEQA Level of Significance After Mitigation
Cultural Resources	Yes	**Significant short term or long term adverse impacts with mitigation/ Conditions of Certification incorporated**	**Cumulative adverse impacts**	**CUL-1** through **CUL-10**	**Significant and unavoidable**
Traffic and Transportation	Yes	No significant short term or long term adverse impacts with mitigation/Conditions of Certification incorporated	No cumulative adverse impacts	**TRANS-1** through **TRANS-7**	Less than significant

C. ENVIRONMENTAL ANALYSIS

C.3 - CULTURAL RESOURCES AND NATIVE AMERICAN VALUES

Testimony of Sarah Allred, Michael McGuirt, and Kathleen Forrest[1]

C.3.1 SUMMARY OF CONCLUSIONS

The proposed Calico Solar Project would entail the construction of one of the world's largest solar power facilities within a 6,215-acre project site in the Central Mojave Desert in eastern San Bernadino County. The project, which would be constructed in two separate phases, would consist of approximately 34,000 solar dish systems (SunCatchers™), a new substation, an electrical transmission line, an administration building and maintenance complex, and other associated facilities, with a generating capacity of up to 850 mega watts (MW).

A total of 119 archaeological sites and ten built-environment (architectural) resources were identified within the Calico Solar project's cultural resources area of analysis. The applicant has recommended, and the BLM has made the determination, that three (3) archaeological sites and five (5) built-environment properties within the project area are eligible for the National Register of Historic Places (NRHP) and the California Register of Historical Resources (CRHR). The BLM further appears to have found, under the National Environmental Policy Act (NEPA), that the proposed action would not have a significant impact on the environment, as that action relates to cultural resources, and that, under Section 106 of the National Historic Preservation Act (NHPA), the proposed action, or undertaking, would not adversely affect significant cultural resources, or historic properties. Energy Commission staff, by contrast, believes that the data on which the applicant's and the BLM's conclusions are based are not adequate to definitively draw conclusions regarding resource eligibility. Energy Commission staff, therefore, believes that an as yet unquantified number of individual archaeological sites are potentially eligible for listing in the California Register of Historical Resources (CRHR), that three archaeological districts and landscapes have the potential to be eligible, that the effects of the proposed action on any of these resources that are conclusively recommended to be eligible would be significant, and that the Commission's adoption of proposed conditions of certification **CUL–1** through **CUL–5** and **CUL–7** through **CUL–10** would reduce these effects to a less than significant level. Energy Commission staff more definitively recommends that four built-environment resources are eligible for listing in the CRHR; however, notwithstanding the Commission's adoption of condition of certification **CUL–6** to reduce significant visual effects to one of those built-environment resources (a segment of historic U.S. Route 66), the effects are unmitigable and would not be reduced to a less than significant level.

[1] Sarah Allred and Michael McGuirt are responsible for all testimony pertaining to the archaeological resources, and Kathleen Forrest is responsible for all testimony pertaining to built environment resources.

C.3.2 INTRODUCTION

In an effort to provide an efficient joint NEPA and CEQA review for the innundation of solar projects in this region, the BLM and the CEC entered into a Memorandum of Understanding (MOU) in August 2007 (http://www.energy.ca.gov/siting/solar/BLM_CEC_MOU.PDF). As parties to the MOU, the BLM and the CEC committed to sharing in the preparation of an environmental analysis in a public process to avoid duplication of staff efforts, to share staff expertise and information, to promote intergovernmental coordination at the local, state, and federal levels, and to facilitate public review. Regarding the sharing of information, as it pertains to cultural resources, the National Historic Preservation Act (Section 304) and the Archaeological Resources Protection Act (Section 9) mandate that Federal agencies (in this case, the BLM) to only disclose archaeological site location information if no harm, theft, or destruction of cultural resources would result from disclosure. Due to the BLM's concerns about potential harm to archaeological sites resulting from the disclosure of that information to parties in the Energy Commission proceeding (see: http://www.energy.ca.gov/2010-CRD-1/documents/2010-06-09_Transcript.pdf), some cultural resource data, namely site record forms and site location information, have been withheld from Energy Commission staff. Staff was, provided with the June 2010 Draft Final Class III Cultural Resources Technical Report (minus the appendices and all site location information), which serves as the primary source of information for the conclusions of this staff assessment, in conjunction with personal communications with BLM Archaeologist, Jim Shearer. Therefore, staff has concluded that the information received was adequate for the purposes of this analysis in assessing historical significance, impacts, and mitigation for cultural resources.

This cultural resources assessment identifies the potential impacts of the Calico Solar Project on cultural resources located within the proposed project area. Cultural resources are defined under federal and state law as including archaeological sites, buildings, structures, objects, and districts. Three categories of cultural resources, classified by their origins, are considered in this assessment: (1) prehistoric, (2) historic, and (3) ethnographic. Prehistoric archaeological resources are associated with the human occupation and use of California prior to enforced European contact. These resources may include sites and deposits, structures, artifacts, rock art, trails, and other traces of Native American human behavior. In California, the prehistoric period began over 12,000 years ago and extended through the eighteenth century until 1769, when the first Europeans began to settle in the state. Historic-period resources include both architecture and archaeological remains and are associated with Euro-American exploration and settlement of an area and the beginning of a written historical record. They may include archaeological deposits, sites, structures, traveled ways, artifacts, or other evidence of human activity. Under federal and state historic preservation law, historic-period cultural resources must, under most circumstances, be at least 50 years old to have the potential to be of sufficient historical importance to merit eligibility for the National Register of Historic Places and the California Register of Historical Resources. A resource less than 50 years of age must be of exceptional historical importance to be considered for the National Register of Historic Places. Groupings of historic-period resources are also recognized as historic districts and as historic vernacular landscapes. Under federal and state laws, historic cultural resources must be greater than fifty years old to be considered of potential historic importance. A resource less than fifty years of age may be historically important if the resource is of exceptional importance in history. Ethnographic resources represent the heritage of a particular ethnic or cultural group, such as Native Americans or African, European, or Asian immigrants. Ethnographic resources may include traditional resource collecting areas, ceremonial sites, topographic features, cemeteries, shrines, or ethnic neighborhoods and/or structures.

For the Calico Solar Project, staff provides an overview of the environmental setting and history of the project area, an inventory of the cultural resources identified in the project area and the nearby vicinity, and an analysis of the potential impacts to cultural resources from the proposed project using criteria from the California Environmental Quality Act (CEQA).

C.3.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

This analysis addresses five basic analytic phases. The initial phase is the determination of the appropriate geographic extent of the analysis for the proposed action. The second phase is to produce an inventory of the cultural resources in each such geographic area. The third phase is to determine whether particular cultural resources in an inventory are historically significant, unless resources can be avoided by construction. The fourth phase is to assess the character and the severity of the effects of the proposed or alternative actions on the historically significant cultural resources that cannot be avoided in each respective inventory. The final phase is to propose measures that would resolve or mitigate significant effects. The details of each of these phases follow below and provide the parameters of the present analysis.

C.3.3.1 THE PROJECT AREA OF ANALYSIS AND THE AREA OF POTENTIAL EFFECTS (APE)

A useful precursor to a cultural resources analysis is to define the appropriate geographic limits for an analysis. The area that Energy Commission staff typically considers when identifying and assessing impacts to cultural resources under CEQA is referred to here as the "project area of analysis." Energy Commission staff defines the project area of analysis as the area within and surrounding a project site, as well as all associated linear facility corridors. The area reflects the minimum standards set out in the Energy Commission Power Plant Site Certification Regulations (Cal. Code Regs., tit. 20, § 1701 et seq., appen. B, subd. (g)(2)) and is sufficiently large and comprehensive in geographic area to facilitate and encompass considerations of both direct and indirect effects to archaeological, ethnographic, and built-environment resources. The project area of analysis is a composite, though not necessarily contiguous, geographic area that accommodates the analysis of each of these resource types:

- For archaeological resources, the project area of analysis is minimally defined as the project site footprint, plus a buffer of 200 feet, and all project linear facilities routes, plus a buffer of 50 feet to either side of the rights-of way for these linear routes.
- For built-environment resources, the project area of analysis is confined to one parcel deep from the project site footprint in urban areas, but in rural areas is

expanded to include a half-mile buffer from the project site and above-ground linear facilities to encompass resources whose setting could be adversely affected by industrial development.

- For a historic district or a cultural landscape, staff defines the project area of analysis based on the particulars of each siting case (i.e., specific to that project).
- For ethnographic resources, the project area of analysis is expanded to take into account traditional use areas and traditional cultural properties which may be far-ranging, including views that contribute to the significance of the property. These resources are often identified in consultation with Native Americans and other ethnic groups, and issues that are raised by these groups may define the area of analysis.

The project area of analysis concept provides an appropriate areal scope for the consideration of cultural resources under NEPA and is consistent with the definition of the area of potential effects (APE) in the Section 106 process (36 CFR § 800.16(d)). The project area of analysis is, therefore, equivalent to the BLM's APE for the purpose of the present discussion and analysis.

C.3.3.2 INVENTORY OF CULTURAL RESOURCES IN PROJECT AREA OF ANALYSIS

A cultural resources inventory of the project area of analysis/APE is a necessary step in the staff effort to determine whether the action may cause, under CEQA, a substantial adverse change in the significance of any cultural resources that are on or would qualify for the California Register of Historical Resources (CRHR).

The development of a cultural resources inventory entails working through a sequence of investigatory phases to establish the universe of cultural resources that will be the focus of the analyses for the proposed project. These phases typically involve doing background research to identify known cultural resources, conducting fieldwork to collect requisite primary data on cultural resources both within and near the proposed project. Geotechnical studies are also conducted to provide a clearer understanding of the landforms within the project area. The results of this work helps support the development of determinations of historical significance for the cultural resources that are identified.

C.3.3.3 DETERMINING THE HISTORICAL SIGNIFICANCE OF CULTURAL RESOURCES

A key part of a cultural resources analysis under CEQA (and for the BLM under NEPA and Section 106) is to determine which of the cultural resources within the project area of analysis/APE are important or historically significant (each of the three regulatory programs uses slightly different terminology to refer to historically significant cultural resources; clarifications on the use of the terms "*historical resource*," "*important historic and cultural aspects of our national heritage*," and "*historic property*" may be found in the "Cultural Resources Glossary" subsection of this report). Effects assessments are only made for those cultural resources that are determined to be historically significant. Cultural resources that can be avoided by construction may remain unevaluated. Unevaluated cultural resources that cannot be avoided are treated as eligible when determining effects. The criteria for evaluation and the requisite thresholds of resource integrity that are, taken together, the measures of historical significance, vary among the three regulatory programs (CEQA, NEPA, and Section 106).

Evaluation of Historical Significance under CEQA

CEQA requires the Energy Commission, as a lead agency, to evaluate the historical significance of cultural resources by determining whether or not they meet several sets of specified criteria. Under CEQA, the definition of a historically significant cultural resource, referred to as a "historical resource," is one that is "listed or determined to be eligible by the State Historical Resources Commission for listing in the CRHR", or "a resource listed in a local register of historical resources or identified as significant in a historical resource survey meeting the requirements of section 5024.1(g) of the Public Resources Code," or "any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the agency's determination is supported by substantial evidence in light of the whole record" (Cal. Code Regs., tit. 14, § 15064.5(a)). The term, "historical resource," therefore, indicates a cultural resource that is historically significant and eligible for listing in the CRHR.

Consequently, under the CEQA Guidelines, to be historically significant, a cultural resource must meet the criteria for listing in the CRHR. These criteria are essentially the same as the eligibility criteria for the NRHP. In addition to being minimum of 50 years old,[2] a resource must meet at least one (and may meet more than one) of the following four criteria (Pub. Resources Code, § 5024.1):

- Criterion 1, is associated with events that have made a significant contribution to the broad patterns of our history;
- Criterion 2, is associated with the lives of persons significant in our past;
- Criterion 3, embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values; or
- Criterion 4, has yielded, or may be likely to yield, information important to history or prehistory.

In addition, historical resources must also possess integrity of location, design, setting, materials, workmanship, feeling, and association (Cal. Code Regs., tit. 14, § 4852(c)).

Cultural resources listed in or formally determined eligible for the National Register of Historical Places (NRHP) and California Registered Historical Landmarks numbered No. 770 and up are automatically listed in the CRHR and, therefore, are also historical resources (Pub. Resources Code, § 5024.1(d)). Even if a cultural resource is not listed or determined to be eligible for listing in the CRHR, CEQA allows a lead agency to make

[2] The Office of Historic Preservation's Instructions for Recording Historical Resources (1995) endorses recording and evaluating resources over 45 years of age to accommodate a potential five-year lag in the planning process.

a determination as to whether it is a historical resource (Pub. Resources Code, § 21084.1).

Evaluation of Historical Significance under NEPA

NEPA establishes national policy for the protection and enhancement of the environment. Part of the function of the Federal Government in protecting the environment is to "preserve important historic, cultural, and natural aspects of our national heritage." Cultural resources need not be determined eligible for the National Register of Historic Places as in the National Historic Preservation Act (NHPA) of 1966 (as amended) to receive consideration under NEPA. NEPA is implemented by regulations of the Council on Environmental Quality, 40 CFR 1500-1508. NEPA provides for public participation in the consideration of cultural resources issues, among others, during agency decision-making.

Evaluation of Historical Significance under Section 106 (Eligibility of Cultural Resources for Inclusion in the NRHP)

The federal government has developed laws and regulations designed to protect cultural resources that may be affected by actions undertaken, regulated, or funded by federal agencies. Cultural resources are considered during federal undertakings chiefly under Section 106 of NHPA of 1966 (as amended) through one of its implementing regulations, 36 Code of Federal Regulations (CFR) CFR 800 (Protection of Historic Properties). Properties of traditional religious and cultural importance to Native Americans are considered under Section 101(d)(6)(A) of NHPA.

Section 106 of NHPA (16 United States Code [USC] 470f) requires federal agencies to consider the effects of their undertakings on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places (NRHP) and to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings (36 CFR Part 800.1). Under Section 106, the significance of any adversely affected cultural resource is assessed and mitigation measures are proposed to resolve such effects. Significant cultural resources (historic properties) are those resources that are listed in or are eligible for listing on the NRHP per the criteria listed at 36 CFR 60.4 (Advisory Council on Historic Preservation 2000) and are presented in the next subsection below.

NHPA of 1966 established the ACHP and State Historic Preservation Officers (SHPO) to assist federal and State officials regarding matters related to historic preservation. As previously mentioned above, the administering agency, the ACHP, has authored regulations implementing Section 106 that are located in 36 CFR Part 800, *Protection of Historic Properties* (recently revised, effective January 11, 2001). 36 CFR Part 800 provides detailed procedures, called the Section 106 process, by which the assessment of impacts on archaeological and historical resources, as required by the Act, is implemented.

Given that the proposed Calico Solar Project is located on lands managed by BLM and requires authorization by the BLM, the proposed action is considered a federal undertaking, and therefore must comply with the NHPA and implementing regulations. NEPA addresses compliance with the NHPA, and the required environmental documentation, whether it is an Environmental Assessment (EA) or an Environmental Impact Statement (EIS), must discuss cultural resources. It is important to recognize, however, that project compliance with NEPA does not mean the project is in compliance with the NHPA.

According to the NHPA (36 CFR Part 800), three steps are required for compliance: (1) identification of significant resources that may be affected by an undertaking; (2) assessment of project impacts on those resources; and (3) development and implementation of mitigation measures to offset or eliminate adverse impacts. All three steps require consultation with interested Native American tribes, local governments, and other interested parties.

Identification and National Register of Historic Places Evaluation

36 CFR Part 800.3 discusses the consultation process. Section 800.4 sets out the steps the ACHP must follow to identify historic properties. 36 CFR Part 800.4(c)(1) outlines the process for National Register of Historic Places (NRHP) eligibility determinations.

The Historic Sites, Buildings and Antiquities Act of 1935 required the survey, documentation, and maintenance of historic and archaeological sites in an effort to determine which resources commemorate and illustrate the history and prehistory of the United States. The NHPA expanded on this legislation and assigned the responsibility for carrying out this policy to the United States Department of the Interior, National Park Service (NPS). Per NPS regulations, 36 CFR Part 60.4, and guidance published by the NPS, *National Register Bulletin, Number 15, How to Apply the National Register Criteria for Evaluation*, different types of values embodied in districts, sites, buildings, structures, and objects are recognized. These values fall into the following categories:

1. Associate Value (Criteria A and B): Properties significant for their association with or linkage to events (Criterion A) or persons (Criterion B) important in the past.

2. Design or Construction Value (Criterion C): Properties significant as representatives of the man-made expression of culture or technology.

3. Information Value (Criterion D): Properties significant for their ability to yield important information about prehistory or history.

The quality of *significance* in American history, architecture, archaeology, engineering and culture is present in districts, sites, buildings, structures, and objects that possess *integrity* of location, design, setting, materials, workmanship, feeling and association. Cultural resources that are determined eligible for listing in the NRHP, along with SHPO concurrence, are termed “historic properties” under Section 106, and are afforded the same protection as sites listed in the NRHP.

C.3.3.4 ASSESSING PROJECT IMPACTS

The core of a cultural resources analysis under CEQA, NEPA, or Section 106 is to assess the character of the effects or impacts that a proposed project may have on historically significant cultural resources. The analysis takes into account three primary types of potential impacts, which each of the three above regulatory programs defines and handles in slightly different ways. The three types of potential effects or impacts include direct, indirect, and cumulative effects or impacts. Once the character of each potential impact of a proposed or alternative action has been assessed, a further assessment is made as to whether each such effect is significant, relative to specific regulatory criteria under CEQA, NEPA, and Section 106.

Direct and Indirect Effects

Direct and indirect effects are those that are more clearly and immediately attributable to the implementation of proposed project. Direct and indirect effects are conceptually similar under CEQA and NEPA. The uses of the concepts vary under Section 106 relative to their uses under CEQA and NEPA as discussed below.

Direct and Indirect Impacts under CEQA

In the abstract, direct impacts to cultural resources are those associated with project development, construction, and co-existence. Construction usually entails surface and subsurface disturbance of the ground, and direct impacts to archaeological resources may result from the immediate disturbance of the deposits, whether from vegetation removal, vehicle travel over the surface, earth-moving activities, excavation, or demolition of overlying structures. Construction can have direct impacts on historic built-environment resources when those structures must be removed to make way for the project or when the vibrations of construction impair the stability of historic structures nearby. New structures can have direct impacts on historic structures when the new structures are stylistically incompatible with their neighbors and the setting, and when the new structures produce something harmful to the materials or structural integrity of the historic structures, such as emissions or vibrations.

Generally speaking, indirect impacts to archaeological resources are those which may result from increased erosion due to site clearance and preparation, or from inadvertent damage or outright vandalism to exposed resource components due to improved accessibility. Similarly, historic structures can suffer indirect impacts when project construction creates improved accessibility and vandalism or greater weather exposure becomes possible.

Ground disturbance accompanying construction at the proposed Calico Solar Project site, along proposed linear facilities, and at a proposed laydown area has the potential to directly impact archaeological resources. The potential direct physical impact of the proposed construction on archaeological resources is commensurate with the extent of ground disturbance entailed in the particular mode of construction. This varies with each component of the proposed project. Placing the proposed plant into this particular setting could have a direct impact on the integrity of association, setting, and feeling of nearby standing historic structures.

Direct and Indirect Effects under NEPA

The concepts of direct and indirect effects under NEPA are almost equivalent to those under CEQA. Direct effects under NEPA are those “which are caused by the [proposed or alternative] action and [which] occur at the same time and place” (40 CFR § 1508.8(a)). Indirect effects are those “which are caused by the [proposed or alternative] action and are later in time or farther removed in distance, but are still reasonably foreseeable” (40 CFR § 1508.8(b)).

Direct and Indirect Effects under Section 106

The Section 106 regulation narrows the range of direct effects and broadens the range of indirect effects relative to the definitions of the same terms under CEQA and NEPA. The regulatory definition of "effect," pursuant to 36 CFR § 800.16(i), is that the term "means alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register." In practice, a "direct effect" under Section 106 is limited to the direct physical disturbance of a historic property. Effects that are immediate but not physical in character, such as visual intrusion, and reasonably foreseeable effects that may occur at some point subsequent to the implementation of the proposed undertaking are referred to in the Section 106 process as "indirect effects."

Cumulative Impacts

Cumulative Impacts are slightly different concepts under CEQA and NEPA, and are, under Section 106, undifferentiated as an aspect of the potential effects of an undertaking, of a proposed or alternative action. The consideration of cumulative impacts reaches beyond the project area of analysis or the area of potential effects. It is a consideration of how the effects of a proposed or alternative action in those areas contributes or does not contribute to the degradation of a resource group or groups that is or are common to the project area of analysis and the surrounding area or vicinity.

Cumulative Impacts under CEQA

A cumulative impact under CEQA refers to a proposed project's incremental effects considered over time and taken together with those of other, nearby, past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Pub. Resources Code sec. 21083; Cal. Code Regs., tit. 14, secs. 15064(h), 15065(a)(3), 15130, and 15355). Cumulative impacts to cultural resources in a project vicinity could occur if any other existing or proposed projects, in conjunction with the proposed project, had or would have impacts on cultural resources that, considered together, would be significant. The previous ground disturbance from prior projects and the ground disturbance related to the future construction of a proposed project and other proposed projects in the vicinity could have a cumulatively considerable effect on archaeological deposits, both prehistoric and historic. The alteration of the natural or cultural setting which could be caused by the construction and operation of a proposed project and other proposed projects in the vicinity could be cumulatively considerable, but may or may not be a significant impact to cultural resources.

Cumulative Impacts under NEPA

Under NEPA, a cumulative is the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR § 1508.7). Cumulatively significant impacts are taken into consideration as an aspect of the intensity of a significant effect (40 CFR § 1508.27(b)(7).

Cumulative Effects under Section 106

The Section 106 regulation makes explicit reference to cumulative effects only in the context of a discussion of the criteria of adverse effect (36 CFR § 800.5(a)(1)). Cumulative effects are largely undifferentiated as an aspect of the potential effects of an undertaking. Such effects are enumerated and resolved in conjunction with the consideration of direct and indirect effects.

Assessing the Significance of Action Effects

Once the character of the effects that proposed or alternative actions may have on historically significant cultural resources has been determined, the severity of those effects needs to be assessed. CEQA, NEPA, and Section 106 each have different definitions and tests that factor into decisions about how severe, how significant the effects of particular actions may be.

Significant Impacts under CEQA

Under CEQA, "a project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment" (Pub. Resourced Code, § 21084.1). Thus, staff analyzes whether a proposed project would cause a substantial adverse change in the significance, that is, the CRHR eligibility, of the subset of the historical resources in the cultural resources inventory for a project area that the proposed project demonstrably has the potential to effect. The degree of significance of an impact depends on:

- The cultural resource impacted;
- The nature of the resource's historical significance;
- How the resource's historical significance is manifested physically and perceptually;
- Appraisals of those aspects of the resource's integrity that figure importantly in the manifestation of the resource's historical significance; and how much the impact will change those integrity appraisals.

Significant Effects under NEPA

Significant effects under NEPA require considerations of both context and intensity (40 CFR § 1508.27), and the considerations are presented below:

(a) *Context.* This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

(b) *Intensity.* This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:

> (1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

(2) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

(3) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

(4) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

(5) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

(6) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

Adverse Effects under Section 106

In accordance with 36 CFR Part 800.5 of the ACHP's implementing regulations, which describes criteria for adverse effects, impacts on cultural resources are considered significant if one or more of the following conditions would result from implementation of the proposed action:

An undertaking has an effect on a historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the NRHP. For the purpose of determining the type of effect, alteration to features of a property's location, setting, or use may be relevant, depending on the property's significant characteristics, and should be considered.

An undertaking is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic properties include, but are not limited to:

1. Physical destruction, damage, or alteration of all or part of the property

2. Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for the NRHP

3. Introduction of visual, audible, or atmospheric elements that are out of character with the property or that alter its setting

4. Neglect of the property, resulting in its deterioration or destruction

5. Transfer, lease, or sale of the property

Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative. A formal effect finding under Section 106 relates to the proposed or alternative action as a whole rather than relating to individual resources.

C.3.3.5 RESOLVING SIGNIFICANT IMPACTS

The concluding phase in a cultural resources analysis, whether under CEQA, NEPA, or Section 106, is to resolve those effects of a proposed project that have been found to be significant or adverse. The terminology used to describe the process of effects resolution differs among the three regulatory programs. The resolution of significant effects under CEQA involves the development of mitigation measures or project alternatives, the implementation of which would minimize any such effects (14 CCR § 15126.4). Mitigation under NEPA includes proposals that avoid or minimize any potential significant effects of a proposed or alternative action on the quality of the human environment (40 CFR § 1502.4). The definition of mitigation in the NEPA regulation includes the development of measures that would avoid, minimize, or rectify significant effects, progressively reduce or eliminate such effects over time, or provide compensation for such effects (40 CFR § 1508.20). The Section 106 process directs the resolution of adverse effects through the development of proposals to avoid, minimize, or otherwise mitigate such effects (36 CFR § 800.6(a)).

The present analysis seeks to resolve any potentially significant effects on cultural resources (i.e., historical resources/historic properties) within the proposed Calico Solar project area of analyis through the development of cultural resource-specific Conditions of Certification (**CUL-1** through **CUL-10**) that would enable the Energy Commission meet its obligations to comply with CEQA while being consistent with the BLM’s obligations under NEPA and Section 106.

C.3.3.6 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Projects licensed by the Energy Commission are reviewed to ensure compliance with all applicable laws. Although the Energy Commission has pre-emptive authority over local laws, it typically ensures compliance with local laws, ordinances, regulations, standards, plans, and policies. The BLM is responsible for compliance with NEPA and Section 106 of the NHPA. LORS applicable to the Calico Solar Project with respect to cultural resources are in Cultural Resources Table 1 below.

Cultural Resources Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
National Historic Preservation Act of 1966, as amended, 16 USC 470(f)	Section 106 of the Act requires Federal agencies to take into account the effects of a proposed action on cultural resources (historic properties) and afford the Advisory Council on Historic Preservation the opportunity to comment.

Applicable Law	Description
36 CFR Part 800 (as amended August 5, 2004),	Implementing regulations of Section 106 of the National Historic Preservation Act
National Environmental Policy Act (NEPA): Title 42, USC, section 4321-et seq.	This statute requires Federal agencies to consider potential environmental impacts of projects with Federal involvement and to consider appropriate mitigation measures.
Federal Land Policy and Management Act (FLPMA): Title 43, USC, section 1701 et seq.	This statute requires the Secretary of the Interior to retain and maintain public lands in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric water resource, and archaeo-logical values [Section 1701(a)(8)]; the Secretary, with respect to the public lands, shall promulgate rules and regulations to carry out the purposes of this Act and of other laws applicable to public lands [Section 1740].
Federal Guidelines for Historic Preservation Projects, Federal Register 44739-44738, 190 (September 30, 1983)	The Secretary of the Interior has published a set of Standards and Guidelines for Archaeology and Historic Preservation. These are considered to be the appropriate professional methods and techniques for the preservation of archaeological and historic properties. The Secretary's standards and guidelines are used by Federal agencies, such as the Forest Service, the Bureau of Land Management, and the National Park Service. The California Office of Historic Preservation refers to these standards in its requirements for selection of qualified personnel and in the mitigation of potential impacts to cultural resources on public lands in California.
Executive Order 11593 May 13, 1971 (36 Federal Register 8921)	This order mandates the protection and enhancement of the cultural environment through providing leadership, establishing state offices of historic preservation, and developing criteria for assessing resource values.
American Indian Religious Freedom Act; Title 42, USC, Section 1996	Protects Native American religious practices, ethnic heritage sites, and land uses.
Native American Graves Protection and Repatriation Act (1990); Title 25, USC Section 3001, et seq.,	The stature defines "cultural items," "sacred objects," and "objects of cultural patrimony;" establishes an ownership hierarchy; provides for review; allows excavation of human remains, but stipulates return of the remains according to ownership; sets penalties; calls for inventories; and provides for the return of specified cultural items.
U.S. Dept. of the Interior, Bureau of Land Management (BLM), the California Desert Conservation Area (CDCA) Plan 1980 as amended – Cultural Resources Element Goals	1. Broaden the archaeological and historical knowledge of the CDCA through continuing efforts and the use of existing data. Continue the effort to identify the full array of the CDCA's cultural resources.
	2. Preserve and protect representative sample of the full array of the CDCA's cultural resources.
	3. Ensure that cultural resources are given full consideration in land use planning and management decisions, and ensure that BLM-authorized actions avoid inadvertent impacts.
	4. Ensure proper data recovery of significant (National Register of Historic Places-quality) cultural resources where adverse impacts can be avoided.

Applicable Law	Description
State	
California Environmental Quality Act (CEQA), Sections 21000 et seq. of the Public Resources Code (PRC) with Guidelines for implementation codified in the California Code of Regulations (CCR), Title 14, Chapter 3, Sections 15000 et seq.	CEQA requires that state and local public agencies to identify the environmental impacts of the proposed discretionary activities or projects, determine if the impacts will be significant, and identify alternatives and mitigation measures that will substantially reduce or eliminate significant impacts to the environment. Historical resources are considered a part of the environment and a project that may cause a substantial adverse effect on the significance of a historical resource is a project that may have a significant effect on the environment. The definition of "historical resources" is contained in Section 15064.5 of the CEQA Guidelines.
AB 4239, 1976	Established the Native American Heritage Commission (NAHC) as the primary government agency responsible for identifying and cataloging Native American cultural resources. The bill authorized the Commission to act in order to prevent damage to and insure Native American access to sacred sites and authorized the commission to prepare an inventory of Native American sacred sites located on public lands.
Public Resources Code 5097.97	No public agency, and no private party using or occupying public property, or operating on public property, under a public license, permit, grant, lease, or contract made on or after July 1, 1977, shall in any manner whatsoever interfere with the free expression or exercise of Native American religion as provided in the United States Constitution and the California Constitution; nor shall any such agency or party cause severe or irreparable damage to any Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine located on public property, except on a clear and convincing showing that the public interest and necessity so require.
Public Resources Code 5097.98 (b) and (e)	Requires a landowner on whose property Native American human remains are found to limit further development activity in the vicinity until he/she confers with the Native American Heritage Commission-identified Most Likely Descendents (MLDs) to consider treatment options. In the absence of MLDs or of a treatment acceptable to all parties, the landowner is required to reinter the remains elsewhere on the property in a location not subject to further disturbance.
California Health and Safety Code, Section 7050.5	This code makes it a misdemeanor to disturb or remove human remains found outside a cemetery. This code also requires a project owner to halt construction if human remains are discovered and to contact the county coroner.

Applicable Law	Description
Local	
County of San Bernardino 2007 General Plan, C. Countywide Goals and Policies of the Conservation Element	GOAL CO 1. The County will maintain to the greatest extent possible natural resources that contribute to the quality of life within the County. GOAL CO 3. The County will preserve and promote its historic and prehistoric cultural heritage. POLICIES CO 3.1 Identify and protect important archaeological and historic cultural resources in areas of the County that have been determined to have known cultural resource sensitivity. CO 3.2 Identify and protect important archaeological and historic cultural resources in all lands that involves disturbance of previously undisturbed ground. CO 3.3 Establish programs to preserve the information and heritage value of cultural and historical resources. CO 3.4 The County will comply with Government Code Section 65352.2 (SB18) by consulting with tribes as identified by the California Native American Heritage Commission on all General Plan and specific plan actions. CO 3.5 Ensure that important cultural resources are avoided or minimized to protect Native American beliefs and traditions.
County of San Bernardino 2007 Development Code	82.12.010 Purpose (a) Many of the resources are unique and non-renewable; and (b) The preservation of cultural resources provides a greater knowledge of County history, thus promoting County identity and conserving historic and scientific amenities for the benefit of future generations. 82.12.040 Development Standards Archaeological and historical resources determined by qualified professionals to be extremely important should be preserved as open space or dedicated to a public institution when possible.

C.3.4 PROPOSED PROJECT

C.3.4.1 SETTING AND EXISTING CONDITIONS

Information regarding the setting of the proposed project places it in both its geographic and natural context and specifies the technical description of the project. Additionally, the prehistoric, ethnographic, and historical backgrounds provide the context for the evaluation of the significance of any cultural resources identified within staff’s area of analysis for this project.

Geographic Setting and Existing Conditions

The proposed Calico Solar Project is located in rural eastern San Bernadino County within the central Mojave Desert approximately 115 miles east of Los Angeles and 37 miles east of Barstow, California, along Interstate Highway 40 (I-40) where it intersects with Hector Road. Nearby towns include the small communities of Newberry Springs and Ludlow, both approximately twelve miles to the west and east, respectively, of the project site. The project area is situated on the north side of I-40, primarily east of Hector Road; the southern project boundary borders I-40; the western boundary borders open undeveloped BLM land; the southeastern boundary borders an existing transmission line; and the northern and eastern boundaries border the base of the Cady Mountain range. The Cady Mountain Wilderness Study Area (WSA) and the Sleeping Beauty Proposed Wilderness Area are located north and northeast, respectively, of the project area. Pisgah Crater, located within the Pisgah Area of Critical Environmental Concern (ACEC), is located south of the proposed project. The Cady Mountains border the northern and eastern boundaries of the Calico Solar project area of analysis. Cady Peak is approximately four miles northeast and Sleeping Beauty Mountain is five miles to the east. Although portions of the project area are currently under private ownership, the majority of the lands are owned and administered by the BLM (Barstow Field Office) and can be found on the following on the following United States Geological Survey (USGS) 7.5-minute series topographic quadrangle maps: Hector (1982 Provisional); Lavic Lake (1955, Photorevised 1973); Sleeping Beauty (1982, Provisional minor changes 1993); Sunshine Peak (1955, Photorevised 1982); and Troy Lake (1982, Provisional minor changes 1993).

The project area is rural; however, a number of prior land use activities have occurred in the area, as evidenced by dilapidated mining-related structures, mining processing equipment, corrals, water tanks, barbed wire fencing, and several underground and above-ground utilities. The primary sources of previous surface and subsurface disturbance within and adjacent to the project area include cattle grazing, off-road vehicle use, historic mining activities, construction of a series of underground pipelines, construction and use of the Pisgah Substation, including associated transmission lines, and the construction and use of a number of transportation routes, including the Burlington Northern Santa Fe (BNSF) railroad tracks, the National Old Trails Road, U.S. Route 66, and I-40. Historic Route 66 roughly follows a similar route as I-40, though both are discrete features within the Project area. The BNSF Railway tracks bisect project site resulting in a north-south division of the study area. Transmission towers occur along the eastern-southeastern project limits. These towers include a pair of historic steel towers, a wooden transmission tower line, and a modern transmission tower. The Pisgah Substation is located within a triangular shaped parcel to the north of an I-40 temporary access route. The series of underground pipelines within the project area are situated south of the BNSF railroad tracks and north of I-40. Three well sites, which are depicted on the USGS maps, were also observed in the project area during the pedestrian survey. Historic mines occur throughout the region, and include the Black Butte Mine to the east and the Logan Mine to the north. Both the Logan and Black Butte Mines were used for the extraction of the mineral manganese and both are located within one-mile of the Calico Solar Project. No springs are indicated on the USGS quad maps for the Calico Solar Project area. The nearest reliable water source existing outside the Calico Solar Project area occurs approximately 12 miles to the west, in the Mojave Valley; numerous springs and wells surround the dry lake bed of ancient Troy Lake, which is just west of the Calico Solar Project area. Water is seasonally available in the form of rain swollen drainages, as indicated by the existence of numerous washes originating in the Cady Mountains and off-site to the east.

Calico Solar Project Description

The proposed Calico Solar Project would entail the construction, operation, and maintenance of one of the world's largest solar power facilities within a 6,215-acre area in the central Mojave Desert with a generating capacity of up to 850-megawatts (MW). The project would consist of approximately 34,000 solar dish systems (referred to as SunCatchers™) and would include a new 230-kV) Calico Solar Substation, 2.0 miles of electrical transmission line, an administration building, a maintenance complex, onsite routes interior to the project boundaries, a site access road, and a bridge over the Burlington Northern Santa Fe railroad tracks. Approximately 739 feet of the single – circuit 230-kV generation interconnection transmission line would be constructed off the project site, but still on BLM managed land. The transmission line would connect the proposed Calico Solar Substation to the existing Southern California Edison (SCE) Pisgah Substation. The project is proposed for development in two phases. Phase I would include 11,000 SunCatchers located on approximately 2,320 acres (3.6 square miles) to produce 275 MW. Phase II would include an additional 23,000 SunCatchers on an additional approximately 5,910 acres (9.2 square miles) to produce an additional 575 MW for the total 850 MW planned production. The total area required for both phases, including the area for the operation and administration building, the maintenance building, and the substation building, was originally 8,230 acres, but has been reduced to 6,215 acres (TS 2010ag). Approval of the Project ROW Grant Application (Form 299, Applications CACA 49539 and 49537) would result in the issuance of a ROW Grant Permit for use of federal lands administered by the BLM. The Project would require an amendment to the 1980 California Desert Conservation Area (CDCA) Plan.

The on-site substation (*i.e.,* Calico Solar Substation [approximately 15 acres]) would be constructed to deliver the electrical power generated by the project to Southern California Edison's (SCE) Pisgah Substation. Approximately twelve to fifteen 220-kilovolt (kV) transmission line structures (90 to 110 feet tall) would be required to make the interconnection from the Calico Solar to the SCE Pisgah Substation. Each of these structures would be constructed within the Project site.

The centrally located Main Services Complex (37.6 acres) would include three SunCatcher™ assembly buildings, administrative offices, operations control room, maintenance facilities, and a water treatment complex including a water treatment structure, raw water storage tank, demineralized water storage tank, basins, and potable water tank. A 15-acre temporary construction laydown area would be developed adjacent to the Main Services Complex.

Tessera Solar's Supplemental Filing dated January 2010 had proposed that water for the Project would be supplied by groundwater from a well located within the Cadiz basin and brought onsite by rail. However, the favorable results of the groundwater exploratory program demonstrate that groundwater is a viable water source for the Project, and water supplied by the well in the Cadiz basin would not be needed as a primary supply. The well that has been installed and tested as part of this investigation (Well #3) would serve as the primary water supply. Based on groundwater quality information collected for this project, it would require treatment to meet facility operations requirements. The water would be treated by a reverse osmosis system to remove the majority of the dissolved solids. A demineralization stage may be required for mirror washing water and the hydrogen generator. To prevent bacterial growth in the raw water storage tank at the facility, chlorine would be added. Wastewater generated as a result of treatment would be discharged to evaporation ponds located at the Main Services Complex. The size of the evaporation ponds is currently estimated to be approximately 0.5 acres. Sanitary waste water would be discharged to a septic tank and leachfield system located adjacent to the Main Services Complex.

Project Construction

The Calico Solar Project would be developed in two phases. The schedule would be approximately 58 months in duration. Construction would require approximately 40 months. Construction is tentatively scheduled to occur over an approximate three-year period beginning in late 2010 through 2012 for Phase 1 and a two-year period between 2013 and 2015 for Phase 2, assuming Southern California Edison (SCE) completes the full transmission build-out necessary for Phase 2 by December 31, 2013.

Project facilities and amenities would be established during the first month of the build-out. The majority of these facilities would be located in the construction laydown area adjacent to the Main Services Complex. Project amenities would consist of site offices, restroom facilities, meal rooms, limited parking areas, vehicle marshalling areas/traffic staging, and construction material/equipment storage areas. Construction power to the project site facilities would be provided by mobile diesel-driven generator sets and/or temporary service(s) from SCE.

Site preparation would be based on avoiding major washes and minimizing surface-disturbing activities. Also, areas of sensitive habitat and cultural resources would be avoided wherever possible. Brush trimming would be conducted between alternating rows of SunCatchers™. Brush trimming consists of cutting the top of the existing brush while leaving the existing native plant root system in place to minimize soil erosion. After brush has been trimmed, blading for roadways and foundations will be conducted between alternating rows of SunCatchers™ to provide access to individual SunCatchers™. Blading would consist of removing terrain undulations and would be limited to 3 feet in cut and 3 feet in fill. The blading operations would keep native soils within 100 feet of the pre-development location, with no hauling of soils across the site. Paved roadways would be constructed as close to the existing topography as possible, with limited cut-and-fill operations to maintain roadway design slope to within a maximum of 10%. Minor grading would also be required for building foundations and pads and parking areas in the Main Services Complex and substation areas. The clearing, blading, and grading operations would be undertaken using standard contractor heavy equipment. This equipment would consist of, but not be limited to, motorgraders, bulldozers, elevating scrapers, hydraulic excavators, tired loaders, compacting rollers, and dump trucks.

From the preliminary geotechnical investigations, it is expected that lightly loaded equipment and structures, including some of the equipment foundations in the substation yard, small equipment such as the fire water pump and standby generator, the support structures for the water treatment plant and hydrogen storage area, and the transmission line lattice steel towers would be supported on shallow footings. Shallow footings would be continuous strip and isolated spread footings.

The majority of each SunCatcher™ would be supported by a single metal pipe foundation that is hydraulically driven into the ground. These foundations are expected to be approximately 20 feet long and 24 inches in diameter. Shallow drilled pier concrete foundations of approximately 36 inches in diameter and an embedment depth with a minimum socketed depth into rock of 6 feet would be used for hard and rock-like ground conditions.The buildings and major structures such as yard tanks would be supported on shallow spread and continuous footings or mat-type foundations. Deep foundations would be required for heavy items, such as the power transformers at the electrical substation.

Project Operations

It is expected that the Calico Solar Project would be operated with a staff of approximately 164 full-time employees. The project would operate 7 days per week, generating electricity during normal daylight hours when the solar energy is available. Maintenance activities would occur 7 days a week, 24 hours a day to ensure SunCatcher™ availability when solar energy is available.

Operation of the Project would generate wastes resulting from processes, routine maintenance, and office activities typical of solar electric generation operations. Non-hazardous wastes generated during operation of the project would be recycled to the greatest extent practical and the remainder of the wastes would be removed on a regular basis by a certified waste-handling contractor.

Inert solid wastes generated at the project site during operation would be predominantly office wastes and routine maintenance wastes, such as scrap metal, wood and plastic from surplus and deactivated equipment and parts. Scrap materials such as paper, packing materials, glass, metals, and plastics would be segregated and managed for recycling. Non-recyclable inert wastes would be stored in covered trash bins in accordance with local ordinances and picked up by an authorized local trash hauler on a regular basis for transport to and disposal in a suitable landfill.

Project operations would consist of few inputs, most of which would be associated with the day-to-day operations and maintenance of the facilities, and the resulting energy production would decrease the area's reliance on imported non-renewable electricity. The existing transmission lines, which traverse the project site, are convenient to this project, and adhere to the goals and policies of the Geothermal/Alternative Energy and Transmission Element. There are no recently proposed zone changes that affect this project, and no changes to the general provisions for development of solar energy are in the planning area.

Project Closure and Decommissioning

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

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

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

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

To ensure that public health, safety, and the environment are protected during decommissioning, a decommissioning plan would be submitted to the Energy Commission for approval before decommissioning. The plan would discuss the following:

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

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

Premature closure or unexpected cessation of project operations would be outlined in the Project Closure Plan. The plan would outline steps to secure hazardous and non-hazardous materials and wastes. Such steps would be consistent with Best Management Practices, the HMBP, the RMP, and according to applicable LORS. The plan would include monitoring of vessels and receptacles of hazardous material and wastes, safe cessation of processes using hazardous materials or hazardous wastes, and inspection of secondary containment structures.

Planned permanent closure effects would be incorporated into the Project Closure Plan and evaluated at the end of the project's economic operation. The Project Closure Plan would document non-hazardous and hazardous waste management practices including the inventory, management, and disposal of hazardous materials and wastes and the permanent closure of permitted hazardous materials and waste storage units.

C.3.4.2 CALICO SOLAR PROJECT AREA OF ANALYSIS / APE

A project's potential to affect cultural resources is analyzed in terms of the maximum area of disturbance that would occur as a result of the project's construction, operation, and potential future decommissioning. Therefore, staff's project area of analysis for cultural resources includes all temporary and permanent construction areas and ultimate proposed rights-of-way established for the project. The vertical extent of potential project effects is also taken into consideration, including the depths of project excavation (for buried archaeological deposits), as well as the height of any permanent project facilities (which could affect the setting for built-environment and/or ethnographic resources).

The inventory of cultural resources within what staff defines as the appropriate area for the analysis of a project's potential impacts is the first step toward the assessment of whether or not the proposed project would cause a significant impact to an important cultural resource and, therefore, have an adverse effect on the environment. The area that staff considers when identifying and assessing impacts to historical resources, referred to as the "project area of anlaysis", is usually defined as the area within and surrounding the project site and associated linear facility corridors. The area is sufficiently large to facilitate considerations of archaeological, ethnographic, and built-environment resources.

Staff's project area of analysis for the Calico Solar Project is, therefore, a composite geographic area that encompasses all project construction and/or operation areas. The project area of analysis for built-environment resources extends an additional half-mile beyond the project footprint to account for potential effects related to resource setting.

C.3.4.3 ENVIRONMENTAL SETTING

Geology

The proposed Calico Solar Project area is located within the geomorphic province of the Mojave Desert, which occupies approximately 25,000 square miles of southeastern

California (Norris and Webb 1976, p. 123). The Mojave Desert is a wedge shaped area largely bound by major faults and structurally referred to as the Mojave Block. The Mojave Desert Geomorphic Province is characterized by broad expanses of desert with localized mountains and dry lakebeds and is bound by the San Bernardino Mountains and the Pinto fault to the south, the San Andreas fault to the west, the Garlock fault to the north and the Basin and Range Province to the east. The block itself is cut by a series of northwest to southeast striking faults including the Helendale, Lenwood, Johnson Valley, Camp Rock, Emerson, Calico, Pisgah, Bullion and Lavic Lake faults. Collectively, the strike slip faults in the Mojave Block are referred to as the Eastern California Shear Zone (ECSZ).The project area of analysis is within a broad valley between the Southwestern and Southeastern Cady mountains, in the central portion of the Mojave Desert Geomorphic Province.

The project area is characterized by Holocene-age and Pleistocene-age alluvial deposition. Alluvial deposits from the adjacent highlands are composed of silty sands and gravels with localized gravel and cobble channels. These sandy alluvial deposits may be locally intertwined with finer-grained basin deposits. The bounding highlands, which include a small portion along the northern project boundary, are underlain by granitic and metamorphic terrain and along the southern edge by younger volcanic deposits (Dibblee and Bassett 1966).

Geomorphology

Present Process Geomorphology

The deposition history is dominated by older (Pleistocene) and younger (Holocene) fanglomerates consisting of sands and gravels flowing in a generally southern direction, derived from the uplifted granitic and andesitic Cady Mountains (Dibblee and Bassett 1966). The older alluvium dominates the upper reaches of the fanglomerate, whereas the younger deposits dominate the lower reaches of the slope. This younger alluvium includes materials associated with a substantial east to west drainage that crosses the southern portion of the project. Although limited data are available, field observations indicate a substantial depth to the fanglomerate deposits. Older fanglomerates and alluvium form low hills in the southern-most extent of the Calico Solar project area of analysis and are separated from the remainder of the Calico Solar project area of analysis by the drainage noted above. These hills, and a northward extension of the Pisgah lava flow, channel the drainage towards Troy Lake to the west.

A major factor affecting the geomorphology of the Mojave, and specifically the Calico Solar project area of analysis and its environs, is the Mojave River itself. This river and its drainage system represent the largest present-day hydrological system in the Mojave Desert (Enzel, et al. 2003:62). Fluctuations in the paleoclimate between wet and dry periods, coupled with the changing path of the sizable Mojave River, resulted in the formation of several freshwater lakes, the most notable of which are Lake Manix and Lake Mojave. As the river changed its course, the overabundance of freshwater would be transported and deposited into naturally occurring basins along or at the terminus of the Mojave River. Marith Reheis and co-authors (2007) note that Lake Manix consists of several subbasins, which are referred to as Coyote Lake, Troy Lake, Manix, and Afton. As the lake developed, “fluvial and deltaic sediments were deposited progressively eastward into the lake” and that studies have hypothesized that there were at least four major lake cycles (Reheis, et al. 2007:5). Based on geological and geomorphological studies the Lake Manix shoreline reached an elevation of 557 meters (m). At this level, the southern extent of the lake itself would have pushed east, potentially abutting the westernmost Calico Solar project area of analysis (Enzel 2003; Reheis *et al.,* 2007). Extensive prehistoric remains are found along the shores of the lake and it is thought to have been a major element in a regional network involving the inhabitants of the project and the project area of analysis.

The occurrence of desert pavements within the Calico Solar project area of analysis reflects the context as described above. In particular, the pavements on the slopes of the Cady Mountains are broader and better developed atop the older, up-slope Pleistocene fanglomerates rather than on the younger surfaces at lower elevations. The older surfaces, and likely the younger ones as well, predate the accepted presence of man in the new world. The most stable pavements, and likely the oldest, lie atop Quaternary alluvium woven among the fanglomerate hills and lava flows within the southern portion of the project area of analysis. Buried cultural deposits would not lilely be found beneath these stable surfaces. The cryptocrystalline silicate nodules that occur as part of the desert pavement matrix may be secondarily sourced to the fanglomerate deposits, though their original matrix remains unknown. Holocene alluvial deposits within and adjacent to the east-west drainage are the most likely source for buried deposits. The loose sandy matrix and the seasonal rain and flood events are likely to have obscured portions of cultural deposits.

Paleoecology

The Calico Solar Project is located within the Mojave Valley-Granite Mountains ecological subsection (Subsection 322Ah) of the broader Mojave Desert (Miles and Goudey 1997). The general environmental setting is that of a wide valley within arid desert, along which is an expansive alluvial fan that is dissected by numerous unnamed south-southwest trending washes and ephemeral drainages.

The project area of analysis is composed of multiple Life Zones whose animal and plant communities attracted and tempered the settlement and adaptations of a long sequence of prehistoric and historic populations. The Life Zones are (from the highest altitude to the lowest): Arctic/Alpine (10,000 feet and above), Canadian/Hudsonian (7,000 to 10,000 feet), Transition (5,000 to 7,000 feet), Upper Sonoran (3,300 to 5,000 feet), and Lower Sonoran (3,300 feet and below). Although some prehistoric and historic inhabitants of the project visited one of more of these Life Zones at one time or another, most settlement and subsistence activities were concentrated in the Transition, Upper Sonoran, and Lower Sonoran Zones, that is, between 5,000 feet and -227 feet in altitude (approximately a mile vertical distance).

The inhabitants of the project area would likely have lived primarily in the Lower Sonoran Life Zone, where acorns and piñon nuts were gathered by groups in the foothills; honey mesquite, piñon nuts, yucca roots, mesquite and cacti fruits were gathered by groups in or near the desert (Bean and Smith 1978) when Troy Lake, Lavic Lake, and Broadwell Lake were wet During times when the lakes were dry, settlement and subsistence were focused on the Upper Sonoran Life Zone in the Cady Mountains and even father distant. Edible varieties of agave cactus grow naturally on the rocky slopes of the Cady Mountains. Acorns and pinyon nuts were traded from Cahuilla bands of the mountains and passes of the Upper Sonoran Life Zone and Transition Life Zone, and mesquite beans were often received in return. There is no archaeological evidence that dried fish from the lakes or the Colorado River were traded beyond the immediate area.

A substantial east to west drainage crosses the southern portion of the Calico Solar Project area, eventually emptying into Troy Lake. The presence of water in drainages and lakes was certainly greater during the terminal Pleistocene and early Holocene periods. Numerous dry stream drainages and lake remnants (*i.e.,* Troy Lake, Lavic Lake, and Broadwell Lake) are located in the vicinity of the Calico Solar Project and attest to this increased presence of water. Based on paleoenvironmental data, the general climatic pattern in the Mojave Desert seems to be that of cool and wet periods, followed by warmer and drier conditions, from the Late Pleistocene through the Late Holocene periods, as reflected in the numerous dry lake beds that are interspersed throughout the area (Sutton, *et al.,* 2007; S. Hall 1985; Spaulding 1991).

Biology

California's diverse environment is separated into ten different bioregions. The Calico Solar Project area of analysis lies within the Mojave Bioregion. The Mojave Bioregion is an arid desert environment which covers over 25 million acres of Southern California, Southern Nevada and the Southwestern Utah and is characterized by desert washes, high plateaus, mountain peaks, palm oases, and large dry prehistoric lake beds called playas. These playas usually consist of sand and gravel basins surrounding central salt flats and were formed by pluvial lakes which once dominated the Mojave Bioregion. The Mojave is bordered on the north by the Sierra Nevada Bioregion, on the west by the Transverse and Peninsular ranges and is separated from the Great Basin, on the east, by the Garlock Fault (Moratto 1984:16, 17). Elevations in the bioregion average between 2,000 to 3,000 feet above sea level and contain isolated peaks of 6,000 to 7,000 feet above sea level.

Although the desert appears barren and remote, it contains a large variety of plant and animal life. Vegetation in the Mojave Bioregion includes Mojave creosote bush, scattered desert saltbush, Joshua tree scrub, alkali scrub, juniper pinyon woodland, numerous varieties of cacti, and hardwood and conifer forests in the higher elevations. Rare plants in the bioregion include white bear poppy, Barstow woolly sunflower, alkali mariposa lily, Red Rock poppy, Mojave monkey flower, and Stephen's beartongue. (Ceres, n.d.). The Mojave Bioregion is characterized by hot dry summers followed by cool winters with occasional rainstorms that often develop into flash floods. Much of the land within the Mojave Bioregion is owned and managed by the BLM or contained in one of the three National Parks: Death Valley, Eastern Mojave, and Joshua Tree and several other recreational areas (Ceres, n.d.).

Georchaeological Investigation for the Calico Project Area

Over the span of human occupation in California (approximately the past 13,000 years), some parts of the landscape have remained stable, while others have either been removed by erosion or buried by the deposition of sediments. The processes of erosion and deposition play an important role in the integrity and surface visibility of archaeological remains. As a result, archaeologists must consider the age and depositional history of the various landforms within a given study area in order to assess the potential for buried archaeological deposits to be present and intact within the study area.

As part of the effort to understand the setting of the Calico Project area, the applicant conducted a geoarchaeological sensitivity analysis to assess the potential for the presence of buried archaeological sites that would otherwise have no surface manifestations (SES 2009dd). In order to assess the sensitivity of the project area to contain buried archaeological deposits that could be affected by the project, the investigation entailed the identification of major landforms within the project area and a determination of the age and depositional history of those landforms. The following is excerpted from the Geoarchaeological anlaysis conducted for the Calico Project.

Major landforms within the project area were initially identified using both color and black-and-white aerial photography in combination with existing geologic maps of the area. Certain broad assumptions could be made about the age and depositional history of each portion of the project area.The mapping and assumptions were then verified and modified during an initial field reconnaissance consisting of an on-the-ground examination of the landscape and key indicators such as relative slope, desert pavement development, and subsoil formation.

Subsurface examinations within the project area were also undertaken in three ways. During the initial field reconnaissance, numerous existing cuts were identified where on-fan drainages and larger channels had incised alluvial deposits and exposed subsurface soil profiles. Although there are innumerable drainage features, the majority, particularly in the northern portions of the project area, are relatively small with only minor incision. To augment this data, the geoarchaeologist was present during geotechnical investigations involving *Modified California Sampler* borings and backhoe-excavated test pits. Borings were advanced between 25 and 50 feet below surface, while test pits extended 15 feet. Soils and contacts relevant to this study (i.e., late Pleistocene age or younger) occurred within the upper approximately 6.5 feet (2 meters) throughout the study area and typically much shallower. All excavated deposits were actively sorted through for archaeological materials, and the excavations were monitored for depositional changes that may suggest greater potential for buried archaeology. Additionally, a sample of any depositional contacts considered to have archaeological potential was screened through ¼-inch hardware mesh. No archaeological materials were observed during any of the geotechnical borings or test pits.

Identification of Major Landforms within the Project Area

The Calico Solar Project study area is bounded to the north and east by the granitic/quartz monzonite/basaltic pluton that forms the Cady Mountains, and to the south by the Pisgah Lava flows. The rock outcrops of the Cady Mountains are heavily eroded and mantled by Quaternary fan piedmonts[3], with more recent fan aprons issuing from the leading edge of these piedmonts. Alternatively, the Pisgah Lava flows have largely created a barrier to the introduction of more recent alluvial material from the mountains and fans to the south, and have served to preserve older deposits at the

[3] A piedmont is an area of land formed or lying at the foot of a mountain or mountain range. A *piedmont flat* is a slightly undulating, residual landscape formed around a mountainous upland.

surface. All of these Quaternary landforms are actually comprised of numerous remnants and more recent deposits of varying ages. By examining the relationship between the landform components one can develop relative age estimates, conclusions as to the depositional history of that landform, and the potential of each landform to harbor buried paleosols of appropriate age.

Before beginning such a discussion, however, a common set of descriptive landscape terms and definitions is necessary. Many different terms are used to describe desert geomorphology, with vastly different implications of scale, accuracy, and implied formation processes. “Alluvial fan” and “bajada” are two common terms that are often misleading because they are used to refer to different types of depositional and erosional landscapes and subsume numerous smaller landform components. The terminology adopted in this study follows after Peterson (1981) because the classification system emphasizes the temporal and spatial relationship between landform components, and was devised in relation to the study and classification of Basin and Range soils− making it highly relevant to the current geoarchaeological study. A discussion of these various landforms is provided in the following sections, with direct reference to the Calico Solar study area.

At the broadest scale, the Calico Solar project study area—including the surrounding piedmonts to the north, east, and south—can be classified as a “semi-bolson[4].” Common in desert regions of the Basin and Range, semi-bolsons differ from true bolsons[5] in that they lack a playa or floodplain, on which alluvial fans normally terminate, and instead are cut through by an axial drainage that marks the termination of the various piedmont landforms. The Calico Solar project area is similar to portions of the semi-bolson in that it lacks many of the distinct depositional features of the larger down-stream axial channel (e.g., terrace, floodplain). The typical axial channel eventually opens out into a true bolson and associated playa. In the case of the Calico Solar study area, this is represented by Troy Lake, several miles west of the project area near the western extent of the Cady Mountains.

The Calico Solar project area semi-bolson can be further divided into two dominant structural sections, one comprising the northern portion of the project area, and the other comprising the southern portion. The larger of these structural sections consists of the Cady Mountains and associated coalescing alluvial fan piedmont—gradually sloping down to the southwest—that dominates the northern approximately two-thirds of the project area. The second structural section in the southern portion of the project area is formed by several different component landforms that are generally lower but more topographically diverse, including the Pisgah Lava flows (functionally related to the Lava Bed Mountains, further to the south), several old remnant fans, inset fans, and associated alluvial flats. These northern and southern sections are divided by the axial

[4] A semi-bolson is a wide desert basin or valley whose central playa is absent or poorly developed, and which is drained by an intermittent stream that flows through canyons at each end and reaches a surface outlet.

[5] A bolson is a semiarid, flat-floored desert valley or depression, usually centred on a playa or salt pan and entirely surrounded by hills or mountains. It is a type of basin characteristic of basin-and-range terrain. The term is usually applied only to certain basins of the southwestern United States and northern Mexico.

channel, which runs roughly east–west, and which has likely been significantly altered by the Burlington Northern Santa Fe rail line that generally follows the same course.

The combined results of this study regarding landform type/age and buried site sensitivity are summarized in Cultural Resources Table 2 below. The following is a discussion of these results.

CULTURAL RESOURCES TABLE 2:
Summary of Geoarchaeological Sensitivity of Landforms within the Calico Solar Project Study Area

Area	Landform	Age	Depositional Regime*	Sensitivity
Northern Section	Rock Outcrops	Tertiary or older	Erosional	None
	Upper Alluvial Fan Piedmont	Pleistocene to Mid-Holocene	Erosional	Very Low
	Lower Alluvial Fan Apron	Pleistocene to Holocene	Variable	Low
Southern Section	Pisgah Lava	Late Pleistocene	Stable	None to very low
	Erosional Fan Remnant (fanglomerate)	Pleistocene	Erosional	Very Low
	Inset Fans	Pleistocene to Holocene	Variable	Very Low to Low
	Relict Alluvial Flat	Pleistocene (?)	Erosional (variable)	Very Low
	Axial Channel (and associated minor landforms)	Late Holocene	Variable	Very Low to Moderate

*Represents the dominant regime since the terminal Pleistocene

Northern Section. The northern portion of the study area is the simpler of the two. This area consists of a fan piedmont that is comprised of numerous coalescing alluvial fans issuing from the mouths of small mountain valleys within the Cady Mountains. The piedmont is composed of the upper alluvial fans themselves, as well as more recent fan aprons at lower elevations. The surfaces of these landforms typically consist of numerous active and abandoned channels and intervening surfaces that range from Early Pleistocene to Holocene in age (Dohrenwend et al. 1991:327). Given the punctuated deposition and erosion of these landforms during the Holocene, however, the archaeological record represented on these landforms may be incomplete.

The most distinct, well-developed desert pavement observed on the alluvial fan piedmont is located in the northeast portion of the piedmont, which has the largest proportion of andesite bedrock (Dibblee 2008). This andesite is generally more resistant than the coarse grain granite and monzonite, and appears to form a more distinct varnish. Given the predominance of granitic parent material, we can expect that desert pavements within the northern portion of the project area will generally be much weaker than in other areas of the Mojave Desert, where more resistant parent material may be present (including the southern portion of the project area). Additionally, comparison of pavement surfaces within the project area may be tenuous, especially between the northern and southern portions, which consist of very different parent materials and geomorphic histories. While a well-developed pavement is invariably indicative of an old land surface, a poorly developed pavement is not inherently young. None the less, an initial field reconnaissance, and a general understanding of the development of alluvial fans within the Basin and Range, suggested that the majority of surfaces within the northern fan piedmont are late Pleistocene to Holocene in age. Given these constraints, an examination of subsurface conditions was considered necessary to evaluate landform ages and to determine the potential for buried archaeological deposits.

- **Rock Outcrops** (Sensitivity: None). At the higher reaches of the piedmont (the northern extent of the project area), rock outcrops are present. These are limited exposures of highly dissected Tertiary andesite and basalt bedrock which form steep, highly-eroded hills (inselbergs) sticking up out of the alluvial fans (Dibblee 2008). While these limited andesite and basalt outcrops provide some of the parent material that make up the alluvial fans, the vast majority appears to be granite and quartz monzonites, which also form the majority of the southern Cady Mountains and into which extend the mountain valleys that transport the material that forms the alluvial fans (Dibblee 2008). Of course, these rock outcrops have little or no potential for harboring buried archaeological deposits.
- **Upper Alluvial Fan Piedmont** (Sensitivity: Very Low). In general, there appears to be a trend of decreasing sediment size as one moves downslope along the piedmont gradient. This is typical of alluvial fans, with bouldery material near the fan head and fine sands at the distal toe (Peterson 1981:22). Test pits and borings within the northern portion of the Calico Solar project area (e.g., TP 016, 026, 027, and 040 through 047) consistently revealed profiles dominated by angular to sub-angular cobbles and gravels, with a clast supported matrix of sandy loam. Different weathering profiles laterally (east–west) across the piedmont indicate that the various fans that make up the piedmont are of different ages– as is expected given the results from other mountain fronts in the Mojave Desert (e.g., Bull 1991; Eppes, et al. 2003; McFadden and Wells 2003). However, no buried soils were identified and the very coarse clast size indicates a very high-energy colluvial/debris flow depositional environment that precludes the preservation of paleo-surfaces and associated archaeological remains.

  The oldest major alluvial fan structure on the piedmont appears to be located along the eastern boundary. Very well-developed varnish and rubification on the desert pavement in the upper portion of the fan, and well-developed subsurface weathering profiles throughout the fan suggest a late Pleistocene age or older. The subsurface profile exhibits very strong pedogenic development, with an upper vesicular horizon, a Btk-horizon with strong reddening (5YR 5/4), and multiple calcic horizons, the strongest exhibiting Stage IV cementation. Coarse high-energy angular and sub-angular colluvial/debris flow material is apparent throughout the profile, and is consistent with other profiles observed across the upper fan piedmont.

  The lithology of the northern coalescing fan piedmont is important for two reasons: the parent material of the alluvial fans directly affects the ability of distinct desert pavements to form and, thus, determination of surface age (as discussed above); and it dictates the availability of usable lithic raw materials for prehistoric populations. Coarse grained granites and monzonites have very little utility as a raw lithic material, as they are not appropriate for flaked stone tool industries, and are similarly difficult to use as groundstone due to their coarse grain and friable nature. The predominance of this parent material may largely explain the dearth of prehistoric archaeological sites on older alluvial fan segments within the northern portion of the project area. This same reasoning would further reduce the potential for buried archaeological resources with the fan piedmont (including the lower fan aprons, see below). In conjunction with the lack of identified paleosols and the consistently high-energy subsurface deposits, the sensitivity for buried archaeological deposits within the upper alluvial fan piedmont is considered very low.

- **Lower Alluvial Fan Apron** (Sensitivity: Low). The finer grain material that dominates the lower portions of the fan piedmont, the near absence of well-developed pavement surfaces, as well as the geomorphic structure– with countless small anastomatizing channels and distinct bar and swale surface morphology– are all typical of fan aprons. However, the topographical continuity between the upper and lower portions of the piedmont is atypical of alluvial fans and their associated younger aprons (Peterson 1981:22-24) and raises questions about the functional relationship and timing of deposition between the upper alluvial fan and the lower aprons. Is the surface morphology and grain size differentiation between the two portions of the fan piedmont a result of timing (i.e., the upper surfaces are older and had time to develop pavement surfaces), or a result of natural clast sorting (i.e., coarse grain material naturally settles-out up-slope, with progressively finer material as one moves down gradient)? The apparent young age of the lower apron surfaces is an initial indicator of their potential to harbor buried archaeological deposits. However, further investigations indicate that there is a low geoarchaeological potential due to the nature of their geomorphic evolution.

  Powell states that younger alluvial fan aprons often “bury or feather out onto older fans distally” (2002:16). Thus, this middle and lower portion of the northern fan piedmont has undergone deposition (and erosion?) since the earliest documented human occupation of this area. Therefore archaeological sites in this portion of the project area have been removed by erosion or may remain buried under these younger fan deposits. Along the eastern alluvial fan piedmont at Clark Mountain, in the northeastern Mojave, it was demonstrated that major progradation of the fan aprons occurred between 8,000 and 4,000 BP, followed by a switch to an erosional regime during the late Holocene. It was conjectured that this transition was due to a reduction in available sediment for deposition (CH2MHill 2008). After an initial erosion of the uplands, fluctuating precipitation and sediment-starved runoff eroded recently deposited material on the lower hill slopes. The middle and lower portion of the Calico Solar alluvial fan piedmont, dominated by fan aprons, is not a stabilized surface. Recent landforms such as bar and swale topography, countless small anastomatizing gullies, and larger channels extend across most of this area and indicate ongoing desiccation and active erosion.

  Buried pedogenic horizons were identified in numerous test pits and borings within the apron portion of the northern fan piedmont. The nature of these contacts are indicative of the initial formation of the lower piedmont and suggests that deposition is typically preceded by significant erosion. The upper unit consists of a single fining upward sequence dominated by coarse sub-angular gravels and cobbles at its base, and sandy loam with few gravels near the surface. This suggests that this portion of the fan apron was formed as a single depositional package, likely during the middle or late Holocene. However, the coarse material at its base, and the very distinct lower erosional contact, indicate that initial deposition of the apron was relatively high-energy and preceded by significant erosion. The lower buried pedogenic unit has a Btk-Bkm-Bk-Ck-C profile, consistent with a Pleistocene age and a truncated upper profile.

The upper unit consists of an Av-Bwk-Ck-C profile that is better developed, with a maximum of Stage I+ to II carbonate development, and consistent with a middle Holocene (?) age. Note that the surface pavement is only slightly more distinct than the preceding example, despite the apparent pedogenic age difference. The surface is more accurately described as stony, with no varnish and only very minor rubification on the ventral surfaces of surface clasts. Again, this unit has coarse angular debris flow-type gravels at its base, and a distinct erosional contact with the underlying paleosol. However, rather than being a single depositional unit, the upper apron mantle appears to be composed of at least three lithologic units, each represented by a fining upward sequence. The continuous weathering profile across these lithologic contacts indicates that they were deposited in relatively rapid succession, with no periods of stability which would have formed individual pedogenic profiles. The lower buried pedogenic unit has a Km-Bkm-Bk-Ck-C profile, again, consistent with a Pleistocene age and an even more heavily truncated upper profile.

Although distinct very old paleosols, buried below recent alluvium, were consistently identified within the lower portions of the alluvial fan piedmont, they are marked by heavily erosional upper contacts. It appears that significant erosion occurred prior to deposition of the fan apron mantles. This erosion would have destroyed any archaeology deposited on these older (now buried) surfaces, and effectively nullifies the potential for buried archaeology within the middle and lower portions of the northern fan piedmont. The presence of more recent lithologic contacts indicates that the fan aprons were sometimes formed through multiple depositional events, but the lack of identifiable paleosols at these contacts suggests that they were laid down more-or-less contemporaneously and, therefore, have a low archaeological potential.

Southern Section. The southern portion of the study area is comprised of generally older and more variable landscape elements compared to the northern portion. While also considered a piedmont, the southern area appears to be generally much older, comprised of numerous relict landforms, with differing source material and component landforms.

An initial clue to the age of the landforms of the southern area is provided by the Pisgah Lava flow. This flow is generally considered to have erupted in a series of closely related events ca. 20,000 BP.[6] The Pisgah lavas overlie numerous deposits just south of the study area, including the older alluvial sediments (Qoa), fanglomerate (Qof), and various clay units (Qc and QTc) mapped by Dibblee (2008) and observed during the field visit for this current study. As such, all of these mapped deposits are at least older than ca. 20,000 BP (i.e., were laid-down well before human occupation in the region). Additionally, the emplacement of the Pisgah lavas effectively blocked deposition of new alluvial material from the Rodman Mountains to the south. This explains both the lack of large late Pleistocene and Holocene alluvial fan deposits– that are present in the northern portion of the Calico Solar project area and throughout the Basin and Range– as well as the presence of so many relict landforms at the surface. Whereas the alluvial fan material in the northern section has its source in the mountain valleys of the Cady Mountains, any more recent depositional landforms within the southern section are comprised of material reworked from the older relict alluvial landforms.

- **Pisgah Lava** (Sensitivity: None to Very Low). As stated above, the Pisgah Lava flows have been dated to approximately 20,000 BP. As such, they have no potential for harboring buried archaeological deposits. The exception to this statement is the eolian sand deposits that have mantled certain limited areas along the base of the lavas. Relatively limited sand sheet has built up along the edge of a portion of the flow near the Pisgah Substation, in the eastern portion of the study area. Limited subsurface exploration indicated that the sheet was only approximately 30 cm thick and directly overlaid the lava flow. Lack of soil development within the sand sheet suggests that it is a very recent, unstabilized deposit. No subsurface archaeological materials were observed.

  Figure 11 shows a desert pavement that has developed on a portion of the Pisgah flow—elevated on a mantle of accretionary eolian sand and silt—and gives an indication of the degree of pavement development that can be expected on a 20,000 year old lavic surface.

  A portion of at least one large archaeological site identified during inventory efforts (KRM-135; URS 2009) is located in close association with the Pisgah Lava flows. The higher elevation western portion of this site is located on fine grain sediments, with a pebbly surface, which appear to be mantled into small embayments of the lava flow. The sediments within these areas appear to be a mixture of fine grain alluvium from a nearby drainage which have been deposited as an older terrace set and preserved within these embayments, along with more recent eolian sands and silts accreted onto the existing surface. As such, these limited portions of KRM-135 appear to have the potential for at least a minor subsurface component, and may represent the only limited potential for buried archaeological deposits associated with the Pisgah Lava flows.

- **Erosional Fan Remnant** (Sensitivity: Very Low). A large proportion of the southern section of the project area is dominated by very old alluvial landforms referred to here as "erosional fan remnants." The erosional fan remnants are generally coincident with the areas of Quaternary fanglomerate (Qof) as mapped by Dibblee (2008). The fanglomerate is an early Pleistocene or older alluvial/fluvial deposit up to

[6] Sylvester et al. (2002) place the timing of the eruptions at 18,000 ±5,000 BP based on argon-argon dating, whereas Phillips (2003) obtained a date of 22,500 ±1,300 BP based on cosmogenic ^{36}Cl analysis. These dates are within the expected range, of a few thousand years, for the multiple flows issuing from the Pisgah crater.

300 feet thick, comprised of poorly sorted coarse gravels and cobbles of mixed Mesozoic porphyry complex, metavolcanics, and Tertiary volcanic rocks (as well as chalcedony/jasper). The clast-supported matrix appears to be comprised of loamy sand with a high $CaCO_3$ content. This very old Quaternary geologic unit has been uplifted along the multiple faults that run north–south through the southern portion of the project area. These faults may have a normal and rotational component, with the highest portions of the uplifted erosional fan remnants located along the fault scarp, which have eroded steeply toward the east (along the scarp) and more gradually to the west.

As the name implies, these uplifted relict landforms are largely erosional, particularly along the steeper side slopes of the fan remnants. The flatter summits of the fan remnants (or "ballenas" if the ridges have been completely separated from other portions of the original alluvial unit) are more stabilized and may exhibit more well-developed desert pavements than the side slopes. This pavement likely formed through a combination of accretionary processes (McFadden, Wells, and Jercinovich 1987) as well as erosional process, where the finer alluvial matrix is eroded away leaving a disproportionate amount of larger clasts at the surface (McAuliffe and McDonald 1995). Subsurface profiles along the side slopes exhibit Stage III to IV $CaCO_3$ morphology, consistent with a Pleistocene or older age.

An additional small area of erosional fan remnant, not mapped as Qof by Dibblee (2008), was identified near the Pisgah Substation, in the western portion of the project area. The subsurface profile, exposed in a channel that cuts through the deposit indicates that it is similar to the Qof—with similar lithology and $CaCO_3$ development—and may be functionally related. The uplifted exposed summit of the fan remnant is limited to a small area east of the Pisgah Substation, while an older depositional fan apron that appears to be related to the fan remnant extends out to the west.

In general, the areas mapped as erosional fan remnant (and Qof by Dibblee 2008) have a very low potential for harboring buried archaeological deposits. These landforms are far too old to bury archaeologically sensitive paleosols. The large number of prehistoric archaeological sites present on the surface of these landforms speaks to both their antiquity and the presence of valuable lithic materials (volcanics and silica rich precipitates) within the fanglomerate deposits.

An exception to this, as on other landforms discussed in this study, is the presence of small confined areas of fine-grain recent eolian deposition. Within the erosional fan remnants, these areas are generally limited to small coppice dunes (small piles of sand built up around and temporarily stabilized by vegetation). The coppice dunes observed in the project area are generally very small, averaging less than 0.5 meter tall by 1 meter wide. Due to their limited area, it is very unlikely that they would obscure an entire site, or bury artifacts significantly different than those observed on the site as a whole.

- **Inset Fans** (Sensitivity: Very Low to Low). Numerous distinct inset fans were mapped within the southern portion of the Calico Solar project area. These are very gross landform designations and, in reality, the areas mapped as inset fan may be comprised of numerous component landforms. However, the dominant landforms in these areas consist of depositional alluvium (fans) inset between older relict landforms.

Perhaps the most geomorphically complicated and interesting of these inset fan units is IF1, located in the central-western area of the southern section of the Calico Solar project area. This area has a gravel and cobble surface lag deposit that forms a well-developed desert pavement, and appears somewhat similar to the clasts from the surrounding Qof fan remnants. The source material for these clasts is likely largely from the eroded fan remnants. However, an examination of the subsurface matrix indicates a much different geomorphic origin for this area. IF1 is underlain by a reddish brown lean clay, which exhibits a course angular blocky structure. Ped faces, when freshly excavated and exposed, exhibit a distinct glossy clay film that may be slickensides, related to periodic wetting and drying cycles. Geotechnical borings B006, B007, and B008 indicate that this clay is over 50 feet thick.

In lower lying areas (including the relict alluvial flat; see below), the clay is overlain by a shallow, well-developed soil profile with a well-developed desert pavement that represents a secondary inset fan. These soils exhibit Stage II to III $CaCO_3$ formation, with diffuse carbonate throughout the profile and distinct thick and indurated laminae within the Bk- and/or K-horizons. Where observed, subsurface profiles contain a well-developed Av-Bwk-Bk-Btk-BCk pedogenic sequence. These pedogenic features suggest that the soil within the IF1 area (and relict alluvial flat), as well as the clay they overlie, are very old, and are consistent with Pleistocene and early Holocene soils observed at other locales within the Mojave Desert (see e.g., McDonald, McFadden, and Wells 2003:Table 1). The contact between the surface soil unit and the clay appears to be an erosional unconformity.

In higher relief portions of IF1, it appears that these soils have either been stripped away or never formed, leaving distinct inset fan remnants and ballenas composed entirely of the clay with a coarse gravel and cobble deflated lag deposit at the surface. Indeed, the IF1 structure is old enough that it too has been dissected and contains both erosional and depositional landforms. An additional indication of the age of the clay unit is the presence of distinct, approximately 5cm thick veins and inclusions of gypsum precipitate within the clay. Given its age and physical characteristics, the underlying thick clay unit at IF1 may be functionally related to the late Miocene or early Pleistocene claystones (QTc) mapped by Dibblee (2008) south of the Calico Solar project area. These are described as light reddish-brown lacustrine deposits that are soft to moderately hard (Dibblee 2008) and which are likely the result of a large paleo-lake that once occupied the area.

Given the age of the soils, the lack of identified paleosols, the very old unconformable lower clay unit, and the largely erosional nature of the relict IF1 inset fan, the potential for buried archaeological deposits is considered extremely low.

The other inset fan units (IF2 and IF3), mapped to the east of IF1 are more typical of inset fans in desert piedmont contexts, in that they do not appear to be underlain by, or composed of, the very old resistant clay unit. These inset fans are, instead, largely composed of reworked and redeposited alluvium from the side slopes of the fan remnants into which they are inset. Subsurface pedogenic indicators observed during the field reconnaissance and in geotechnical borings indicate that these other inset fans are relatively old (middle Holocene?). Subsurface profiles observed within inset fans IF2 and IF3 generally correspond to an Av-ABw-Btk-Bk Cox-C sequence with Stage I+ to II $CaCO_3$ morphology. While these soils are likely younger than those observed in other areas across the southern section of the study area, no paleosols were discovered.

In general, these inset fans are considered unlikely to contain buried archaeological sites because they were largely laid down unconformably on the erosional Pleistocene fanglomerate deposits. The preservation of archaeological material is wholly dependent on the erosional history prior to deposition of the inset pediment. Given the highly erosive nature of the fanglomerate piedmont in general, this type of localized subsurface preservation seems unlikely.

The final smaller inset fan (IF4) mapped at the western extent of the Calico Solar project area, inset between the relict alluvial flat and the Pisgah Lava appears much younger and more active than the other inset fans. The meandering channel that created the inset fan has been heavily affected by modern disturbance adjacent to it, and the construction of a culvert under Highway 40 which focuses numerous small upstream gullies into a single drainage. Profiles within a stabilized bank of the incising channel show that it has actively eroded the underlying paleosol (probably related to the relict alluvial flat) and redeposited it unconformably further downstream. The nature of the relatively high-energy unsorted gravelly alluvium upstream suggests that any artifacts on this surface may be the result of erosion and redeposition. As such, the IF4 inset fan is also considered to have very low potential for buried archaeological deposits (with no surface manifestation); though additional reworked artifacts, where they are evident on the surface, may be partially buried in a highly disturbed context within recent depositional units.

- **Relict Alluvial Flat** (Sensitivity: Very Low). The large area mapped as "relict alluvial flat," in the western portion of the project area, appears to be functionally related to the IF1 inset fan. As such, this area could also be considered an apron of the IF1 inset fan. However, alluvial flat is preferred here because it describes the properties of the geomorphic surface—a nearly level alluvial surface between the piedmont and axial stream of a semi-bolson—without assuming genesis from a single parent landform, and without inherent morphological assumptions.[7] As with other landforms, the term "relict" implies that the surface has been stable for a considerable time and, as such, has also been highly dissected.

  This landform can be distinguished from other relict landforms in the southern area by a nearly flat, low lying surface that is cut by numerous braided and anastomatizing channels/gullies. These channels are dominantly oriented in the same direction as the major axial channel (i.e. east–west) that crosses the project area. Between these small channels/gullies tend to be bars of intact desert pavement. Although no borings or test pits were advanced within the western portion of the relict alluvial flat, the geoarchaeological reconnaissance and an earlier geologic reconnaissance of the project area (URS 2008) – which mapped a surface

7 For example, a fan apron is generally assumed to consist of a thin mantle of relatively young alluvium that typically buries an older pedogenic soil (Peterson 1981:51).

clay unit at the western extent of the project area– suggest that the landform is underlain by the thick Pleistocene/Miocene clay. Soils in this area have well-developed subsurface horizons that are similar to those observed within the IF1 inset fan (see previous discussion).

The geomorphic evolution and interpretation of geoarchaeological sensitivity for the relict alluvial flat is considered similar to that of the IF1 inset fan. Given the well-formed pavement, upper pedogenic unit, and dissected nature of the relict flat, it appears that this area was dominated by a stable and subsequent erosional geomorphic regime for much of the Holocene. The potential for buried archaeological deposits within this area is considered very low.

- **Axial Channel** (Sensitivity: Very Low to Moderate). The "axial channel" represents the area occupied by the main drainage that bisects the Calico Solar semi-bolson, as well as component landforms related to the active channel. While the active channel is primarily an erosional structure, small depositional features such as alluvial flats, limited terraces, and fine overbank deposits are the result of deposition by the axial channel. In the absence of identified springs or fresh water sinks/lakes, the axial channel represents the largest and most reliable source of seasonal water within the Calico Solar project area. As such, this would have represented a very important resource to prehistoric populations in the project area. The only limited evidence for food processing (milling equipment) found during the cultural resources survey of Calico Solar is found in close proximity to this watercourse.

  Excavations were performed at TP050, near the interface of the lower fan piedmont apron and the axial channel zone. It is difficult to determine if the fine-grain alluvium at the surface of this location originates from the on-fan drainages or the axial channel, but appears that it may be related to an overbank deposit of the channel. The subsurface profile within TP050 is well-developed but unusual. The lack of pavement development at the surface is not consistent with the subsurface profile. An Av horizon has developed in the upper 3 to 5 cm, with a slightly consolidated loamy sand with gravel subsoil (ABw). This is followed by a zone of weak clay and carbonate accumulation (Btk) with observable rubification (ox). This overlies a second Btk-horizon with much stronger structure, distinct clay films on grains within peds, and carbonate accumulation completely surrounding larger gravels and cobbles (Stage II). This is underlain by an indurated carbonate layer (Bkm; Stage III+), as well as a Bk and Cox horizon not shown in Figure 18b.

  The existence of multiple B-horizons and gradual increase of carbonates to an indurated lamina is common in very old soils. However, the low carbonate accumulation and weak structure in the upper horizons (with such a well-developed lower profile) is unusual. A distinct lithologic contact is observable between the two Btk horizons with the upper dominated by fine-grain loamy sand and the lower dominated by coarse gravels and cobbles. While this may simply represent a facies shift during a single depositional event, the above observations suggest that the contact may also be pedogenic, with the lower Btk representing a truncated portion of a buried soil. In either case, the potential for intact buried archaeological deposits is low (i.e., either a buried surface is absent, or any archaeological deposits on that surface have likely been removed through subsequent erosion).

Test Pit 051 was placed in a similar geomorphic setting near the interface of the toe of a fan apron and the axial channel zone. The upper pedogenic unit is less well-developed than the preceding example, with an AB-Bw-Bwk-C profile, corresponding to a late Holocene age. This unit overlies a very old buried pedogenic unit with a Btk-Bkm-Km1-Km2-Bk-Ck-C profile. Again, a truncated erosional contact seems to be indicated.

No well preserved upper horizons of paleosols were observed in the subsurface explorations within the vicinity of the axial channel. However, multiple truncated paleosols were noted below relatively young fine-grain alluvial deposits. This suggests that there is the potential for low-energy burial of older land surfaces under significant amounts of recent alluvium (up to 2 meters) within the reach of the axial channel. The preservation of archeological deposits on these surfaces is entirely dependent on the erosional history prior to burial (in both of the test pits discussed here, it appears that significant erosion may have occurred prior to burial). Given these considerations, the geoarchaeological sensitivity of the axial channel is considered low within the current active channel/wash, but moderate on the small terraces and minor component landforms adjacent to the channel where, given the right geomorphic history, significant fine-grain low-energy alluvium *may* bury intact relict surfaces. The archaeological sensitivity of these limited areas is bolstered by the proximity to the only major seasonal watercourse identified within the study area.

Conclusions of the Geoarchaeological Investigation

The axial channel (and associated deposits), which cuts across the central portion of the study area and interfaces with fine-grain sediments from the toe of the alluvial fan piedmont, may represent the only geomorphic feature in the Calico Solar project area where buried archaeological deposits (with no surface manifestation) may reasonably be expected. While much smaller than the Mojave River drainage discussed by Sutton (1996), the same geomorphic processes that have buried sites along the Mojave River may be at play here, though on a much smaller scale. The fine-grain alluvial deposition along the margins of the axial channel—in the form of limited terrace deposits and alluvial flats—is functionally similar to that along the Mojave River, though large stratified alluvial terraces like those associated with the larger river, are clearly absent. As such, buried archaeological deposits, if present in this portion of the project area, will likely be aerially confined sites with a sparse deposit similar to surface sites in the Calico Solar study area, buried under up to two meters of very recent fine-grain alluvium. Given the likelihood that the course of the axial channel has meandered over its history, and scoured any existing land surfaces, the preservation of buried archaeological sites in this area will likely be greatly limited.

The vast majority of the northern alluvial fan piedmont is represented by a subsurface depositional environment that is too high-energy and coarse, with no observed paleosols, to preserve buried archaeological deposits. This lack of depositional sensitivity is coupled with an absence of economically viable lithic resources, which may largely explain the absence of surface sites on the fan piedmont. The high-energy erosional contacts between buried paleo-surfaces and overlying mantle deposits within the fan aprons, coupled with the lack of viable economic resources, largely precludes the presence of buried archaeological deposits within in this portion of the project area as well. Both the very old age and largely erosional nature of the major landforms in the southern section of the project area indicate that buried archaeological sites (with no surface manifestation) are very unlikely. It appears that the greatest potential for site burial in the southern portion of the Calico Solar project area is in those places where unconsolidated and active eolian sands have obscured alluvial landforms. However, these eolian features appear to be so limited that they are unlikely to obscure any significant portion of an archaeological site.

A secondary conclusion of this geoarchaeological study is that prehistoric site location within the Calico Solar Project study area seems to be largely dictated by the availability of raw lithic materials. The series of coalescing fans that make up the alluvial fan piedmont north of the railroad tracks have their source in the Cady Mountains. An examination of Dibblee's (2008) geologic map of the Cady Mountains, indicates that the dominant material present above these fans is granite to quartz monzonite (gqm), with more limited (and presumably more resistant) outcrops of basalt and andesite (Tb and Ta). This is confirmed by subsurface geoarchaeological investigations of the alluvial fans, which show that the majority of material present is coarse-grained granitic sands, gravels, and cobbles, with little utility for prehistoric tool making. On the other hand, the fanglomerate remnant alluvial fans—and inset alluvial fans, which generally are comprised of reworked fanglomerates—that make up the majority of the landforms south of the railroad tracks, have a much more variable parent material—including volcanics, metavolcanics, and silicates (jasper, etc.)—more conducive to prehistoric tool production.

C.3.4.4 CULTURAL SETTING

<u>Prehistoric Background</u>

The chronological sequence of the cultural complexes for the Mojave Desert initially proposed by Warren (1980, 1984) and Warren and Crabtree (1986), divides the prehistoric era into five temporal periods: Lake Mojave, Pinto, Gypsum, Saratoga Springs, and Shoshonean. The four earlier periods encompass what is called the Archaic Period of the Great Basin and, in the Saratoga Springs period, formative influences from the Southwest (Lyneis 1982), while the Shoshonean period includes the ethnographic era. Claims have been made for archaeological assemblages dating to periods earlier than Lake Mojave, but as Warren and Crabtree (1986) note, all are controversial and, even if valid, have little or no relationship to later cultural developments in the region.

The Mojave Desert sequence has recently been expanded by Sutton *et al.,* (2007) to include elements more closely aligned to prehistoric cultural complexes in the Central Mojave Desert. Similar to Warren and Crabtree (1986), Sutton *et al.,* (2007) notes little evidence of a "Pre-Clovis" occupation of the Mojave Desert during the Pleistocene, but does not discount the possibility of such evidence existing in the region. In contrast to the earlier sequence, Pleistocene era occupation is identified and termed the hypothetical "Pre-Clovis" and "Paleo-Indian" Complexes. Other elements of the Sutton *et al.,* (2007) Mojave Desert chronology for the Holocene period include the Lake Mojave complex, Pinto complex, Dead Man Lake complex, Gypsum complex, Rose Spring complex, and Late Prehistoric complex, as described below. As used herein, "climactic periods (*e.g.,* Early Holocene) [refers] to specific spans of calendric time and cultural complexes (*e.g.,* Lake Mojave Complex) to denote specific archaeological manifestations that existed during (and across) those periods" (Sutton *et al.,* 2007:233).

Additionally, Sutton *et al.,* (2007: Table 15.1 and 15.2) provide good summaries of major archaeological research conducted in the Mojave Desert since 1982. Due to the advent of cultural resource management projects, primarily on military bases and on federal land in the Mojave, more than 3 million acres have been surveyed with more than 20,000 sites identified in the last twenty-seven years. These include surveys at China Lake Naval Weapons Center, Edwards Air Force Base, Fort Irwin, Twenty-Nine Palms Marine Corps Center, and federal Bureau of Land Management Land (Basgall and Glambastiani 2000; Basgall 2004; Hall 1993; Warren 1991). In terms of excavation projects in the Mojave, work has been conducted on a wide range of site types, from Paleo-Indian sites to Late Prehistoric sites, several of which have provided radiocarbon dates that support the cultural chronology that has evolved with these more recent investigations (Sutton *et al.,* 2007: Table 15.3). The chronological sequence presented below is based on both the earlier and more recent archaeological survey and excavation projects in the Mojave.

Paleo-Indian Complex (10,000 to 8000 cal B.C.)

The Paleo-Indian Complex was an era of environmental transition between the late Pleistocene and early Holocene. The beginning of the Paleo-Indian Complex was characterized by increased rainfall and cooler temperatures, which formed deep lakes and marshes, even in the interior desert regions of California. As temperatures warmed at the start of the Holocene, glaciers slowly retreated, sea levels rose, and the interior lakes and marshes gradually evaporated over the millennia (Moratto 1984:78).

The earliest, clear evidence for human occupation of the Mojave Desert begins at about 12,000 years ago, while claims for earlier, pre-Holocene era occupations such as those made for the Calico Early Man site (Duvall and Venner 1979), Tule Springs (Harrington and Simpson 1961), Lake China (Davis 1978), and Lake Manix (Simpson 1958, 1960, 1961) remain unsubstantiated.

In 1926, a fluted point found in Folsom, New Mexico transformed the debate about the antiquity of the earliest inhabitants of the New World, pushing the date back to approximately 15,000 B.P. Since that time, many other sites containing this type of point have been identified throughout the United States. The Paleo-Indian Complex within the Mojave Desert is, thus far, represented exclusively by the Clovis Complex, though the relationship with the later Great Basin stemmed series points is also a consideration. The Paleo-Indian Complex experienced profound environmental changes, as cool, moist conditions of the terminal Wisconsin glacial age gave way to a warmer, drier climate of the Holocene (Spaulding 1990).

The China Lake site remains the only presumed occupation of the Paleo-Indian complex in the Mojave Desert for the late Pleistocene Period. China Lake is located near an ancient Pleistocene lake. Excavations at this site began in 1968 and lasted through the end of the 1970s (Moratto 1984:66-70). China Lake has a well-sealed stratigraphic context with prehistoric tools intermixed with the fossilized remains of extinct mammals. The tool sequence from the site suggests that China Lake was inhabited from as early as 9,200 cal. B.C. (Sutton *et al.,* 2007: 234). The earliest calibrated dates for China Lake are from habitation debris at the Pleistocene lakeshore that continued through 10,000 B.C., where Proto-Clovis and Clovis cultures were identified. Nearly all of the tools identified at this site were produced from obsidian and fine-grained cryptocrystalline silicates (cherts and jaspers).

One common theme among nearly all Paleo-Indian sites in North America is the tool assemblage: projectile points, hafted to the end of a spear and launched using a throwing tool (atlatl), made from fine-grained lithic material and fluted. Fluted points, defined as a component of the Clovis culture in California, have been found nearly throughout the entire state from coastal estuary environments to ancient Pleistocene lakeshores, which are now in desert areas. At least five sites near Cajon Pass have been identified containing fluted projectile points, suggesting an early occupation of approximately 12,000 BP, which corresponds to the "hypothetical Pre-Clovis" complex (pre-10,000 cal B.P) for San Bernardino County (Sutton *et al.,* 2007:236). In addition to fluted points, the Paleo-Indian tool assemblage was composed mainly of scrapers, burins, awls, and choppers, all used for the processing of animal remains and foodstuffs.

The late Pleistocene to early Holocene geological period of transition, approximately 14,000 to 8,000 BP, was a period of global climatic change and in the California interior, pluvial lakes formed from glacial melt (Roberts 1989). Some early researchers pose the theory of two different traditions relating to interior and coastal adaptation during this transition. Based on work in the Panamint Valley, Davis (1969) posited the theory of "Paleo-Desert," a geographic distinction from Paleo-Indian sites of the "Paleo-Coastal" tradition. In the Paleo-Desert geographic region, Paleo-Indian sites are generally located along the shorelines of these ancient pluvial lakes (Davis 1969). No sites dating to this period have been recorded to date in the project area of analysis.

Lake Mojave Complex (ca. 8000 – 6500 cal B.C.)

The temporal period 8000 to 6500 cal B.C. is referred to as the Altithermal Climatic Phase in which there was a dramatic shift towards a much warmer environment in the desert regions, and which appears to have witnessed a near hiatus in the occupation of the Mojave Desert. During this time it seems that people living in the desert regions migrated towards the coastal region. The change in the climate affected the distribution of floral and faunal communities and correspondingly people migrated toward the coast to exploit littoral resources. A small frequency of ground stone implements is present during this time, from which infers limited hard seed grinding activities (Sutton *et al.,* 2007:237). The high incidence of extra-local materials and marine shell is interpreted as wider spheres of interaction than witnessed previously. Sutton *et al.,* (2007: 237) interprets these and other data as indicators of "a forager-like strategy organized around relatively small social units."

Cultural materials dating from this Complex encompass the Playa cultures (Rogers 1939), the San Dieguito Complex (Warren 1967), and the Lake Mojave Complex (Warren and Crabtree 1986). This phase is considered ancestral to the Early Archaic cultures of the Pinto Complex, representing a shift toward a more diversified and generalized economy (Sutton 1996:228). The Lake Mojave assemblages, first identified at Lake Mojave (Campbell *et al.,* 1937), include Lake Mojave series projectile points (leaf-shaped, long stemmed points with narrow shoulders) and Silver Lake points (short bladed, stemmed point with distinct shoulders). Other diagnostic items include flaked stone crescents; abundant bifaces; and a variety of large, well-made scrapers, gravers, perforators, heavy core tools, and ground stone implements (Sutton *et al.,* 2007:234).

Millingstones generally occur in small numbers during this time. In the Mojave Desert and southern Great Basin, this assemblage is typically (but not exclusively) found around the margins of ancient lakes, although the role of the lakes in the overall adaptation remains unclear. According to Sutton (1996:229), Lake Mojave Complex sites occur more commonly in the eastern and central Mojave Desert, while rare occurrences have been noted within the western Mojave in the Lake China, Coso, and Owens Lake areas

The Lake Mojave cultural pattern seems to represent relatively small nomadic social units centered on foraging strategies with undefined hunting and lacustrine resource exploitation patterns. Studies conducted at Fort Irwin show a reliance on smaller taxa with less reliance on large game based on protein residue analysis; however, these data are contradictory to the cultural constituents recorded for this complex that suggest large game exploitation (Sutton *et al.,* 2007:237). There is an overlap in time between the Lake Mojave Complex and the Pinto Complex of approximately 1,000 years, in which continuity of technology occurs with a steady introduction of technologies referred to as the Pinto Complex. No sites dating to this period have been recorded to date in the project area of analysis.

The Pinto Complex (ca. 6500 – 4000 cal B.C.)

The Pinto Complex represents a broad continuity in the use of flaked stone technology, including less reliance on obsidian and cryptocrystalline silicates, as well as the prevalence of ground stone implements in the material culture (Sutton *et al.,* 2007:238), which distinguishes it from the Lake Mojave Complex. Climatic changes occur between the Early and Middle Holocene periods about 7500 B.P and 5000 B.P. appears to have been more arid across the Mojave region (S. Hall 1985; Spaulding 1991). It is during this time that woodland attained its approximate modern elevation range, and the modernization of desert scrub communities was completed with the migration of plant species such as creosote bush into the area (Byers and Broughton 2004). Warren (1984) sees this period as marking the beginning of cultural adaptation to the desert, as materials characteristic of the Pinto Complex gradually replace those of the preceding Lake Mojave Complex. Sites associated with this era are usually found in open settings, in relatively well-watered locales representing isolated oases of high productivity.

From the period 5000 B.C. to 3500 B.C., there was increased occupation of the desert regions during the Medithermal Climatic Period, a period of moister and cooler temperatures allowing for the intensive re-occupation of the desert region. In the desert region, the occupation is referred to as the Pinto Basin Complex. However, Sutton *et al.,* (2007:238) cite recent work conducted on Fort Irwin and Twenty-Nine Palms that produced radiocarbon dates as 6870 cal B.C., thus pushing the back the inception of the complex coincidental with the Lake Mojave Complex.

The Pinto Complex is marked by the appearance of Pinto series projectile points, characterized as thick, shouldered, expanding stem points with concave bases, as well as, bifacial and unifacial core tools, and an increase in millingstones. Pinto points were typically produced by percussion reduction, with limited pressure retouch. Named for the Pinto Basin site (Campbell and Campbell 1935), the points were presumably used on atlatl darts. Large numbers of such artifacts were also recovered from the Stahl site near Little Lake (Harrington 1957; Schroth 1994).

Major technological shifts for this Complex include a significant increase in the use of millingstones (Warren and Crabtree 1986; Sutton *et al.,* 2007:238)). Warren (1990) attributes the latter development to the exploitation of hard seeds, part of a process of subsistence diversification brought on by increased aridity and reduced ecosystem carrying capacity. Big game hunting probably continued as an important focus during this time, but the economic return of this activity likely decreased as mountain sheep and deer (artiodactyls) populations declined in response to increased aridity (Warren and Crabtree 1986). During this transitional period there is faunal evidence that indicates exploitation of rabbit, rodent, reptile, and freshwater mussel resources.

The majority of Pinto Complex archaeological sites have been found near pluvial lakes, adjacent to fossil stream channels, near springs, and in upland regions. Many of these sites contain substantial midden deposition and cultural debris, which indicates larger groups and prolonged occupation for this time period (Sutton *et al.,* 2007:238).

A new complex has been proposed by Sutton *et al.,* (2007) that appears to be a variation of the Pinto Complex: the Dead Man Lake Complex (7000-3000 cal. B.C.), based on archaeological findings from the Twenty-Nine Palms area. The primary variation between Pinto and the Dead Man Complex is the presence of small to medium sized contracting stemmed or lozenge shaped points, battered cobbles, bifaces, simple flaked tools, milling implements, and shell beads (Sutton *et al.,* 2007:239).

Based on the current archaeological data there appears to have been a gap between the Middle and Late Holocene period, since few sites have been found that date between 3000 and 2000 cal B.C. It is believed that climatic changes during this period resulted in hotter and drier conditions, which may have led to the abandonment this region for approximately 1,000 years (Sutton *et al.,* 2007:241).

No sites dating to this period have been recorded to date in the project area of analysis.

Gypsum Complex (ca. 2000 cal B.C. – cal A.D. 200)

Gradual amelioration of the climate began by around 5000 B.P, culminating in the Neoglaciation at about 3600 B.P., with a period of increased moisture dating to the latter part of the Middle Holocene (Spaulding 1995). This increase in moisture would have presumably resulted in favorable conditions in the desert, and may have influenced changes in cultural adaptations, including increasing population, trade, and social complexity (Sutton 1996: 232; Sutton *et al.,* 2007:241).

Gypsum Complex sites are characterized by medium to large stemmed and corner notched projectile points, including Elko series, Humboldt Concave Base, and Gypsum. In addition, rectangular-based knives, flake scrapers, occasional large scraper planes, choppers and hammerstones; handstones and milling tools become relatively commonplace and the mortar and pestle appear for the first time. One site with an Elko series projectile point was recorded in the project; no similar projectile points have been found in the project area of analysis.

This Complex is marked by population increases and broadening economic activities as technological adaptation to the desert environment evolved. Hunting continued to be an important subsistence focus, but the processing of plant foods took on greater importance as evidenced by an increase in the frequency and diversity of ground stone artifacts. Later, the bow and arrow were introduced, increasing hunting efficiency. Perhaps due to these new adaptive mechanisms, the increase in aridity during the late Gypsum Complex (after ca. 2500 B.P.) seems to have had relatively little consequence on the distribution and increase in human populations (Warren 1984; Warren and Crabtree 1986). In addition to open sites, the use of rock shelters appears to have increased at this time. Base camps with extensive midden development are a prominent site type in well-watered valleys and near concentrated subsistence resources (Warren and Crabtree 1986). Additionally, evidence of ritualistic behavior during this time exists through the presence of rock art, quartz crystals, and paint (Sutton *et al.,* 2007:241).

A shift in subsistence orientation and mobility near the end of the Gypsum Complex is suggested, with increased emphasis on the hunting of smaller mammals (Basgall *et al.,* 1986; Sutton 1996:234). Rock art suggests that the hunting of mountain sheep was important during the Gypsum Complex (Grant *et al.,* 1968); mountain sheep and deer, rabbits and hares, rodents, and reptiles remains are reported from Gypsum Complex sites in the central Mojave Desert (Hall and Basgall 1994). Evidence from the western Mojave Desert suggests that there was a major population increase ca. 3000 to 2300 B.P (Gilreath and Hildebrandt 1991; Sutton 1988).

Rose Spring Complex (ca. cal A.D. 200 – 1100)

The climate during the Rose Spring Complex remains relatively stable and consistent during the middle of the Late Holocene period. In the western Mojave Desert, some regions show an increase in lake stands, such as at Koehn Lake during this time (Sutton *et al.,* 2007:241). At the beginning of this period lakes were at high points; as the environment began to shift towards the end of this period, lakes began to desiccate and recede, which marked the end of the Rose Spring Complex around AD 1100.

The Rose Spring Complex is characterized by small projectile points, such as the Eastgate and Rose Spring series, stone knives, drills, pipes, bone awls, various milling implements, marine shell ornaments; the use of obsidian is prevalent during this time (Sutton *et. al.,* 2007:241). Smaller projectile points appear to mark the introduction of a bow and arrow technology and the decline of the atlatl and spear weaponry (Sutton 1996: 235). Sutton (1996: 235; 2007:241) notes that Rose Spring Complex sites are common in the Mojave Desert and are often found near springs, washes, and lakeshores.

Subsistence practices during the Rose Spring Complex appear to have shifted to the exploitation of medium and small game, including rabbits/hares and rodents, with a decreased emphasis on large game. At the Rose Spring archaeological site, numerous bedrock milling features, including mortar cups and slicks, are associated with rich midden deposits, indicating that milling of plant foods had become an important activity. In addition, evidence of permanent living structures are found during this time and include wickiups, pit houses, and other types of structures (Sutton *et al.,* 2007:241). In the eastern Mojave Desert, agricultural people appear to have been present, as Anasazi populations from Arizona controlled or influenced a large portion of the northeastern Mojave Desert by cal A.D. 700 (Sutton *et al.,* 2007:242).

No sites dating to this period have been recorded to date in the project area of analysis.

Late Prehistoric Complexes (cal A.D. 1100–Contact)

Paleoenvironmental studies conducted within the western Mojave Desert point to increased effective moisture beginning just after 2000 B.P., as evidenced by a shoreline bench feature at Koehn Lake (Sutton 1996:238). The Koehn Lake site appears to have been abandoned by 1,000 years ago, as Koehn Lake desiccated during a major "medieval drought." This drought may have influenced the movement of people from this area north and east across the Great Basin (Sutton 1996:239). Population began to decrease, due in part to a drier climate, and later as a result of European contact.

Characteristic artifacts of this Complex include Desert series projectile points (Desert Side-notched and Cottonwood Triangular), Brownware ceramics, Lower Colorado Buff Ware, unshaped handstones and millingstones, incised stones, mortars, pestles, and shell beads (Warren and Crabtree 1986). The faunal assemblages typically contain deer, rabbits/hares, reptile, and rodents. The use of obsidian dropped off during this time with the increased use of cryptocrystalline silicates.

Between 1,000 and 750 years ago, ethnic and linguistic patterns within the Mojave Desert increased in complexity. One of the most important regional developments during the Late Prehistoric Period was the apparent expansion of Numic-speakers (Shoshonean groups) throughout most of the Great Basin. Many researchers accept the idea that sometime around A.D. 1,000, the Numa spread eastward from a homeland in the southwestern Great Basin, possibly from Death Valley (Lamb 1958) or Owens Valley (Bettinger and Baumhoff 1982). While there is little dispute that the Numic spread occurred, there is much disagreement over its mechanics and timing (see Madsen and Rhode 1995).

The Late Prehistoric Complexes mark the first recorded historical documentation of Native American inhabitants at European contact. The ethnohistoric record provides valuable data for understanding Late Prehistoric archaeology. The Late Prehistoric Complexes reveal a significantly different suite of material culture than that seen in earlier Complex assemblages. Manos and millingstones became more frequent, as did mortar and pestles. In addition, bow and arrow technology with the use of Desert Side-notched and Cottonwood points, both emerge during the Late Prehistoric Complexes. Large occupation sites, representing semi-permanent and permanent villages, emerge during this time as well.

During this time the first locally produced pottery is seen in the Mojave Desert Region, likely coming from the Anasazi in the southwest. Also, smaller projectile points, Cottonwood and later Desert Side- Notched points were introduced to use with bow and arrow technology. Plant food processing is indicated by the presence of manos and metates.

Ethnographic Background

Prehistorically, there was a large movement of people across the Mojave Desert and ethnographically several groups are associated with the Project area of analysis and surrounding Mojave Desert region. The Kawaiisu, Kitanemuk, Southern Piute, Serrano, Chemhuevi, Tabtulabal, and Panamint occupied the Mojave Desert region, north, south, west, and east of the Project. In this region there were four major linguistic groups originating from northern Uto-Aztecan groups; Tubatulabalic, Hopic, Numic, and Takic (Sutton *et al.,* 2007:243). The Mojave River appears to have been a major boundary between Takic and Numic speaking groups during prehistoric times. Groups occupying the Central Mojave Desert were of the Takic and Numic linguistic groups. Takic speaking groups originated in the southwestern Mojave Desert, expanding south and east sometime around 500 cal. B.P, and include the Serrano and Kitanemuk (Sutton *et al.,* 2007:243). At time of contact, groups south of the Mojave River and much of southern California were part of the Takic linguistic group. The groups north and east of the Project were of the Numic linguistic group, which included the Kawaiisu, Chemhuevi, and Southern Piute.

During the ethnographic period, the Serrano, Vanyume (Beñeme) and the Chemehuevi occupied the region in which the Project is located. The Vanyume were a small division of the Serrano, about whom little ethnographic information is known. The Chemehuevi entered the Mojave Desert much later in time. Other groups that could have entered the Project area were the Kawaiisu, the Kitanemuk, the Southern Piute, the Mohave, and the Ancestral Pueblo. Eerkens (1999:301) states that the area around Fort Irwin, northeast of the Project Site, was inhabited by the Kawaiisu, Chemehuevi, Las Vegas Paiute, and the Vanyume, although he acknowledges that all groups in the area maintained flexible settlement patterns based on availability of resources (1999:302). The Project area of analysis and surrounding valleys were not conducive for large scale inhabitation based on the fluctuating environmental conditions and overall arid nature of the region; therefore groups occupying/utilizing the area would have been small and nomadic (Zigmond 1986:398).

Serrano. The Project area of analysis is situated within the traditional boundaries associated with Mission San Gabriel during the Spanish Period (1769–1821) (Bean and Vane 1979). The natives in this area were known as the Yucaipaiem clan of the Serrano (Altschul, Rose and Lerch 1984; Kroeber 1925; Strong 1929; Bean and Smith 1978). They spoke a language that falls within the Takic family of the Uto-Aztecan language group. This language family is extremely large and includes the Shoshonean groups of the Great Basin. Due to the proximity of the Serrano and Gabrieliño bands in the area and their linguistic similarities, ethnographers have suggested that these two bands shared the same ethnic origins (Kroeber 1925; Bean and Smith 1978). For this reason, they will be referred to as the Serrano.

According to Kroeber (1976:611), the Serrano comprised five groups or bands: Kitanemuk, Alliklik, Vanyume, Kawaiisu and Serrano. They inhabited lands from the San Bernardino Mountains, part of the Transverse Mountains east of the Cajon Pass, across the Mojave Desert east as far as Twenty-Nine Palms, and from the Tehachapi Mountains to the northern Colorado Desert. They occupied most of modern day San Bernardino County (Bean and Smith 1978). Relatives of the Serrano included the

Gabrieliño and Luiseño to the west at the Pacific Coast, and the Cahuilla inhabiting the Colorado Desert. For much of the Late Prehistoric Complex, the Serrano band of the much larger Serrano tribe were the likely inhabitants of the western Mojave Desert, what is today the Cajon Pass and Barstow area. Most of what is known about the Serrano has been based upon the work done by Hicks (1958) and by later researchers working on a site known as CA-SBR-1000, located near Yucaipa, San Bernardino County, California. Studies indicate that the village had been occupied for thousands of years and that it was a major trading center both prehistorically and historically. Little is known about early Serrano social organization because the band was not studied until the 1920s (Kroeber 1925) and enculturation had seriously compromised their native lifeway. Kroeber (1925) indicates that the Serrano were a hierarchically ordered society with a chief who oversaw social and political interactions both within their own culture and with other groups. The Serrano had multiple villages ranging from seasonal satellite villages to larger, more permanent villages.

Resource exploitation was focused on village-centered territories and ranged from gathering and hunting with occasional fishing. The primary staple varied depending on locality. Acorns and piñon nuts were gathered by groups in the foothills; honey mesquite, piñon nuts, yucca roots, mesquite, and cacti fruits were gathered by groups in or near the desert (Bean and Smith 1978). Hunting activities consisted of deer, mountain sheep, antelope, rabbits, other small rodents, birds, with the most desired game bird quail (Bean and Smith 1978).

Serrano structures were situated near water sources and consisted of large, circular thatched and domed structures of willow and covered with tule thatching. These living structures were often sufficient to house a large family. In addition to the living structure, a ramada, an open air structure for outdoor cooking, was located adjacent to the home (Benedict 1924; Kroeber 1925; Drucker 1937; Bean and Smith 1978). A large ceremonial structure was often present and was used as the religious center where the lineage leader resided. Additional structures, such as granaries for food storage and sweathouses for ritual activities, were often located adjacent to pools or streams (Strong 1929; Bean 1962-1972; Bean and Smith 1978).

The Serrano, like the neighboring groups, were primarily semi-nomadic, hunter-gatherers. Because of their inland location, Serrano society was left relatively intact during the period of initial Spanish colonialization, unlike the Gabrielino, who inhabited the coastal area. In 1772, Spanish explorer Pedro Fagès traveled through the Cajon Pass to the Mojave Desert in an attempt to identify the native groups in this region. Fages' ultimate goal was to place the Serrano under supervision of a mission. By 1819, the Serrano were relocated to the Estancia of the Mission San Gabriel in Redlands (Bean and Smith 1978:573). At the time of relocation, there were likely on the order of 3,500 Serrano inhabiting the Mojave Basin. Between 1840 and 1860 a smallpox epidemic decimated the population. By 1885, there were only "390 Serranos [sic] remaining in all of southern California" (AccessGenealogy.com 2005) and the census of 1910 recorded only 100 Serrano (Kroeber 1976:616).

Vanyume (Beñeme). Limited information is available on the Vanyume during the historic period. What information exists describes the Vanyume as a small division of the Serrano living in the Mojave Desert, north of Serrano territory. They were referred to as the "Serrano of the Mohave River" (Kroeber 1925:614). The name Vanyume is a Mohave word; the name Beñeme was given to the entire Serrano cultural group by Father Garcés. The Vanyume spoke a Takic language related to the Kitanemuk to the west and the Serrano to the South. Kroeber reported that the Vanyume were occasionally friendly with the Mohave and Chemehuevi, but hostile to the Serrano (Kroeber 1925:614). Kroeber also stated that the population of the Vanyume was very small at the time of historic contact. The "chief" of the Vanyume reportedly lived in one of the villages at the upper reaches of the Mojave River near Victorville. The Vanyume were hunters and gatherers, and shell beads and millingstones were known to have been used. The Vanyume are generally associated with similar life ways as the Serrano to the south (Yohe II and Sutton 1991).

Chemehuevi. The Chemehuevi were a band of the Southern Paiute that possibly entered the eastern Mojave Desert area from the north in fairly recent prehistoric times. The Chemehuevi, also called the Pah-Utes, were closely related to the Southern Paiute in Death Valley and the Southern Nevada region. At the time of ethnographic contact, the Chemehuevi claimed a large portion of the eastern and central Mojave Desert, perhaps as far west as Afton Canyon on the Mojave River (Kelly and Fowler 1986:368). Although the Chemehuevi territory boundaries are unclear, it is certain that they inhabited the Providence Mountains. Based on archaeological data, the Chemehuevi entered the Mojave Desert sometime in the 17th century (Yohe II and Sutton 1991).

The Chemehuevi were strongly influenced by the Mohave. It is possible that they displaced the Desert Mohave, a Yuman speaking group (Kelly and Fowler 1986:368). Many Chemehuevi words are related to Mohave vocabulary, along with agricultural practices, house construction, warfare, and other cultural elements such as religious practices. Like the Mohave, the Chemehuevi used square metates, paddle and anvil pottery techniques, and hair dye (Kelly and Fowler 1986:369). In addition to their close association with the Mohave, the Chemehuevi traded widely with the Shoshone, Kawaiisu, Serrano, Vanyume, Cahuilla, and Diegueno (Kelly and Fowler 1986:369).

Influence from the Pueblo area to the east is seen in the form of agricultural practices of many of the Southern Paiute groups. The Chemehuevi, in more well watered areas and flood plains, grew yellow maize, gourds, beans, and winter wheat, combining Mohave and Pueblo practices (Kelly and Fowler 1986:371). Kroeber reported that the Chemehuevi occasionally farmed small areas of corn, beans, melon and pumpkins and wheat. In more arid areas the Chemehuevi were hunter-gatherers. They hunted large game, such as deer and mountain sheep, along with rabbits, rodents, lizards, and other small game (Kroeber 1925:597). Plant foods were of great importance and included a variety of grass seeds, pinyon, and mescal (yucca).

The Chemehuevi had a large range associated with seasonal food practices and traveled through most of the Mojave Desert as far as the Tehachapi area and the San Bernardino Mountains. Occasionally they traveled to the Pacific coast to collect haliotis shells (Kelly and Fowler 1986:377). It was also reported that they would travel as far east as the Hopi's territory, about a two month round trip (Kelly and Fowler 1986:377).

Little is known about the Chemehuevi material culture. However, in historic times they used basketry, primarily willow, to a great extent both for storage and for carrying possessions (Kroeber 1925:97). They also made basketry hats. The Chemehuevi used some pottery but relied more on basketry.

Spanish colonization had little effect on the Chemehuevi until the early 1800s. Although other Southern Paiute groups were enculturated earlier by the Spanish, the Chemehuevi's isolated territory protected from being assimilated into the mission system. With the opening of the Old Spanish Trail, the Chemehuevi became more affected by the Spanish, and were brought to the missions to work (Kelly and Fowler 1986:386).

In 1874, the United States government established the Colorado River Reservation in an effort to move the remaining Chemehuevi onto the reservation. However, the reservation was shared with the Mohave band, with whom the Chemehuevi had differences from 1865 to 1871, the Chemehuevi were at war with the Mohave. They were therefore, reluctant to move to the reservation (Kelly and Fowler 1986:388). Some of them were either forced to move to the reservation, while some of them would not move. Many stayed in their historic locations, finding work on farms and ranches and in mines. In 1901, the Chemehuevi received their own reservation in the Chemehuevi Valley.

Other Native American Groups Associated With the Region. In addition to those groups affiliated with the Project area, many other groups occupied and utilized the Mojave Desert in a variety of ways. For example, it appears that the Anasazi of southern Nevada greatly influenced the cultures within the region. By 1450 B.P., the Anasazi were exploiting turquoise deposits at Halloran Springs, approximately 25 miles northeast of the Calico Solar project area of analysis. The Anasazi Pueblo was 150 miles across the desert; therefore Anasazi miners must have spent a considerable amount of time in the area based on the amount of turquoise mined and the abundance of "Basketmaker III" pottery found near the springs (Fagan 2003: 310). Turquoise was mined up to twelve feet below the ground and for centuries Mojave turquoise was traded to the east of its source, throughout the Southwest; however, it does not appear that turquoise was traded to the west as evidence of it does not appear in the material cultural of California tribes.

About 1450 B.P., the use of bow and arrow technology spread throughout California's eastern deserts, eventually becoming the dominant hunting technology throughout California. The bow and arrow has many advantages over spears and atlatls and made hunting much more efficient. Bow and arrow technology could have been introduced to California by the Anasazi or by another Great Basin group, during this time. In addition, by 1200 B.P., buff, gray, and brownware pottery, made by Ancestral Pueblo groups and other surrounding tribes of the Lower Colorado River region, entered the Mojave Desert. The trade of technology along with items such as sea shells and steatite objects probably took place along the Mojave Trail (Fagan 2003:311) (Figure 2.8-1). Bow and arrow technology is appropriate, however, only if larger animals that can be hunted that way are available for the taking. Such game was usually unavailable in the valley of the project, but would have been more useful in the project area of analysis as there were larger game in the Cady Mountains and around the pluvial lakes or short term water holes in the old lake beds.

Other tribes in the region include the Mohave. The Mohave lived along both the east and west banks of the Colorado River. During the winter, they inhabited semi-subterranean houses and depended upon maize agriculture for subsistence (Kroeber 1902; 1925). Throughout the rest of the year they were a hunting and gathering group, often traveling west far into the Mojave Desert. The Mohave traveled throughout southern California and northern Arizona utilizing a large network of trails (King and Casebier 1976:281). Two major geographical features influenced the Mohave's trade routes: the location of their villages along the Colorado River, and the waterless portions of the desert, also known as the Mojave Sink or Mojave Trough. Two major trade routes were used which started at villages along the Colorado River. The first route was the Pah-Ute Creek to Soda Springs route, which later became known as the Mojave Road wagon train. The other route ran south of the Mojave Road route through Poshay Pass and the Mojave River flood plain to the southeast corner of Soda Lake. The more northern route, the Mojave Road, was more heavily used, both prehistorically and in more recent historic times by Native Americans and European and American settlers alike (King and Casebier 1976:282).

Although the Mohave lived southeast of the project area, they potentially exercised a great amount of influence over the Mojave Desert region. They were skilled traders and traveled long distances to either fight or trade with other groups (Fagan 2003:297). Their movement across the southwest promoted the spread of new technologies, beliefs and ideas throughout the desert and southwestern regions. These Mojave transhumant patterns may have may have facilitated the knowledge, introduction, and sharing of arid lands water management techniques in the form of fields of rock piles to the project area of analysis and the broader desert region.

Regional Historic Context

Spanish Period (1540 to 1821)

The Spanish had explored much of the California coast and San Francisco and Monterrey bays by 1769, but paid little attention to the California interior. Several factors were detrimental to European exploration in the Project area: travel and communication were slow; there were few roads, trails and maps; and no supply stations existed in California's interior deserts (King and Casebier 1976).

Between 1775 and 1776, Father Francisco Garcés, a Franciscan missionary originally stationed near present-day Tucson, Arizona, explored the Mojave Desert as part of Spain's effort to forge an overland route to its settlements in Alta California. Garcés traveled with the 1775 Anza expedition until it crossed the Colorado River near present-day Yuma, Arizona (King and Casebier 1976:283). Garcés left the expedition at the Colorado River crossing and traveled north to the Mohave Villages near present-day Needles, California, while Anza continued west. Garces, in the company of Mohave guides, proceeded west to Mission San Gabriel in Los Angeles along the Mohave Trail, in the approximate location of the Mojave Road wagon route. The corridors of the Mojave Trail and the later Mojave Road are approximately 15 miles north of the Burlington Northern Santa Fe Railroad, north of the Cady Mountains near I-15. On his return trip he visited several Mohave villages on the banks of the Colorado River. The journal Garcés kept during this expedition is the earliest written record of the eastern Mojave Desert (King and Casebier 1976; Robinson 2005). Spanish contact with the Mohave and Colorado Desert peoples likely came from both the east and west during this time (Vane and Bean 1994:1-8), as evidenced by the Anza/Garces expeditions, as well as known contacts made on the California coast.

The closest Spanish mission, Mission San Gabriel in Los Angeles, was too far away to have an every day effect on the Native Americans in the Mojave Desert. Native Americans who fled the missions often escaped into the Mojave Desert and exposed the Mohave tribe to Spanish influences, including the use of horses, which led to raids on the missions and horse thievery. In 1819, Lieutenant Gabriel Moraga led an expedition of fifty soldiers into the Mojave Desert in an attempt to retrieve stolen horses, to exact revenge against the Mohave for their raids on the coastal Spanish settlements, and for their ability to spread unrest against the Spanish and other Native American groups (King and Casebier 1976:284). Moraga's expedition was only the second Spanish-sponsored trip into the Mojave Desert. Lack of water in the arid Mojave Desert forced Moraga and his soldiers to turn back.

During the Spanish period, no permanent European settlements were established in the project vicinity, although there were reports that the Spanish had active mines in the Barstow area. It is unknown if the mines were being worked by the Spanish, Native Americans, or later Mexican or American prospectors because only mine shafts remained and no written records have been discovered (King and Casebier 1976:300).

Mexican Period (1821 to 1848)

In 1810, an independence movement began as many rancheros sought to split Mexico (and California) from Spain. In 1821, this desire came to fruition when New Spain (Mexico) became independent. Following Mexico's independence, the Alta and Baja California missions received less financial support from Spain and Mexico, and ultimately, independence from Spain was a catalyst for Mexico to secularize all California missions. Secularization would free vast amounts of land that had been under mission control and the land would become civilian pueblos or large land grants awarded to Mexican, American, or European settlers. In 1831, Governor Jose Maria Echeandia announced the secularization of a number of missions, and by 1834, all the missions were secularized, including Mission San Gabriel in Los Angeles, the nearest mission to the Project. Within ten years, the mission system had failed, the neophytes had left, and the buildings were in disrepair. Following secularization, San Gabriel mission became a parish for the City of San Gabriel and had little further effect on the Native Americans in the Project vicinity (Rolle 2003).

During Mexican control of Alta California, Americans started to enter California through the Mojave Desert, many of them using the Mojave Trail located north of the Project Area. Jedediah Smith, mountain man and fur trapper, was the first American to reach California using an overland route. Smith followed a route from the Great Salt Lake in Utah south to the Virgin and Colorado rivers and across the Mojave Desert to Spanish southern California. Smith arrived at the Mohave Villages in October 1826, then proceeded west on the Mojave Trail. After Smith's initial visit other American mountain men and trappers ventured into the desert, including William Wolfskill, George C. Yount, Christopher "Kit" Carson, James Ohio Pattie, and Ewing Young (Brooks and others 1981; King and Casebier 1976:285; Robinson 2005).

Jedediah Smith's ventures down the Virgin and Colorado rivers, combined with Garcés' route across the Mojave Desert, linked the Spanish settlements in New Mexico and California, stimulating trade between these regions (Wright 1982). In 1829, New Mexico merchant Antonio Armijo reached the Las Vegas Valley via the Virgin River, pioneering a route that became known as the Old Spanish Trail. Armijo's route followed the Mojave Trail in the project vicinity, but later routes of the Old Spanish Trail turned southwest out of Utah and headed toward the Mojave River through the San Bernardino Mountains. This route became known as the Northern Route of the Old Spanish Trail. The Mohave Indians had become increasingly hostile to travelers through their territories, and blazers of the northern route most likely took this path to avoid conflicts. The junction of the Northern Route of the Old Spanish Trail and the Mojave Trail was approximately 18 miles east of present-day Barstow, at a location historically called Fork of the Roads, northwest of the project area. Trade along the trail ended in 1848 with the Mexican-American War (Nystrom 2003; Robinson 2005; Rogge 2008).

No Mexican period artifacts have been found thus far in the project area of analysis.

American Period (1848 to Present)

Transportation

Mojave Road. The term "Manifest Destiny" was one of the likely causes for the Mexican-American War, which took place between 1846 and 1848. Jacksonian Democrats coined the phrase in the 1840s as a political philosophy whereby the United States would control all of the land between the Atlantic and Pacific oceans. The focus for expansion was on the northwest coast in Oregon territory and on the Texas territory. In 1845, during the Presidency of James K. Polk, the United States annexed Texas; the following year, the U.S. invaded Mexico. In 1848, the United States, victorious over the Mexican Army, signed the Treaty of Guadalupe Hidalgo, and acquired all Mexican territory north and west of the Rio Grande and Gila Rivers, which included Texas, New Mexico territory, and Alta California. American settlers began to migrate to the newly acquired territory, and the discovery of gold in 1848 and the ensuing Gold Rush in 1849 brought numerous settlers to California. Most of these travelers likely used the northern route of the Old Spanish Trail to enter California from New Mexico, Utah, and Nevada, although some likely followed the Mojave Trail as well (Robinson 2005).

Soon after California was granted statehood in 1850, the government wanted to recognize all of the trails running through California to promote immigration to the state, facilitate trade and communication, and develop routes of defense. A year after the Treaty of Guadalupe Hidalgo was signed, Lieutenant James H. Simpson of the Army Corps Topographical Engineers attempted to follow Father Graces' direct route across the Mojave Desert (Mohave Trail), and in 1851, the U.S. Army Corps of Engineers sent another expedition to explore the area. During the 1840s and 1850s, the Union Pacific Railroad also contemplated using Gracés' route in an attempt to find the most practical course for a railroad line across the desert. Several explorers, hired by railroad companies, traveled throughout the Mojave Desert during the 1840s and 1850s. Eventually, a more northern route was selected for the transcontinental railroad line. In the late 1850s the General Land Office in California began the process of mapping the Mojave Desert area, and at that time several groups of surveyors mapped the desert (King and Casebier 1976:288-289).

Beale's Wagon Road was built in 1857 north of the Calico Solar Project area of analysis, along the 35th Parallel, and was in use between 1857 and 1861. Edward Fitzgerald Beale was a famous American Frontiersmen and was superintendent of the wagon road development. Beale, along with his party and 25 camels, crossed the Colorado River into California 15 miles north of present-day Needles, California, and followed the Mojave Trail west. In 1859, the U.S. Army established Fort Mojave near the location of Beale's river crossing in an effort to protect travelers from Mohave Indian attacks. As a result, the Mojave Trail developed into a wagon road, which allowed supplies to be brought to Fort Mojave overland from Los Angeles. The wagon road was called the Mojave Road or the Government Road and was actively used until the beginning of the Civil War in 1861.

During the Civil War, troops stationed at Fort Mojave were ordered to abandon the fort and report for duty in Los Angeles. The fort remained abandoned until the middle of 1863, when California Volunteers occupied it to protect travelers on the Mojave Road. Traffic had increased along the road as a result of gold discoveries about 100 miles south of Fort Mohave in the La Paz Mining District. Other travelers along the Mojave Road in the 1860s were members of the military on their way to Arizona to fight in the Apache Wars or merchants and ranchers hauling supplies and livestock to Prescott, the capital of the Arizona Territory. The Mojave Road also was used as a mail route between 1866 and 1868 (King and Casebier 1976; Nystrom 2003; Robinson 2005).

Although there was considerable traffic through the Mojave Desert into Southern California, most followed the Old Spanish Trail to the west of the Project area of analysis or the Mojave Road to the north, and any settlements associated with these routes would have been located adjacent to the trails. Except for miners, most other settlers did not stay in the desert until a railroad was constructed. Only a few early homestead claims were filed. These early homesteads consisted mainly of ranches raising sheep and cattle. The arid environment prohibited large scale agriculture except on the banks of the Mojave or Colorado Rivers (Walthall and Keeling 1986).

Atlantic & Pacific Railroad. Plans for a transcontinental railroad had been delayed due to the Civil War, but once the war ended, interest in the construction of transcontinental railroads resumed. In 1866, Congress contracted the Atlanta & Pacific Railroad (A&P) to construct a railway from the east to the California border. In 1879, the A&P partnered with the St. Louis & San Francisco Railroad and the Atchison, Topeka, & Santa Fe Railroad to facilitate construction of the transcontinental railroad. The A&P began construction of their track in Albuquerque, New Mexico in 1880 and reached Needles, California in May 1883. The A&P constructed a bridge over the Colorado River at Needles in August 1883 (Gustafson and Serpico 1992; Myrick 1992; Robinson 2005).

As the A&P tracks were being laid, the Southern Pacific Railroad was constructing a new railroad line between Mojave and Needles to intercept the A&P tracks at the Arizona border and protect its California interests. The Southern Pacific constructed the Mojave to Needles branch between 1882 and 1883, working east from their Mojave station (Gustafson and Serpico 1992; Myrick 1992). When surveyors initially explored the project vicinity for a viable railroad route, they assessed the Mojave Road corridor, and found that the terrain was too steep and unsuitable for railroad construction. In the arid Mojave, the trail through the mountain range was preferred to the flatter terrain because more sources of water could be found in the mountainous areas. In 1868, General William J. Palmer of the Union Pacific Railroad eastern division surveyed a railroad route to the south of the Cady Mountains, where the terrain was more favorable for railroad construction. Although the Union Pacific never constructed the railroad through the Mojave Desert, it was largely Palmer's route that the Southern Pacific used to construct the Mojave to Needles branch (Nystrom 2003; Robinson 2005).

For more than a year, the A&P and the Southern Pacific lines continued to operate independently. The Southern Pacific Railroad instituted tri-weekly service to Needles in 1883, but the trip through the Mojave Desert was long and desolate. The railroad had constructed only one station and turntable in the 124-mile stretch between Mojave and Ludlow. The Southern Pacific Railroad was reluctant to join rails with the A&P fearing that the completed line would compete with their newly constructed Sunset Route, which crossed into California further south on the Arizona border at Yuma. Passengers heading east on the Southern Pacific Railroad's line to Needles were inconveniently required to disembark from the train with their belongings and transfer to the A&P cars. Although each of the railroads developed local business, the volume of passenger travel was not large enough to support operations. The Southern Pacific Railroad's route through the Mojave Desert did facilitate mining operations in the area. Anticipating large future revenues from hauling bulk ore, the railroad provided water for miners at 2 cents per gallon anywhere on the route, putting an end to the water scarcity problem for mine development in the area (Myrick 1992).

By the end of 1883, the A&P began making plans to construct their own line parallel to the Southern Pacific's line across the Mojave Desert to San Francisco. The Southern Pacific Railroad realized that if the A&P constructed a parallel line across the desolate Mojave Desert, its line would essentially become useless. In October 1884, an agreement was signed in which the Southern Pacific Railroad would sell its Needles to Mojave section to the A&P for $30,000 per mile. Until the debt was paid, the A&P would lease the line. In addition, the A&P also received an option for trackage rights between Mojave and San Francisco. The A&P received full title to the Mojave to Needles branch in 1911 (Gustafson and Serpico 1992; Myrick 1992). The construction of the railroad changed the course of travel across the Mojave Desert in the project vicinity. The railroad provided travelers with water sources across the vast desert and travel was much easier along the flat railroad corridor than along the mountainous Mojave Road to the north. A wagon road was constructed adjacent to the railroad alignment and use of the Mojave Road decreased.

The California Southern Railroad joined with the A&P in 1885 to provide service from Kansas City to San Diego. The junction of the two lines was initially called Waterman Junction, but in 1886 it was renamed Barstow. Barstow is located approximately 40 miles west of the project area of analysis and is the closest city. The construction of the railroad brought numerous settlers to the area and although other railroad lines were eventually constructed throughout southern California, the route passing through Barstow remained a popular line for both freight and passenger service. In addition, the railroad acted as a lifeline connecting Barstow, alone in the desert, to the rest of Southern California. Barstow was a sizable railroad hub, and the railroad was the main employer in the city for many years.

In 1897, the A&P was redesignated as the Santa Fe Pacific Railroad and later became the Atchison, Topeka, & Santa Fe Railroad. When the A&P took over the Mojave to Needles branch in 1884, there were depots at Daggett, Fenner, and Needles (Figure 2.8-1). During the 1880s, 1890s, and the first decade of the twentieth century, Santa Fe Pacific constructed facilities at various locations along the line. All of the structures were wood frame, with the exception of brick and reinforced concrete structures in Needles. Santa Fe Pacific railroad sidings in the project vicinity include Troy, Hector, Pisgah, and Lavic. The Hector siding is the closest to the Calico Solar Project area of analysis. Neither the Pisgah or Troy sidings had any depot facilities. The building of the grade for the laying of the track through the Calico Solar Project area of analysis may, however, have contributed to the burying of any cultural resources that were beneath, or immediately north of the track in its present location. Hector had a 12-by-14-foot wood frame telegraph and train-order office that was constructed in 1906, which was closed in 1923 and moved to Earp in 1934. The Lavic siding was the largest of the four with a 24-by-34-foot frame combination passenger and freight depot that was constructed in 1901. The depot was closed in 1923 and removed (Gustafson and Serpico 1992; Myrick 1992).

The lack of water along the Mojave to Needles branch required the railroad to haul water in large tanks to the stations and construction camps. In 1897, a station was constructed at Newberry Springs, approximately 6 miles west of Troy, and this station became the railroad’s primary source of water in the region. Although freight trains typically carried surplus water cars, engineers often had to go back to Newberry Springs for additional water supply (Gustafson and Serpico 1992; Myrick 1992).

The A&P Railroad/Santa Fe Pacific Railroad/Atchison, Topeka & Santa Fe Railroad is located between the Calico Solar Project Phase 1 and Phase 2 of the project area. The railroad is now operated as the Burlington Northern Santa Fe Railway.

National Old Trails Road and U.S. Route 66. Prior to the construction of the railroad between Needles and Barstow in 1883, travel across the Mojave Desert in the project vicinity was limited to the Mojave Road corridor, which evolved from a network of prehistoric trails, early trails developed by mountain men, early explorers, and gold seekers; and routes developed during the railroad surveys of the 1850s. After the railroad was completed, the travel corridor shifted south of the Cady Mountains, new roads were constructed between local mines and railroad sidings, and a wagon road was constructed adjacent to the railroad tracks from Barstow to the Arizona border (Hatheway 2001). In the first decade of the 1900s, this wagon road would be converted to an auto route, as the use and ownership of the automobile became more prevalent.

The automobile first made its appearance to the American public in the late 1890s, and by 1900 automobiles were still the toys of the wealthy, with only one for every one thousand Americans. Although Henry Ford introduced his Model T in 1907, widespread use of the automobile did not occur until after World War I. In 1914, Ford perfected full assembly line production and two years later more than half a million automobiles were sold. As the use of the automobile rose, the demand for good roads increased. Most rural roads in the 1900s had been constructed for wagon traffic and were not suited to automobile traffic (Fischer and Carroll 1988; Keane and Bruder 2004; Lyman 1999; Paxson 1946).

By 1910, national and local organizations promoted good roads in the United States, including the National Old Trails Road in the project area of analysis. A precursor to U.S. Route 66, in spirit but not always in location, the National Old Trails Road was part of the 2,448-mile ocean-to-ocean highway from Baltimore, Maryland to the California coast. The National Old Trails Road also was part of the National Auto Trail System, an informal network of automobile routes marked by local organizations in the early twentieth century. The National Old Trails Road, where it traverses the Project area of analysis, was located along and in the vicinity of the alignment of the old wagon road that was constructed adjacent to the Santa Fe Railroad tracks in the 1880s. The highway was designated by booster organizations in 1912, and by 1914 the Auto Club of Southern California had provided signage for much of the highway (Keane and Bruder 2004; Robinson 2005; Wikipedia contributors 2008).

In 1916, the Federal Highway Aid Act was passed to help fund rural roads, using a 50/50 funding match for states with a highway department. Route planning, however, remained a local matter, which usually did not include engineering surveys. In 1919, Congress liberalized the funding match requirements, and by late 1921, Congress passed the Federal Highway Act that further reduced the state match to about 26 percent (Lyman 1999) and required federal aid to be concentrated upon “such projects as will expedite the completion of an adequate and connected system of highways, interstate in character” (Paxson 1946:245). Up to seven percent of a state’s roads could be listed for reconstruction to create the national highway system. By 1923 a tentative plan had been developed linking every city with a population of 50,000 or more, with construction planned over a ten-year period (Paxson 1946).

During the early 1920s, automobile travel was an adventure for many Americans and was subsequently heavily promoted. By the late 1920s, much of the National Old Trails Road in the project vicinity had been widened and oiled or surfaced with gravelly sand. The segment of the highway across the Mojave Desert was notorious for its poor condition, and by 1925 the highway was full of ruts and chuck holes. The highway was narrow with no road shoulders or striping, tended to follow the natural topography of the area, and was vulnerable to the effects of erosion. The State of California had designated the highway as a public highway in 1919, but did not take any responsibility for the segment between Barstow and Needles until 1923, leaving the burden of maintenance to San Bernardino County. Despite the poor conditions, motorists were never more than four miles from the railroad, where they could find help in the form of stations and section crews, and water was available every 5 to 10 miles (Bischoff 2005; Hatheway 2001; Scott and Kelly 1988). Aggregate mining for sand and gravel became prevalent in the area (King and Casebier 1976) and the scraping scars for the aggregate for the pavement of the Hector section of the National Old Trails Road can still be observed in the project area of analysis.

In 1926, the American Association of State Highway and Transportation Officials designated the National Old Trails Road in the Mojave Desert as U.S. Route 66. U.S. Route 66 was one of the main arteries of the National Highway System and was one of the first great highways in the United States, running from Chicago to the Pacific Ocean. Federal funding allowed for improvements, such as the construction of road shoulders. In the 1930s, the original alignment of the National Old Trails Road in the Project Area was abandoned in favor of a route to the south, which is the current alignment of historical U.S. Route 66 (Bischoff 2005; Scott and Kelly 1988; Wikipedia contributors 2008).

The new U.S. Route 66 alignment eliminated sharp turns, reduced steep grades, and straightened the roadway to accommodate higher speeds. The use of heavy machinery allowed for large road cuts that had not been possible in the early days of road building. The section of U.S. Route 66 from Needles to Los Angeles was the most heavily traveled section of the highway, and in 1934 this segment was paved. Much of the paving of U.S. Route 66 was completed by the Works Progress Administration during the Great Depression of the 1930s. By 1938 all of U.S. Route 66 was paved (Bischoff 2005; Scott and Kelly 1988).

U.S. Route 66 was an important transportation route during the Great Depression. In his book, *The Grapes of Wrath*, John Steinbeck wrote about migration of Midwestern farmers to the Pacific coast along this roadway. World War II caused further migration to the west coast along U.S. Route 66 as millions of Americans went to work in war related jobs in California. U.S. Route 66 became so famous that it was memorialized in Bobby Troup's popular song "Get Your Kicks on U.S. Route 66" (Scott and Kelly 1988) and was featured in many Hollywood movies.

While accommodations in the Calico Solar Project area of analysis were limited to road-side camping in the wilds, as a subsequent consequence of the heavy use of U.S. Route 66, thousands of businesses opened, mostly serving cross-country travelers. Businesses varied from grocery stores, service stations, restaurants, and motels to dance halls and tourist attractions. One of these tourist attractions in the project vicinity may have been the Pisgah Crater, a young volcanic cinder cone located south of the Project area of analysis. A road was constructed from U.S. Route 66 to the Pisgah Crater between the late 1930s and early 1950s from U.S. Route 66 either to provide access for travelers along the highway or for local aggregate miners (Scott and Kelly 1988).

Barstow was the last stop from Los Angeles before crossing the desert or the first stop after the desert, and was a popular rest area along the highway even during the Depression. During that time, business from U.S. Route 66 was an important part of the economies of many towns and small cities. By World War II, many businesses along U.S. Route 66 competed for travelers' money. Native American crafts sales became an important industry along the route. During the war, military use of the road increased in conjunction with development of military training bases in the Mojave Desert (Scott and Kelly 1988).

The Golden Age of U.S. Route 66 was the era after World War II and before the opening of other major east-west interstate highways, such as Interstate 40 (I-40). The increased traffic along U.S. Route 66 also led to its demise. Although the highway was an important east-west thoroughfare, it could no longer handle the volume of traffic and heavy military equipment using the road. After World War II, a new national interstate highway system was planned, and eventually replaced much of U.S. Route 66 (Scott and Kelly 1988).

There are no historic buildings associated with U.S. Route 66 along the segment of the road that is within 0.5 miles of the Project area of analysis. There are historical buildings associated with U.S. Route 66 in the town of Ludlow, located about 12 miles east of Pisgah and about 11 miles east of the Project, and in Newberry Springs, about 15 miles west of the Interstate 40 Hector exit and about 13 miles west of the Project.

Interstate Highways. Throughout the 1950s and 1960s, U.S. Route 66 remained the main road between the Midwest and the West Coast. Increased traffic and the narrowness of the roadway eventually led to the downfall of the road. On August 2, 1956, President Dwight D. Eisenhower signed the Federal Aid Highway Act which provided funding to upgrade America's roads. Eisenhower based his vision of a more connected America on Germany's Reichsautobahnen rural super highways. Eisenhower and his advisors originally envisioned creating a 40,000 mile interstate system costing approximately twenty-seven billion dollars. Construction began almost immediately throughout the United States (Weingroff 2008).

On December 13, 1958, Interstate 15 opened between Victorville and Barstow. This marked the beginning of the modern highway era in the Barstow area. The entire length of Interstate 15 from Los Angeles to Las Vegas was opened by July 1961. At that time, the stretch between Baker and Las Vegas was used by more than 500 vehicles an hour in one direction (Swisher 1997).

Interstate 40 begins at its junction with Interstate 15 in Barstow, then runs through the Mojave Desert to Needles and into Arizona. Interstate 40 is located along the southern edge of the Calico Solar Project area of analysis. Although the Interstate 40 is now a cross-country highway, its last sections were not built until 1980. In the southwest, much of present day Interstate 40 absorbed U.S. Route 66. Many of the western portions of Interstate 40 also follow the Beale Wagon Road. The segment of Interstate 40 in the project vicinity was not constructed until 1968.

Mining

Since the 1860s, mining has been the most important commercial industry near the Calico Solar Project area of analysis. Silver was discovered in 1863, although it is possible the Spanish had mined in the area almost a century before. Prospectors attempted to establish mines to sell to investors with sufficient capital. In the following decade, smaller operators attempted to compete with larger corporations, but without railroad transportation, very little money was made until the early 1880s with the coming of railroad through the eastern Mojave Desert (Brooks and others 1980; King and Casebier 1976:300-305).

The period between 1900 and 1919 was known as the “the Great Years” for mining in northeastern San Bernardino County (King and Casebier 1976:305) as it was more profitable than any other time. Copper, lead, zinc, and other base metals, as well as gold and silver, were mined throughout the Mojave Desert and San Bernardino County. Also, during World War I, chromium, manganese, tungsten, and vanadium were mined. Several large mining districts were developed, including Copper World, near Valley Wells; gold mines at Hart; lead, zinc, and copper in the Mohawk mines near Mountain Pass; copper mines near Von Trigger Spring; and gold mines at the north end of Old Dad Mountain (King and Casebier 1976).

During the Great Depression, a resurgence of gold mining took place, but World War II caused a return to the mining of base metals. The Vulcan Iron mine, in the Providence Mountains northeast of the Project, was excavated during that time. Since the end of World War II, mining in the area has considerably slowed. More recently, other nonmetals such as clay, talc, and cinder mining have gained popularity, especially around the Kingston Mountains in the vicinity of Interstate 15. Aggregate mining for sand and gravel has become prevalent in the area (King and Casebier 1976).

Manganese Mining in the Project Vicinity. Several manganese mines exist in this region, including the Logan Mine within the Calico Solar Project area of analysis, and the Black Butte Mine, located just over one half mile east of the Calico Solar Project area of analysis. Manganese was first mined in earnest during World War I, when the demand increased due to its use in the production of iron and steel. After World War I, manganese mining throughout the country decreased and continued to wane throughout the Depression but once again increased with the onset of World War II in the 1940s. In addition to iron and steel production, manganese also was used in the minting of the war-time nickel between 1942 and 1945. By 1943, deposits of manganese had been located in several desert locations throughout San Bernardino County, including the Lavic, Owl, and Whipple Mountains. Manganese, in combination with copper and silver, was used to produce these coins in an effort to conserve nickel for military uses (Tucker and Sampson 1943).

In 1942, the Metal Reserve Company of Washington D.C. published competitive price schedules for manganese ores. They offered $48 per ton for high grade ore (ore containing 48 percent manganese), $35.20 per ton for low grade A ore (44 percent manganese), and $26.00 per ton for low grade B ore (40 percent manganese). Ores containing 35 to 39 percent manganese were also accepted at a reduced price. Manganese producers in San Bernardino County brought their ore to stockpile points in Parker and Phoenix, Arizona. Lower grade ores containing 15 to 35 percent manganese often took their ore to the Kaiser Steel Corporation in Fontana, California. In the early 1940s, manganese ore was shipped from 5 deposits in San Bernardino County with ore containing 20 to 46 percent manganese. After the war, several manganese deposits continued to be worked in San Bernardino County (Tucker and Sampson 1943; Wright and others 1953).

Southern California Edison and the Hoover Dam

Two parallel Southern California Edison (SCE) steel-tower 220-kilovolt transmission lines are located in the Pisgah Substation Triangle area and the historic built-environment 0.5-mile buffer of the Project area of analysis. The SCE 220-Kilovolt North

Transmission Line was constructed between 1936 and 1939 and the SCE South 220-Kilvolt South Transmission Line between 1939 and 1941. The transmission lines originate at the SCE switchyard at the Hoover Dam and terminate in Chino, California. The transmission lines were constructed to deliver power from the Hoover Dam to SCE service areas in southern California.

Plans for development of a hydroelectric plant on the Colorado River were conceived as early as 1902 in response to fuel shortages that were limiting the mining activities in the vicinity of the river. SCE began to investigate development of such a plant and signed an option to utilize river water for power generation. Engineers surveyed the Colorado River and a preferred dam site was selected, but at the time the technology to transport the power to the SCE's service area (a distance of 300 to 400 miles) at high voltages did not exist. Because of technological limitations and the decline in mining activity along the Colorado River, SCE abandoned this option (Myers 1983).

Throughout the next twenty years, development of a power generating facility on the Colorado River was discussed and debated by public and private power companies and the concept of the use of a dam was investigated to control the highly variable flows of the river. In 1921, SCE and U.S. Geological Survey engineers once again surveyed the river and throughout the 1920s, SCE filed licensing applications with the Federal Power Commission in an effort to obtain the right to construct dams and power generating facilities, but none were approved. In 1928, Congress passed the Boulder Canyon Act, which stipulated that the federal government would construct a dam on the Colorado River if public and private utility companies would take responsibility for the distribution of electrical hydropower. In 1930, SCE signed a contract stating that they would buy and distribute power for themselves and all other investor-owned utility companies. The Los Angeles Bureau of Power and Light agreed to purchase and distribute power for state and municipal utilities, as well as the metropolitan water district (Myers 1983).

Construction of Hoover Dam began in 1931 and was completed in 1935. Power production for use began in 1936 when power was delivered to the cities of Los Angeles, Pasadena, Glendale, and Burbank through three parallel transmission lines constructed by the Los Angeles Bureau of Power and Light (currently Los Angeles Department of Water and Power). The second company to distribute Hoover Dam power was the Nevada-California Corporation. The power was conveyed by a 132-kilovolt transmission line that had been originally constructed in 1930 and 1931 to deliver power to the dam site during construction. This transmission line is known as the Edison Company Boulder Dam-San Bernardino Electrical Transmission Line (Hatheway 2006; Hughes 1993; Myers 1983).

The Metropolitan Water District of Southern California was the next to distribute electrical power in 1938. This transmission line, known as the Metropolitan Water District Line, used technology similar to that used previously by SCE for 220-kilovolt transmission lines in southern California. Utility companies in southern California, such as the Pacific Light and Power Company (which merged with SCE in 1917) and SCE, were innovators in the development of high voltage systems. In 1926, Stanford University established a high-voltage laboratory and worked with Pacific Gas and Electric and SCE in research and development. Through this collaboration insulators for

California's 220-kilovolt lines were developed (Hughes 1993; Myers 1983; Schweigert and Labrum 2001).

The SCE 220-Kilovolt North Transmission Line was constructed between 1936 and 1939, using the same design and technology SCE had been using for its high-voltage transmission lines in southern California (including its Vincent 220-kilovolt line), and the design used by the Metropolitan Water District for its Hoover Dam line. The transmission line was energized in 1939, after the completion of Hoover generating units A-6 and A-7 (Myers 1983; Schweigert and Labrum 2001).

When World War II began in Europe, SCE planners anticipated an increase in demand for power in southern California. SCE began construction on a second transmission line, the SCE South 220-Kilvolt South Transmission Line, in 1939. SCE North and SCE South take divergent courses from the SCE switchyard at the Hoover Dam, but meet near Hemenway Wash in Nevada, and run nearly parallel to each other from north of Boulder City, Nevada to Chino, California. SCE North and SCE South are parallel within the Calico Solar PROJECT AREA OF ANALYSIS. Both SCE North and SCE South delivered electricity that was essential to war-time industries in Southern California. These industries included the Douglas, Vultee, and Northrup aircraft plants, Consolidated Steel, the Long Beach Naval Shipyard, Kaiser Steel, Alcoa, Columbia Steel, as well as automobile factories, tire plants, oil refineries, ordnance works, and military bases and depots (Myers 1983; Schweigert and Labrum 2001).

Natural Gas Pipelines

Two natural gas pipelines run through the Calico Solar Project area of analysis —the Pacific Gas and Electric Pipeline and the Mojave Pipeline. Although it was known that natural gas could be used for fuel in the early years of the nineteenth century, it was not until 1859 when large amounts of natural gas were discovered in Titusville, Pennsylvania, that a commercial market for natural gas developed. Wide-spread use of natural gas began in the west when southwestern natural gas fields were discovered in the 1920s. Large natural gas fields found in the north Texas panhandle in 1918 and in Kansas in 1922, as well as the development of the technology needed to transport natural gas the long distances to urban areas, resulted in the development of the interstate gas pipeline industry (Castaneda 2001).

The Pacific Gas and Electric Pipeline on the Project Site is a 33-to-44-inch natural gas pipeline. The pipeline is an interstate pipeline that carries natural gas from the natural gas fields of Texas and New Mexico to Northern California. The 502-mile long pipeline was constructed in 1948, and at the time, was the largest pipeline in the country (PG&E Corporation 2004).

The Mojave Pipeline on the Project Site is a 24-inch natural gas pipeline, owned by El Paso Natural Gas Corporation, one of the largest natural gas companies in North America. The El Paso Natural Gas Corporation expanded their services into southern California in the 1940s in response to the post World War II population growth. The Mojave Pipeline is a 450-mile-long interstate pipeline that carries natural gas from Arizona to Kern County, California. It was constructed in the late 1940s (El Paso Corporation 2008; International Directory of Company Histories 1996).

While the modern practice of "monitoring" trenching for pipelines was not well-established at the time of the construction and installation of the PG&E and El Paso Natural Gas pipelines, subsequent surface surveys have not revealed negative impacts to cultural resources that are different from the range of site types and isolates identified during the survey for the Calico Solar project. A re-survey of the project is underway as this document is being prepared and this section will be updated in the future, if necessary.

Military Use

Several military bases are located in the Mojave Desert region and within the same region as the project, including Twenty-Nine Palms, south of the Calico Solar Project, and Fort Irwin, located approximately 37 miles northeast of Barstow. These, and other military installations in the area, led to an increase of traffic near the Project, and in the area population as civilians associated with the military took up residence.

During World War II, General George S. Patton established the Desert Training Center in California and Arizona, much of which was located on public land east of the Calico Solar Project area of analysis. Training exercises were designed to prepare U.S. troops for combat in the hostile desert terrain and climate. The army established camps and emergency airfields, remnants of which can still be found, including rock alignments designating tent camps and emergency airfields. The Desert Training Center closed in 1944 toward the end of World War II. During desert training, the army created the first detailed maps of the Mojave Desert to facilitate training activities. The maps were created using aerial photography and land-based methods. After the war, those maps were used by the U.S. Geological Survey to create 15-minute topographic quadrangles in the late 1940s and early 1950s (Nystrom 2003). These training areas were located on public land east of the Project area of analysis; there are no known desert training areas in the project vicinity.

Twenty years later, during the Cold War, the Mojave Desert in the vicinity of the Project again hosted a major training exercise. A training exercise, known as Desert Strike included troops from both the U.S. Army and Air Force and encompassed a 12 million-acre area in California and Arizona centered on the Colorado River. The two-week exercise was designed to test tactical deployment of nuclear weapons, and involved combat training between two hypothetical countries. Desert Strike occurred in May 1964 and resulted in the expenditure of approximately $60 million and 33 deaths (Garthoff 2001; Nystrom 2003; *Time Magazine* 1964).

Summary

Prior to arrival of Europeans in California, the central Mojave Desert was inhabited for thousands of years by indigenous populations, as evidenced by multiple archaeological complexes of different cultural affiliations. During ethnographic times, the Serrano, Vanyume and the Chemehuevi inhabited the area. The project area lies in a transitional zone near pluvial lakes, such as Troy Lake located to the west of the project, which experienced episodes of inundations and desiccations. As a result it is unlikely that this area would have been suitable to support a large population for prolonged periods of time. Indigenous people traveling in this area adapted to these arid desert environments and managed successfully to exploit resources as is evident in the cultural materials they left behind.

During the Spanish and Mexican periods, San Bernardino County and the Project area remained relatively isolated. There were no Spanish and Mexican land grants in the region surrounding the project area, and the Spanish were mainly interested in using the area as an overland route to their coastal missions. The Spanish explored and used the Mojave Trail trade route blazed by the Mohave Indians north of the project area. This trail also was used by American explorers and mountain men who ventured into Mexican territory prior to the American period. The establishment of Fort Mohave on the banks of the Colorado River resulted in the use of the Mojave Trail as a wagon route, subsequently renamed the Mojave Road. This roadway was used as a travel and trade corridor until the railroad was constructed in the 1880s. After the railroad was built, travel through the Mojave Desert in the project vicinity shifted south into the project area of analysis. In the early 1900s, a wagon road that had been constructed adjacent to the railroad began to be used by automobiles and was designed the National Old Trails Road. The National Old Trails Road was designed as U.S. Route 66 in the 1920s, and by the 1930s, its original alignment was abandoned in favor of the alignment of U.S. Route 66 to the south. In the late 1960s, I-40 was constructed along the north side of U.S. Route 66 in the Calico Solar project area.

During the American period, the area was not ranched or farmed due to arid conditions, though some attempts at cattle grazing have noted. Because of the arid conditions, the Calico Solar Project area of analysis and its vicinity were used as a travel corridor rather than an area of settlement. Some mining activities occurred in the area, in particular manganese mining beginning in the 1940s. The area also was used as the setting for the Desert Strike military training exercises in 1964 and has been used as a corridor for electrical transmission lines and natural gas pipelines. Modern infrastructure in the project vicinity includes two steel tower transmission lines, wooden pole power lines, and underground pipelines along the south and east borders of Calico Solar Project. Radio facilities are also located south and east of the project.

C.3.5 CULTURAL RESOURCES INVENTORY

The analysis of the proposed action requires a detailed cultural resources inventory for the area where the action has the potential to disturb or destroy cultural resources. More specifically, the effort to develop the inventory involved a sequence of investigatory phases that included background literature research, consultation with Native Americans and the broader public, and primary field identification, description, and preliminary interpretation of the cultural resources present within the project area of analysis. This “Cultural Resources Inventory” subsection covers the methods and results of each phase of the background research and of the field investigations that have been conducted to complete a cultural resources inventory for the project area of analysis/APE. This subsection includes discussions of the archival research and the consultations that have taken place with Native American groups and the broader public about the project area of analysis/APE as a whole. This subsection also provides discussions of the field investigations conducted to date for the project. The investigations include the pedestrian archaeological survey work conducted to date of the project area of analysis and the built-environment and ethnographic resource surveys. Separate subsections below explore the historical significance of the cultural resources identified during the inventory, assess the potential effects of the proposed action on significant cultural resources and on previously unidentified, buried archaeological resources, and propose mitigation measures for all significant effects.

C.3.5.1 PRE-FIELD BACKGROUND AND LITERATURE RESEARCH

The background research for the present analysis employs information that the applicant and the BLM gathered from literature and records searches and information that the BLM and Energy Commission staff gathered as a result of consultation with local Native American communities and with other potential public interest groups. The purpose of the background information is to help formulate the initial cultural resources inventory for the present analysis, to identify information gaps, and to contribute to the design and the interpretation of the field research that will serve to complete the inventory.

Literature and Records Searches

On July 28, 2008, Robin E. Laska and Dustin Kay performed a records search at the San Bernadino Archaoelogical Information Center (SBAIC), which is the California Historical Resource Information System (CHRIS) cultural resources database repository for San Bernardino County. Ms. Laska searched all relevant previously recorded cultural resources and previous investigations completed for the Project area and a one-mile search radius. Information included location maps for all previously recorded trinomial and primary prehistoric and historical archaeological sites and isolates, site record forms and updates for all cultural resources previously identified, previous investigation boundaries and National Archaeological Database (NADB) citations for associated reports, historic maps, historic addresses and resources listed on various state and federal inventories. These inventories included: the National Register of Historic Places, the California Register of Historical Resources, California Landmarks, California Places of Historic Interest, and others.

All previous cultural resource survey areas and all previously recorded cultural resource site locations were transferred to USGS 7.5' quadrangles and later digitized into geographic information system (GIS) using ArcGIS 9.2 software. The following USGS quadrangle maps were used to this purpose; Hector (1982 Provisional), Lavic Lake (1955 Photorevised 1973), Sleeping Beauty (1982 Provisional Minor Changes 1993), Sunshine Peak (1955 Photorevised 1992), and Troy Lake (1982 Provisional Minor Changes 1993) (S.B.B.M). These data were combined with additional layers including topography, aerial photography and others.

Results of Prefield Research

Previous Investigations

Based on the literature research conducted at the SBAIC, 22 cultural resource studies have been conducted within the Project footprint and one-mile record search radius (see Cultural Resource Table 3 below). Twelve of the previous studies occurred within the one-mile record search radius; nine occurred both within the Project footprint and one-mile search radius. One of these studies (Class II inventory–literature review) was prepared for the BLM on behalf of the Applicant, and was submitted in August of 2006. This earlier report provided a preliminary assessment of the project area and includes a cultural resource record search results and background setting, but does not include a pedestrian survey of the Calico project area. The vast majority (95 percent) of the Calico project area had not been previously investigated. Nineteen of the previous survey reports within the record search radius were positive for cultural resources, 10 of those reports occur within the Calico project limits. With the exception of a few recent studies, the majority of these previous investigations were conducted more than 15 years ago.

CULTURAL RESOURCES TABLE 3:
Previously Conducted Cultural Resource Investigations in the Calico Project Area and One-mile Radius

Survey Report Number	Company	Author	Date	Report Title	Investigation Type	In footprint	In one-mile research radius
1060038		Simpson, Ruth D.	1958	The Manix Lake Archaeological Survey	Positive Archaeological Survey		X
1060047		Simpson, Ruth D.	1960	Archaeological Survey of the Eastern Calico Mountains	Negative Archaeological Survey		X
1060064		Simpson, Ruth D.	1965	An Archaeological Survey of Troy Lake, San Bernardino County	Positive Archaeological Survey		X
1060874	Archaeological Research Unit, UCR	Barker, James P., Rector, Carol H., and Wilke, Philip J.	1979	An Archaeological Sampling of the Proposed Allen-Warner Valley Energy System, Western Transmission Line Corridors, Mojave Desert, Los Angeles and San Bernardino Counties, California and Clark County Nevada	Positive Archaeological Survey	X	X
1060964	Regional Environmental Consultants	Norwood, Richard H	1980	Cultural Resource Survey for a Portion of the Earp to Johnson Valley, California, Enduro Racecourse Route	Positive Archaeological Survey		X

Survey Report Number	Company	Author	Date	Report Title	Investigation Type	In footprint	In one-mile research radius
1060965	Unknown	Musser, Ruth A.	1980	A Cultural Resource Inventory: Johnson Valley to Parker Motorcycle Race – The Public Comment Alternative	Negative Archaeological Findings		X
1061449	E.R. of Applied Conservation Technology, Inc.	Well, Edward B., Jill Weisbord, and Blakely	1964	Cultural Resources Literature Research, Records Check and Sample Field Survey for the California Portion of the Celeron/All American Pipeline Project.	Positive Archaeological Survey	X	X
1061940	California State University, Bakersfield – Cultural Resource Facility	Sutton, Mark Q. and Robert E. Parr	1989	A Cultural Resource Inventory for the Proposed Hidden Valley Hazardous Waste Disposal Facility, San Bernardino County, California	Positive Archaeological Survey		X
1061979	New Mexico University	Fagan Bryan *et al.*	1989	Cultural Resource Report for the All American Pipeline Project: Santa Barbara, California to McCarney Texas and Additional Areas to the East – Along the Central Pipeline Route Texas	Positive Archaeological Survey	X	X
1062220	Bureau of Land Management	BLM	1978	Archaeological Sites of the California Desert Area (Owlshead, Amargosa, Mojave Basin Planning Unit, Phase III): Archaeological Sample Unit Records.	Positive Archaeological Survey	X	X

Survey Report Number	Company	Author	Date	Report Title	Investigation Type	In footprint	In one-mile research radius
1062234	California State University, Bakersfield – Cultural Resource Facility	Yohe II, Robert M. and Sutton, Mark Q.	1992	An Archaeological Assessment of Eight Alternative Access Routes Into the Proposed Hidden Valley Hazardous Waste Disposal Facility, San Bernardino County	Positive Archaeological Survey	X	X
1062330		Simpson, Ruth D.	1964	The Archaeological Survey of Pleistocene Manix Lake (and Early Lithic Horizon)	Positive Archaeological Survey		X
1062388	Far Western Anthropological Research Group	McGuire, Kelly R.	1990	A Cultural Resources Inventory and Limited Evaluation of the Proposed Mojave Pipeline Corridor in California and Arizona	Positive Archaeological Survey	X	X
1062399	Far Western Anthropological Research Group	McGuire, Kelly R. and Glover, Leslie	1991	A Cultural Resource Inventory of a Proposed Natural Gas Pipeline Corridor From Adelanto to Ward Valley, San Bernardo County , California	Positive Archaeological Survey		X
1062406	California State University, Bakersfield – Cultural Resource Facility	Osborne, Richard H.	1991	Addendum to Archaeological Investigation of Hidden Valley Hazardous Waste Facility Access Route From Highway 40 to Hector Siding	Positive Archaeological Survey	X	X
1062701	California State University – Bakersfield	Sutton Mark Q. and Robert E. Parr	1989	An Archaeological Survey for Hidden Valley, Central Mojave Desert, California	Positive Archaeological Survey		X

Survey Report Number	Company	Author	Date	Report Title	Investigation Type	In footprint	In one-mile research radius
1062710	Dames and Moore	Apple McCorckle, Rebecca and Liliburn, Lori	1993	Cultural Resources for the Fort Cady Boric Acid Mining and Processing Facility Newberry Springs, California	Positive Archaeological Survey		X
1062808	Southern California Gas Company	Padon, Beth and Breece, Ladurel	1993	Archaeological Assessment, Kern Mojave Pipeline, San Bernardino County, Ca	Positive Archaeological Survey	X	X
1062862	Dames and Moore	Apple McCorckle, Rebecca	1993	Cultural Resources Testing and Evaluation Report for the Fort Cady Boric Acid Mining and Processing Facility, Newberry Springs - CA	Positive Archaeological Survey		X
1063630	Tetra-Tech	Budinger, Fred	2001	An Archaeological Assessment of the Proposed Verizon Wireless Newberry Springs Unnamed Cellular Telecommunications Site to be Located South of National Trails Highway (Old Rte 66) and West of Hector Off-Ramp From Hwy 40	Negative Archaeological Survey		X
1063631	ACS Limited	Clark, Caven	1998	Archaeological Survey at the Hector Meter Station	Positive Archaeological Survey	X	X
On File with BLM	Environmental Planning Group	Rowe, Robert, A.	2006	Results of Cultural Records Search in Support of the Proposed Solar One Power Generating Facility, Hector, San Bernardino County, California	Positive Records Search	X	X

Previously Recorded Cultural Resources

A total of 68 previously documented cultural resources were identified in the project area of analysis and the one-mile search radius (see Cultural Resources Table 4). Twenty-four of these resources are prehistoric isolates, 38 are prehistoric archaeological sites, and six are historic-era resources (two of which are built-environment properties). Sixteen of these previously recorded cultural resources occur either partially or fully within the Calico project area of analysis, including one prehistoric isolate, twelve prehistoric archaeological sites, one historic archaeological site, and two historic built-environment resources. A discussion of the relocation of these resources within the project area of analysis and the corresponding site record updates is provided in the field inventory results section of this document. Of the previous investigations, most were completed before the advent/availability of global position system (GPS) data collection and standardized archaeological data-recording processes. Much of the previously recorded information is unevaluated, the site descriptions are poor, and locational information tends to be inaccurate or unavailable.

CULTURAL RESOURCES TABLE 4:
Previously Recorded Cultural Resources Within the Calico Project Area and One-mile Radius

Resource Designation	Cultural Resource Type	Cultural Resource Description	In Project Footprint	Within the one-mile research radius	Latest Update
36-061415	Prehistoric	Isolated jasper flake		X	1990
36-061416	Prehistoric	Two isolated chalcedony flakes		X	1990
36-061417	Prehistoric	Isolated chalcedony flake		X	1990
36-061420	Prehistoric	Isolated chalcedony flake and isolated rhyolite flake		X	Unknown
36-061421	Prehistoric	Isolated jasper flake		X	1991
36-061423	Prehistoric	Isolated cryptocrystalline flake		X	1990
36-061424	Prehistoric	Isolated white cryptocrystalline flake		X	1990
36-061425	Prehistoric	Isolated white cryptocrystalline flake		X	1990
36-061426	Prehistoric	Isolated red cryptocrystalline flakes		X	1990
36-061427	Prehistoric	One isolated red cryptocrystalline flake tool and one red cryptocrystalline flake		X	1990
36-061428	Prehistoric	Two isolated cryptocrystalline flakes		X	1990
36-061429	Prehistoric	Isolated cryptocrystalline silicate flake		X	1990
36-061430	Prehistoric	Isolated cryptocrystalline silicate flake		X	1990
36-061431	Prehistoric	Isolated cryptocrystalline silicate flake		X	1990
36-061432	Prehistoric	Isolated cryptocrystalline silicate flake		X	1990
36-061433	Prehistoric	Two isolated cryptocrystalline silicate flakes		X	1990
36-061434	Prehistoric	Isolated cryptocrystalline silicate flake		X	1990

Resource Designation	Cultural Resource Type	Cultural Resource Description	In Project Footprint	Within the one-mile research radius	Latest Update
36-061435	Prehistoric	Isolated cryptocrystalline silicate flake		X	1990
36-061436	Prehistoric	Isolated cryptocrystalline silicate flake		X	1990
36-064406	Prehistoric	Isolated chert flake and one piece of angular waste		X	2001
36-064407	Prehistoric	Two isolated chalcedony flakes	X		2001
36-064408	Prehistoric	Isolated red jasper flake fragment		X	2001
36-064409	Prehistoric	Isolated agate bifacial core		X	2001
36-064410	Prehistoric	One isolated red jasper flake and a second flake with dorsal scars		X	2001
CA-SBR-10649H	Prehistoric	Small lithic test and quarry area with flakes and one core	X		2001
CA-SBR-1585	Prehistoric	Also known as EM-266, this is a Petroglyph Site		X	1976
CA-SBR-1793	Prehistoric	Pottery sherds, awl, two bifaces		X	1963
CA-SBR-1889	Prehistoric	Lithic scatter containing metates, projectile points and debitage		X	1969
CA-SBR-1893	Prehistoric	Also known as SBCM 674, this site consists of two projectile points, scrapers flakes and bone which were collected at time of recordation	X		1963
CA-SBR-1905	Prehistoric	Jasper quarry with sparse scatters consists of flakes, bifaces and scrapers		X	1980
CA-SBR-1907	Prehistoric	Large quarry area containing debitage, cores and bifaces		X	1990
CA-SBR-1908	Prehistoric	Low density; sparse cobble testing/ quarry area consisting of cryptocrystalline silicate, basalt and rhyolite materials.	X	X	1979
CA-SBR-2910H	Historic	Also known as National Old Trails Road/Highway 66/ SM364. This is an early 20th century two lane paved road at Mile Post 183 where it becomes a graded dirt road.	X	X	2001
CA-SBR-3515	Historic/ Prehistoric	Two rock rings, it was not determined if they were historic or prehistoric		X	1978
CA-SBR-3516	Prehistoric/Historic	Lithic quarry site containing flakes and cores of chert material and historic trash scatter		X	1991
CA-SBR-3076	Prehistoric	Chalcedony lithic scatter	X		1985
CA-SBR-4307	Prehistoric	Several lithic scatters		X	1980
CA-SBR-4308	Prehistoric	Two lithic reduction stations that		X	1980

Resource Designation	Cultural Resource Type	Cultural Resource Description	In Project Footprint	Within the one-mile research radius	Latest Update
		contain flakes and cores			
CA-SBR-4309	Prehistoric	Lithic scatter with a lithic reduction station. Possible basalt and andesite tools present on site.		X	1980
CA-SBR-4405H	Historic	A booth and cargo loading platform located where the railroad splits.		X	1980
CA-SBR-4558H	Historic	Also known as SBCM 4918, This site is a 1930s and 1940s manganese mining area containing a galvanized steel structure, mill tailings, mine and historic trash scatters	X	X	1979
CA-SBR-4681	Prehistoric	Lithic scatter	X		1980
CA-SBR-5600	Prehistoric	Lithic reduction station	X		1980
CA-SBR-5598	Prehistoric	Large cobble test/quarry area		X	1991
CA-SBR-5599	Prehistoric	Lithic scatter and rock rings		X	1980
CA-SBR-5794	Prehistoric	Cobble quarrying and lithic reduction area		X	1989
CA-SBR-5795	Prehistoric	Lithic scatter originally containing 100s of flakes, several biface fragments and cores		X	2001
CA-SBR-5796	Prehistoric	Low density lithic scatter containing flakes and cores	X		2001
CA-SBR-6511	Prehistoric	Very large low density lithic scatter containing debitage and shatter	X		1989
CA-SBR-6512	Prehistoric	Also known as MP-26, this is a small low density lithic scatter that contains debitage		X	1989
CA-SBR-6513	Prehistoric	Also known as MP-27, this is a single segregated lithic reduction locus containing approximately 15 felsite flakes total		X	1989
CA-SBR-6517	Prehistoric	Small flake scatter with one core and eight flakes		X	1989
CA-SBR-6518	Prehistoric	Small cobble test and quarry area with two segregated reduction loci and debitage		X	1989
CA-SBR-6519	Prehistoric	A single Segregated Reduction Locus made up of approximately four flakes		X	1989
CA-SBR-6520	Prehistoric	Small cobble test and quarry area with one segregated reduction locus and debitage	X		1989
CA-SBR-6521	Prehistoric	Low density cobble test and quarry area with debitage, cores, bifaces and blanks	X		1989

Resource Designation	Cultural Resource Type	Cultural Resource Description	In Project Footprint	Within the one-mile research radius	Latest Update
CA-SBR-6522/H	Prehistoric and Historic	Low density cobble test and quarry area with debitage, cores, bifaces and blanks		X	1989
CA-SBR-6525	Prehistoric	Also known as MP-84, this is a low density lithic scatter that contains one lithic reduction locus flakes and debitage		X	1989
CA-SBR-6526	Prehistoric	Also known as MP-85, this site contains two adjacent lithic reduction loci and flakes		X	1989
CA-SBR-6527	Prehistoric	Also known as MP-86, this site is a small low density flaked stone scatter		X	1989
CA-SBR-6528	Prehistoric	Also known as MP-87, this is a small density lithic scatter	X		1989
CA-SBR-6693H NRHP E SBR 94028	Historic	Railroad Line built in 1883 for the Atlantic and Pacific Railroad Co., associated artifacts include track and train parts, railroad tableware, and insulator glass fragments	X	X	2001
CA-SBR-6786	Prehistoric	Cobble quarrying area comprised of approx. 200 flakes and four cores		X	1990
CA-SBR-6836	Prehistoric	Small lithic scatter containing approximately six jasper flakes		X	1991
CA-SBR-6895	Prehistoric	Single Segregated Reduction Locus containing flakes		X	1990
CA-SBR-10637	Prehistoric	Small lithic scatter containing at least nine chert flakes		X	
P1084-1	Historic	Two sets of foundations (one concrete and one concrete slab)		X	
P1793-1H	Historic	Hector train siding, 20 miles west of Ludlow, CA	X	X	

C.3.5.2 CONSULTATIONS

Native American Consultation

The Energy Commission has no specific regulatory obligation to consult with Native American tribes and/or individuals as a requirement under CEQA; however Energy Commission cultural resource staff routinely consult with local Native American representatives as a matter general policy, regardless of federal tribal recognition/status, to seek input and identify any concerns they may have regarding potential effects to cultural resources of importance to Native Americans. As the proposed Calico Solar project is located on land owned by the federal government and managed by the BLM, the BLM indicated its desire at the outset of this project to take the lead in all Native American Consultation, as is stipulated in the *Memorandum of*

Understanding between the U.S. Department of the Interior, Bureau of Land Management, California Desert District, and the California Energy Commission Staff Concerning Joint Environmental Review for Solar Thermal Power Plant Projects (http://www.energy.ca.gov/siting/solar/BLM_CEC_MOU.PDF).

On August 20, 2007, the BLM initiated contact with local Native American tribal organizations regarding a number of upcoming solar energy projects proposed on BLM land in the region, including the Calico Solar project. Among the tribal organizations contacted were the Chemehuevi Reservation; the San Manuel Band of Mission Indians; the Colorado River Indian Tribe; and the Twenty-nice Palms Band of Mission Indians; and the Fort Mojave Indian Tribe.

On July 22, 2008, the project applicant contacted the Native American Heritage Commission (NAHC) requesting a search of the NAHC's Sacred Lands File (SLF) in an attempt to determine the presence or absence of Native American sacred sites within the Calico project area. The response from the NAHC in July 2008 indicated that the SLF search identified no sacred sites in the project area of analysis. A list of local Native American representatives who could be contacted regarding potential concerns or knowledge of cultural resources that could be affected by the project was also provided in the response from the NAHC.

In a letter dated November 5, 2008, the BLM initiated formal consultation with the tribes regarding the Calico Solar Project, as a part of their obligation under Section 106 of the National Historic Preservation Act. Since that time, the BLM has maintained ongoing communications with the local tribal organizations through letters, phone calls, and meetings (Jim Shearer, personal communication.). During the course of this time, no Native American representatives have identified specific cultural resources of concern to them within the project limits; however, they have indicated an interest in the project and concerns for the resources that the applicant has identified in the project area.

On April 29, 2010, staff attended the BLM's Cultural Resources Programmatic Agreement kick-off meeting for the Calico Solar Project. Also present at that meeting were Ann Brierty and Anthony Madrigal, Sr. of the San Manuel Band of Mission Indians. During that meeting, Ms. Brierty and Mr. Madrigal expressed concerns for both cultural and biological resources that may be affected by the project.

On June 13, 2010, Energy Commission staff participated in an onsite field visit with the BLM and several members of the local Native American community including: Ann Brierty, Raymond Galvan, and Anthonly Madrigal, Sr. of the San Manuel Band of Mission Indians; Robert Chavez, Domingo "Chance" Esquerra, and Matthew Leivas of the Chemehuevi Tribe; Anthony Madrigal, Jr. of the Twentynine Palms Band of Mission Indians; and Linda Otero, of the Fort Mojave Indian Tribe and the AhaMaKav Cultural Society. During the field visit, the participants visited selected sites, including CA-SBR-1908/H, CA-SBR-13093, and CA-SBR-13443/H, which are being targeted for avoidance by the project applicant (as discussed below in Section C.3.6). During this field visit, tribal members expressed interest and concerns for the cultural resources that the applicant identified during the cultural resource inventory. Some indicated that they would consult with their Elders and would report back to the BLM, if there were any issues. Consultations with interested Native Americans regarding the treatment of the cultural resources in the project area of analysis are ongoing.

On July 26, 2010, in an effort to follow up on the June 13th project site visit, staff contacted several tribal members, including Robert Chavez, Matthew Leivas, Linda Otero, Ann Brierty (phone messages only), and Anthony Madrigal, Jr. (email only). Staff also made attempts to contact other tribal members (i.e., Raymond Galvan and Anthony Madrigal, Sr.) for whom attempts to leave messages were unsuccessful (i.e., voicemail box full, or invalid phone number). Staff's discussions with tribal members indicated that they were not necessarily aware and/or fully informed of the other remaining archaeological sites in the project area beyond the three that were visited during the above-described field trip that took place on June 13, 2010. Staff's impression from the phone conversations was that many of the individuals have busy lives and, therefore, limited time to participate in the project; however all are very concerned and interested in the treatment of Native American cultural resources in the project area and do wish to be kept informed at the very least.

Other Consultations

The applicant contacted the San Bernardino County Land Use Services, City of Barstow Community Development department, and Mojave River Valley Museum on September 15, 2008 to identify cultural resources within a one-mile radius around the Project footprint that had been listed pursuant to ordinance or recognized by a local historical society or museum. To date, no responses have been received from the local agencies or the museum.

Energy Commission staff also consulted with the following organizations in July and August 2010 regarding built-environment resources: Kaisa Barthuli, Program Manager for the Route 66 Corridor Preservation Progam of the National Park Service; Michael Buhler, Executive Director of the San Francisco Architectural Heritage; and Brian Turner, Staff Attorney with the Western Regional Office of the National Trust for Historic Preservation.

C.3.5.3 NEW INVENTORY INVESTIGATIONS

The cultural resource inventory reported here encompasses the 8,230-acre project area of analysis. The applicant identified a total of 335 cultural resources within the project area of analysis/APE, including 206 archaeological isolates, 119 archaeological sites, and 10 historic built environment resources. This total includes twelve of the sixteen previously recorded cultural resources identified as a part of the prefield records search that were relocated during the field survey, including P-36-064407, CA-SBR-1908, CA-SBR-2910H, CA-SBR-3076, CA-SBR-4681, CA-SBR-5600, CA-SBR-5794, CA-SBR-5796, CA-SBR-6521, CA-SBR-6528, CA-SBR-6693H, and P1793-1H. Updated DPR site forms were prepared for the twelve relocated resources. The field surveyors were unable to relocate the remaining four previously recorded resources (CA-SBR-10649, CA-SBR- 1893, CA-SBR- 6511, and CA-SBR- 6520). The four sites that were not relocated appear to no longer exist due to surface artifact collection at the time of original recordation in 1963 (CA-SBR-1893) and/or mitigation or impact due to pipeline construction (CA-SBR-6511, CA-SBR-6520, and CA-SBR-10649H) within the project area. The details of the cultural resource inventory are described below, including all previously recorded and newly identified archaeological sites and built environment resources.

C.3.5.4 CLASS III INTENSIVE ARCHAEOLOGICAL FIELD SURVEY

Archaeological Field Survey Methodology

The initial cultural resource field inventory of the Calico Solar project area of analysis/APE was conducted between August 4 and October 31, 2008. The applicant also conducted additional field surveys and more refined site recordation between October 2009 and March 2010. These additional surveys were intended to provide a better resolution of data for the site records, as specified in data requests by the BLM and Energy Commission staff (SES 2009dd). The pedestrian survey for the Class III Intensive Field Survey covered the original 8,230-acre Calico Solar (phases 1 and 2) project area of analysis/APE, as well as an additional 200 feet beyond that limit. The principal survey methods consisted of a systematic walk-over in parallel transect intervals no greater than 15 meters apart. Areas of steep terrain (greater than 45° angle), where access was not feasible due to unsafe/unstable surfaces, were not surveyed. These areas total less than 11 acres and occur within the northeastern project area along the south-southwest facing slope of the Cady Mountains. The areas of steep terrain not surveyed have an extremely low likelihood of containing cultural resources based on the angle and decomposition of volcanic rocks eroding downslope. Areas that were situated within or atop steep terrain with the potential for cultural resources were investigated (*e.g.,* caves and ridge tops). The survey transects extended across the entire horizontal extent of the project limits. Survey crews were guided by Trimble XH sub-meter global positioning system (GPS) units uploaded with records search, township, built-environment features, and project-specific boundary data. Individual crews were assigned portions of the project area for survey and recordation.

The applicant reported that the archaeological data recorded during the Class III intensive field survey represents a preliminary in-the-field assessment based solely on observations of artifacts and other cultural components visible on the surface (TS 2010an, p.6-15). The applicant has conducted no subsurface testing within the project area, and more formal laboratory analysis of artifacts was beyond the scope of the Class III intensive field survey (TS 2010an, p. 6-15). The BLM representatives did collect all temporally diagnostic artifacts identified on the surface by the applicant during the survey fieldwork. BLM archaeologist, James Shearer, took possession of those artifacts, which are now located at the BLM Barstow field office (TS 2010an, p. 4-2).

Site Recordation

The guidelines applied to field survey and recordation of cultural resources within the Project area of analysis were provided by BLM Barstow archaeologist Jim Shearer (TS 2010an, p. 4-3). The guidelines define archaeological sites as consisting of six (6) or more historic period artifacts or prehistoric period artifacts with a tool within 30 meters of each other. Groups of five or fewer prehistoric or historic artifacts within 30 meters of each other were recorded as isolated finds. Isolated groupings of five or fewer non-diagnostic historic cans were not recorded under the guidelines provided.

Individual Locus numbers were assigned to areas within sites where higher artifact concentrations occurred. A locus number was assigned to concentrations of more than six artifacts within a discrete location. Discrete locations were defined as single reduction loci, multiple single reduction loci, and/or lithic scatter concentrations. In the case of multi-component sites, historic and prehistoric components were assigned an individual locus when possible.

Once identified in the field, survey teams recorded archaeological sites and isolates by completing the appropriate Department of Parks and Recreation (DPR) 523 Series forms. Form information was collected using a combination of staff observations and data recording devices including sub-meter GPS and digital cameras. Each isolated find and site was given a designation that included the initials of the team leader and a sequential number (e.g., RAN-001, with isolated finds including the designator "ISO," e.g., RAN-ISO-002). Site and loci boundaries were delineated by team members transecting the area of the find with transects spaced no greater than 5 meters apart. Artifacts and/or artifact clusters were flagged, described, and photographed. Individual artifacts not part of a larger concentration were point-provenienced with the GPS, as were concentrations smaller than five meters across. Concentrations with a diameter of five meters or more were recorded as polygons representing the outer loci boundary. Digital photographs were taken of selected artifacts and concentrations. Each site was recorded with one or more photographs. All photographs were recorded onto the team's log with relevant data including temporary site/isolate designation, date, direction, recorder, and subject. Trails segments also mapped with the sub-meter GPS, following the trail until terminated or no longer feasible to follow, measured, described in notes, and photographed.

Data Processing

Data collected in the field were transferred to electronic field office data files on a daily basis. Data were quality checked to ensure conformance with the scope of work, agency satisfaction, and regulatory compliance. GPS data were downloaded using TerraSync software and transmitted to GIS staff for post-processing, e.g., applying differential data correction. Initial plots of data from each survey team were compiled and reviewed to determine the validity of resource boundaries with regard to established methods. Where appropriate, resource areas were combined into larger units based on distance between artifacts and/or concentrations (i.e., less than 30 meters).

Cultural Resource Site Taxonomy

Based on previous archaeological investigations completed within and/or near the Calico project area, the applicant developed categories of archaeological site types that one could expect to encounter during the Class III intensive field survey. The general prehistoric and historic site type categories listed below provided a framework for the definition and documentation of resources identified in the project area:

Isolated Find: Per the guidelines applied to intensive field survey and recordation of cultural resources within the Project area of analysis, provided by BLM archaeologist Jim Shearer, an isolated find is defined as a group of five or fewer prehistoric and/or historic artifacts more than 30 meters from any other prehistoric and/or historic artifacts.

Based on this definition, individual and groups of less than five historic period cans were not recorded during the survey.

Lithic Reduction Scatter: This site type includes all sites containing flaked and/or battered stone artifacts indicative of lithic reduction activities, including lithic debitage, cores (including early-stage bifacial cores), tested (or assayed) cobbles, and hammerstones; with no other artifact types present.

Complex Lithic Scatter: This site type may contain the same artifact types defined above for Lithic Reduction Scatters, but also contains formed flaked stone tools indicative of a wider range of activities beyond lithic reduction. Those tools may include projectile points or other late-stage bifacial tools, patterned or unpatterned flake tools, and edge-modified flakes.

Ground Stone Scatter: This site type includes milling-related artifacts, including "top" and "bottom" stones, such as manos and/or expedient hand stones and metates, respectively.

Ceramic Scatter: This site type contains objects made of clay that were fired and hardened to form utilitarian vessels or objects for use by prehistoric cultures. These objects are usually found as fragments at archaeological sites.

Fire-Affected Rocks and/or Hearths: These site types are typically loose scatters or discrete concentrations of rocks that have been affected by intense heat and display cracking or pot lid fractures, charring, and/or fire/smoke blackening.

Cleared Circles: These features are typically found on desert pavement surfaces. They consist of roughly circular areas ranging from approximately one to three meters in diameter where the larger rocks on the ground surface have been removed or relocated to the outer edge of the area, leaving only the smaller, surficial pebbles remaining within the circumference of the features. Similar features may result from natural or cultural processes.

Trails: These site types are 30-to-50-centimeter-wide footpaths that appear tamped or pushed (constructed) into the surrounding soils. These features are most apparent on desert pavement surfaces or other stable landforms. Often, particularly on desert pavement surfaces, the larger rocks have been cleared from the path of the trail. These site types may or may not be associated with other archeological remains.

Rock Cluster Features: These are features that may occur as isolated finds or can be associated with prehistoric or historical archaeological sites and are often referred to as cairns. These features consist of constructed rock concentrations that stand out from the surrounding ground surface. Such features can consist of a single course of rocks, or rocks stacked higher than one course. These features may represent prehistoric activity, or they may be associated with mining claims and homesteading land claims. Similar rock clusters are also commonly used by off-highway vehicle (OHV) users to demarcate OHV tracks, trails, and racecourses.

Historical Refuse: This site type consists of a deposit and/or sparse distribution of domestic, commercial, construction, or industrial debris (e.g., cans, bottles, ceramic tableware, milled lumber, machinery, and appliances) that pre-dates 1963.

Historical Structure: This site type consists of any structure constructed prior to 1963 including, but not limited to, residential buildings, commercial buildings, ancillary structures, and electrical sub-stations.

Historical Survey/Mapping Features: These site types are built/constructed features erected prior to 1963 (not including Rock Cluster Features) that may be isolated and/or associated with other site types listed. Examples of such features include United States General Land Office (GLO) benchmarks, aerial photograph markers, and concrete foundations.

Historical Linear Resources: Linear resources include the following subtypes constructed prior to 1963: roads, railroads, and transmission lines. These sites may or may not be associated with other historical resources.

Historical Mining Sites: These sites may include, but are not limited to, borrow pits; shafts; adits/prospects or other surface mining features; access roads; mining-related equipment and other mining-related artifacts; mining-related structural ruins; and raked and scraped surfaces resulting from gravel mining that pre-date 1963.

Results of Archaeological Field Inventory

Overall surface visibility was good to excellent throughout the project area of analysis. Visibility ranged from 90-100 percent over approximately 80 percent of the ground surface; areas with greater visibility were inspected for cultural materials to ensure adequate coverage for resource discovery. Evidence of disturbances observed within and surrounding the project area included various above- and below-ground utility developments (e.g., transmission lines and pipelines), numerous rodent burrows, flash flooding/erosional cuts, mining activities, livestock trampling, off-road vehicle use, unpaved access roads, and archaeological vandalism (i.e., unauthorized artifact collection/site looting), as evidenced by apparent collection piles.

Employing the survey methods and site taxonomy/classifications described above, the applicant's Class III pedestrian archaeological field survey resulted in the identification of 119 archaeological sites and 206 archaeological isolates within the project area of analysis/APE. The archaeological sites include 94 prehistoric sites, eight historic-era sites, 15 multi-component sites (containing both prehistoric and historic-era components), and two rock cluster feature sites of indeterminate age. The archaeological resources listed and described in Cultural Resources Table 5, below, include all newly identified and relocated/updated cultural resources in the project area of analysis/APE.

CULTURAL RESOURCES TABLE 5:
Cultural Resources Inventory for the Calico Solar Project Area

Site Designation	Cultural Context	Site Taxonomy	Project Phase	Geomorphic Landform	Potential for Buried Deposits Based on Geomorphic Landform	Applicant/BLM Eligibility Recommendations
CA-SBR-1908/H UPDATE	Multi-Component Archaeological Site	Lithic Reduction Scatter Rock Cluster Features Historical Refuse Fire Affected Rocks and/or Hearths	Phase 2	Erosional Fan Remnant/Inset Fan	Very Low to Low	Rock Feature Recommended Eligible by Applicant & BLM; Lithic Reducion Scatter and historical refuse are Non-Contributing
CA-SBR-3076 UPDATE (EJK-021)	Prehistoric Archaeological Site	Complex Lithic Scatter	Phase 2	Relict Alluvial Flat/ Inset fan/ Axial Channel	Very Low to Moderate	Recommended Not Eligible
CA-SBR-4558H UPDATE (Logan Mine)	Historic Archaeological Site	Historical Refuse Historical Mining Site Historical Structure	Phase 1	Upper Alluvial Fan Piedmont	Very Low	Recommended Not Eligible
CA-SBR-4681/H UPDATE (RAN-102/H)	Multi-Component Archaeological Site	Complex Lithic Scatter Historical Survey/Mapping Features	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-5600/H UPDATE (RAN-189/H)	Multi-Component Archaeological Site	Complex Lithic Scatter	Phase 2	Erosional Fan Remnant/ Inset Fan/ Pisgah Lava	None to Low	Recommended Not Eligible
CA-SBR-5796 UPDATE (DRK-180)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-6521 UPDATE (RAN-115)	Prehistoric Archaeological Site	Lithic Reduction Scatter Rock Features	Phase 2	Erosional Fan Remnant/Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-6528 UPDATE (RSS-020)	Prehistoric Archaeological Site	Complex Lithic Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-12990 (DRK-001)	Prehistoric Archaeological Site	Lithic Reduction Scatter	200 Foot Buffer	Lower Alluvial Fan Apron	Low	Recommended Not Eligible
CA-SBR-12991 (DRK-012)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 1	Lower Alluvial Fan Apron	Low	Recommended Not Eligible
CA-SBR-12992H (DRK-021H)	Historic Archaeological Site	Historical Refuse	200 Foot Buffer	Lower Alluvial Fan Apron	Low	Recommended Not Eligible

CA-SBR-12993 (DRK-023)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Upper Alluvial Fan Piedmont	Low	Recommended Not Eligible
CA-SBR-12994 (DRK-026)	Prehistoric Archaeological Site	Lithic Reduction Scatter	200 Foot Buffer	Lower Alluvial Fan Apron	Low	Recommended Not Eligible
CA-SBR-13002/CA-SBR-13003/H (DRK-134/DRK-136/H)	Multi-Component Archaeological Site	Lithic Reduction Scatter Historical Refuse Fire Affected Rocks and/or Hearths	Phase 2	Lower Alluvial Fan Apron	Low	Recommended Not Eligible
CA-SBR-13004 (DRK-139)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13005 (DRK-140)	Prehistoric Archaeological Site	Complex Lithic Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13006 (DRK-141)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13007 (DRK-142)	Prehistoric Archaeological Site	Complex Lithic and Groundstone Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13008 (DRK-145)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13009 (DRK-150)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13010 (DRK-152)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13011 (DRK-153)	Prehistoric Archaeological Site	Complex Lithic Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13012H (DRK-155H)	Historic Archaeological Site	Historical Refuse Fire Affected Rocks and/or Hearths	Phase 2	Lower Alluvial Fan Apron	Low	Recommended Not Eligible
CA-SBR-13013 (DRK-160)	Prehistoric	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant/Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13014H (DRK-163H)	Historic Archaeological Site	Historical Refuse	Phase 2	Lower Alluvial Fan Apron	Low	Recommended Not Eligible
CA-SBR-13015 (DRK-166)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13016 (DRK-167)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Axial Channel	Very Low	Recommended Not Eligible
CA-SBR-13017H (DRK-168H)	Historic Archaeological Site	Historical Refuse	Phase 2	Lower Alluvial Fan Apron	Low	Recommended Not Eligible

CA-SBR-13020 (DRK-173)	Prehistoric Archaeological Site	Lithic Reduction and Groundstone Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13021 (DRK-174)	Prehistoric Archaeological Site	Lithic Reduction Scatter and Possible Hearth	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13022/CA-SBR-13024 (DRK-175/DRK-177)	Prehistoric Archaeological Site	Complex Lithic Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13025 (DRK-178)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13026 (DRK-182)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant/Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13027 (DRK-184)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13028 (KRM-002)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Upper Alluvial Fan Piedmont	Very Low	Recommended Not Eligible
CA-SBR-13029 (KRM-003)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Upper Alluvial Fan Piedmont	Very Low	Recommended Not Eligible
CA-SBR-13030 (KRM-008)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Upper Alluvial Fan Piedmont/ Lower Alluvial Fan Apron	Very Low to Low	Recommended Not Eligible
CA-SBR-13031 (KRM-024)	Prehistoric Archaeological Site	Trail	Phase 2	Lower Alluvial Fan Apron	Low	Recommended Not Eligible
CA-SBR-13032 (KRM-028)	Prehistoric Archaeological Site	Trail	Phase 2	Upper Alluvial Fan Piedmont	Very Low	Recommended Not Eligible
CA-SBR-13038/CA-SBR-13040/H (KRM-160/KRM-167/H)	Multi-Component Archaeological Site	Lithic Reduction Scatter Rock Cluster Features	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13039 (KRM-164)	Prehistoric Archaeological Site	Lithic Reduction Scatter Rock Ring Feature	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13041 (KRM-170)	Prehistoric Archaeological Site	Complex Lithic Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13042 (LTL-008)	Prehistoric Archaeological Site	Complex Lithic Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13044 (LTL-011)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible

CA-SBR-13045 (LTL-012)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13046 (LTL-015)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13047 (LTL-016)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13048 (LTL-017)	Prehistoric Archaeological Site	Complex Lithic Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13049 (LTL-018)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13050 (LTL-019)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13051 (LTL-022)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Pisgah Lava	None to Very Low	Recommended Not Eligible
CA-SBR-13052 (LTL-023)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan Pisgah Lava	None to Very Low	Recommended Not Eligible
CA-SBR-13053 (RAN-011)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Upper Alluvial Fan Piedmont	Very Low	Recommended Not Eligible
CA-SBR-13054 (RAN-025)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 1	Upper Alluvial Fan Piedmont	Very Low	Recommended Not Eligible
CA-SBR-13055 (RAN-101)	Prehistoric Archaeological Site	Lithic Reduction Scatter Rock Cluster Features	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13056 (RAN-108)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13059 (RAN-114)	Prehistoric Archaeological Site	Complex Lithic Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13060 (RAN-116)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13061/CA-SBR-13076 (RAN-118/RAN-173)	Prehistoric Archaeological Site	Lithic Reduction Scatter Rock Cluster Features Historical Refuse	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13062 (RAN-120)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13063/H (RAN-123/H)	Multi-Component Archaeological Site	Lithic Reduction Scatter Rock Cluster Features Historical Refuse	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible

CA-SBR-13064 (RAN-128)	Prehistoric Archaeological Site	Lithic Reduction Scatter Rock Cluster Features	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13065 (RAN-131)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Axial Channel	Very Low to Moderate	Recommended Not Eligible
CA-SBR-13066 (RAN-138)	Prehistoric Archaeological Site	Lithic Reduction Scatter Historical Refuse	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13068 (RAN-146)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13069 (RAN-154)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13070/CA-SBR-13067/H (RAN-155/RAN-139/H)	Multi-Component Archaeological Site	Lithic Reduction Scatter Historical Refuse Fire Affected Rocks and/or Hearths	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13071 (RAN-163)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13072 (RAN-168)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Axial Channel	Very Low to Moderate	Recommended Not Eligible
CA-SBR-13073 (RAN-169)	Prehistoric Archaeological Site	Complex Lithic Scatter	Phase 2	Lower Alluvial Fan Apron	Low	Recommended Not Eligible
CA-SBR-13074 (RAN-170)	Prehistoric Archaeological Site	Complex Lithic Scatter	Phase 2	Lower Alluvial Fan Apron	Low	Recommended Not Eligible
CA-SBR-13075 (RAN-171)	Prehistoric Archaeological Site	Complex Lithic Scatter	Phase 2	Lower Alluvial Fan Apron Axial Channel	Very Low to Moderate	Recommended Not Eligible
CA-SBR-13078 (RAN-177)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13079 (RAN-179)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13080 (RAN-180)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Axial Channel	Very Low to Moderate	Recommended Not Eligible
CA-SBR-13081 (RAN-181)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Axial Channel	Very Low to Moderate	Recommended Not Eligible
CA-SBR-13082 (RAN-183)	Prehistoric Archaeological Site	Lithic Reduction Scatter Rock Cluster Features	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13083 (RAN-186)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible

CA-SBR-13084 (RAN-188)	Prehistoric Archaeological Site	Complex Lithic Scatter	Phase 2	Erosional Fan Remnant/Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13085 (RAN-190)	Prehistoric Archaeological Site	Lithic Reduction Scatter Rock Cluster Features	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13086 (RSS-005)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13089 (RSS-009)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Axial Channel/Relict Alluvial Flat	Very Low to Moderate	Recommended Not Eligible
CA-SBR-13091 (RSS-013)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Axial Channel	Very Low to Moderate	Recommended Not Eligible
CA-SBR-13092 (RSS-014)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13093/H (RSS-017/H)	Multi-Component Archaeological Site	Complex Lithic Scatter Rock Cluster Features	Phase 2	Erosional Fan Remnant/ Axial Channel/ Inset Fan	Very Low to Moderate	Rock Features and Cleared Areas are Recommended Eligible by Applicant & BLM; Complex Lithic Scatter are Non-Contributing
CA-SBR-13094 (RSS-018)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13096 (SGB-013)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 1	Lower Alluvial Fan Apron	Low	Recommended Not Eligible
CA-SBR-13097 (SGB-017)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 1	Lower Alluvial Fan Apron	Low	Recommended Not Eligible
CA-SBR-13104 (SGB-041)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Upper Alluvial Fan Piedmont	Very Low	Recommended Not Eligible
CA-SBR-13105 (SGB-097)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Rock Outcrop within the Upper Alluvial Fan Piedmont	None to Very Low	Recommended Not Eligible
CA-SBR-13106 (SGB-099)	Prehistoric Archaeological Site	Lithic Reduction Scatter Fire Affected Rocks and/or Hearths	Phase 2	Rock Outcrop within the Upper Alluvial Fan Piedmont	None to Very Low	Recommended Not Eligible
CA-SBR-13107 (SGB-104)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Rock Outcrop within the Upper Alluvial Fan Piedmont	None to Very Low	Recommended Not Eligible
CA-SBR-13111 (SGB-120)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13122 (KRM-165)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible

CA-SBR-13123 (EJK-002)	Prehistoric Archaeological Site	Lithic Reduction Scatter Historical Refuse	Phase 2	Relict Alluvial Flat/Axial Channel	Very Low to Moderate	Recommended Not Eligible
CA-SBR-13124/H (EJK-004/H)	Multi-Component Archaeological Site	Lithic Reduction Scatter Historical Refuse	Phase 2	Relict Alluvial Flat/Axial Channel	Very Low to Moderate	Recommended Not Eligible
CA-SBR-13125/H (EJK-005/H)	Multi-Component Archaeological Site	Lithic Reduction Scatter Historical Refuse	Phase 2	Relict Alluvial Flat	Very Low	Recommended Not Eligible
CA-SBR-13126/ CA-SBR-5794/H (EJK-009/H)	Multi-Component Archaeological Site	Complex Lithic Scatter Rock Cluster Features Historical Refuse	Phase 2	Axial Channel/Relict Alluvial Flat	Very Low to Moderate	Recommended Eligible by Applicant & BLM; Parts of the Site Within the project area of analysis are Non-Contributing
CA-SBR-13349/H (RSS-006/ SGB-112/ SGB-114/SGB-118/SGB-127/H)	Multi-Component Archaeological Site	Complex Lithic and Groundstone Scatter Historical Refuse	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13441 (RAN-107/RAN-110)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13442 (DRK-133/LTL-009)	Prehistoric Archaeological Site	Complex Lithic Scatter	Phase 2	Erosional Fan Remnant/Inset Fan	Very Low to Low	Recommended Not Eligible
CA-SBR-13443/H (DRK-176/RAN-175/H)	Multi-Component Archaeological Site	Complex Lithic and Groundstone Scatter Historical Refuse	Phase 2	Axial Channel	Very Low to Moderate	Prehistoric Component Recommended Eligible by Applicant & BLM; Historic Component Recommended as Non-Contributing
CA-SBR-13444 (DRK-170/DRK-171)	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
CA-SBR-13445 (RSS-008/RSS-011)	Prehistoric Archaeological Site	Complex Lithic Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
DRK-S1-001H	Historic Archaeological Site	Trail	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible

DRK-S1-013	Indeterminate	Rock Cluster Feature	Phase 2		Very Low	Recommended Not Eligible
MN-S1-001	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
MN-S1-004	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
MN-S1-005	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
MN-S1-009	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
MN-S1-017H	Historic Archaeological Site	Historical Refuse	Phase 2	Axial Channel	Very Low to Moderate	Recommended Not Eligible
NOTR-PRM-S1-002/H	Multi-Component Archaeological Site	Lithic Reduction Scatter Historical Refuse	Phase 2	Erosional Fan Remnant	Very Low	Recommended Not Eligible
PRM-S1-009	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Upper Alluvial Fan Piedmont	Very Low	Recommended Not Eligible
PRM-S1-021H	Historic Archaeological Site	Rock Cluster Features Historic Survey/Mapping Features	Phase 2	Upper Alluvial Fan Piedmont	Very Low	Recommended Not Eligible
P36-014578 (RAN-035)	Indeterminate	Rock Cluster Features	Phase 2	Upper Alluvial Fan Piedmont	Very Low	Recommended Not Eligible
P1793-1H (RAN-050/H)	Multi-Component Archaeological Site	Historical Refuse	Phase I	Axial Channel	Low	Recommended Not Eligible
SM-S1-001	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible
SM-S1-003	Prehistoric Archaeological Site	Lithic Reduction Scatter Fire Affected Rocks and/or Hearths	Phase 2	Inset Fan/Erosional Fan Remnant	Very Low to Low	Recommended Not Eligible
SM-S1-005	Prehistoric Archaeological Site	Lithic Reduction Scatter	Phase 2	Inset Fan	Very Low to Low	Recommended Not Eligible

Discussion of Results of Archaeological Surveys

As described in the Environmental Setting section of this document, a geoarchaeological investigation was conducted for the Calico Solar project in response to BLM/CEC Data Requests 92 to 96 (SES Nov. 2009dd DR 92-108). The results of geoarchaeological investigation concluded that the overall potential for buried archaeological resources to occur in the project area ranges from very low to moderate, depending on to the underlying landform, as well as the degree of desert pavement stablization present on the project site. The applicant defines desert pavement as a desert surface covered with closely packed, interlocking angular or rounded rock fragments of pebble and cobble size (TS 2010an, p. 3-4).

Based on the geoarchaeological analysis, the applicant states that the degree of desert pavement stabilization is directly correlated with the likelihood of the matrix to contain buried archaeological deposits (*i.e.,* the less stable or poorly developed desert pavement surfaces exhibit more sediment visibility and are, therefore, more likely to contain buried archaeological deposits) (TS 2010an, p. 4-4). Although a well-formed desert pavement does not preclude the existence of a buried component to a site located on that pavement, it does significantly decrease the likelihood that a buried archaeological deposit *not already evident on the surface* is buried below it. In cases where archaeological remains are *evident on desert pavement surfaces*, artifacts that have been part of the desert pavement for longer periods of time will exhibit more patination and weathering from eolian (wind) abrasion. Thus, sites with a large number of heavily weathered surface artifacts may have a higher number of subsurface artifacts than a site with relatively "fresh" looking artifacts (TS 2010an, p. 4-4). The applicant reports a varying degree of artifact weathering in some of the site descriptions; however, there does not appear to be a comprehensive analysis of the degree of artifact weathering at the various sites.

The majority of archaeological sites identified during the survey were found to occur in the southern portion of the project area where the surface is covered by varying degrees of desert pavement. These areas of desert pavement also contain an abundance of naturally occurring cryptocrystalline silicate materials (chalcedony, jasper, others), which are suitable for the production of flaked stone tools. Thus, the locations of the prehistoric sites observed within the Calico Solar Project study area appear to be largely dictated by the availability of these lithic raw materials that are constituents of the pavements. Referred to as 'pavement quarries' (see Byrd, et al. 2009), these areas of desert pavement, which also contain naturally-occurring raw material exploited by prehistoric inhabitants for toolstone production, are commonly found on alluvial landforms in the Mojave Desert region. As such, the applicant has stated, "the correlation of these desert pavement surfaces with the archaeological materials contained therein may be informative" (TS 2010an, p. 3-4).

The geoarchaeological study also suggests that the Holocene alluvial deposits within and adjacent to the landform identified as the east-west Axial Channel (in the southern portion of the project area) are the most likely source for buried archaeological deposits. Archaeological sites identified along this drainage contain a variety of artifact types, including groundstone and other indications of, at the least, food processing localities. The loose sandy matrix and the seasonal rain and flood events are likely to have obscured portions of these deposits (TS 2010an, p. 2-4). At least sixteen (16) sites within the project area occur within the Axial Channel and associated minor landforms (see Cultural Resources Table 5).

Among the 119 archaeological sites documented in the project area of analysis, eighty-four (84) sites are categorized as *Lithic Reduction Scatters* consisting of locally occurring raw material obtained onsite. As discussed above in the methods section, sites classified as *Lithic Reduction Scatters* contain prehistoric flaked and/or battered stone artifacts including lithic debitage, cores, tested/assayed cobbles, and hammerstones with no other artifact type present. Indicative of primary lithic reduction activities, such sites are common and even anticipated to be present in the context of a pavement quarry landscape where materials are being tested/assayed for suitability of toolstone manufacture.

Twenty-two (22) sites in the project area are categorized as *Complex Lithic Scatters*, which contain the same artifact types defined for *Lithic Reduction Scatters* above, but also contain formed flaked stone tools indicative of a wider range of activities beyond primary lithic reduction, such as projectile points or other late-stage bifacial tools, patterned or unpatterned flake tools, and edge-modified flakes. In addition, groundstone and fire affected rock and/or hearths were noted in at least five (5) sites in the project area, and groundstone was noted in at least four (4) sites. The presence of *Complex Lithic Scatter* sites, as well as the occurrence of hearths/fire affected rock and groundstone, in the project area suggests that a wider range of activities, beyond primary lithic reduction (intial testing/assaying), may have been occurring in the project area.

Over 560 *Rock Cluster Features* have been documented at 14 different archaeological sites in the project area. The applicant defines *Rock Cluster Features* as constructed rock concentrations, which consist of a single course of rocks or are stacked in multiple courses. These rock features have been recorded in association with seven (7) prehistoric sites, one (1) historic-era site, and four (4) multi-component sites (which contain both historic and prehistoric elements) in the project area of analysis. Two (2) of the rock features were recorded as isolated sites unassociated with any other archaeological remains. The function and cultural affiliation of the rock cluster features remains unknown at this time, as the applicant was unable to discern any patterns or associations that would enable a conclusive determination regarding whether these features are historic or prehistoric in origin. The primary artifact association of the rock features in the project is with prehistoric flakes and fragments, although not all features have them. Associations with historic artifacts are limited to the margins of the National Old Trails Road or other historic roads. The archaeological deposits of this feature type are found exclusively on the Inset Fans and Relict Alluvial Fan Piedmont landforms. It is uncertain from surface inspection, recordation, and review of the pertinent literature whether the rock features are all prehistoric, all historic, or both. The applicant points out that some of the stones that make up the rock clusters exhibit distinct rubification on their upper surfaces (TS 2010an, p. 5-335). Rubification is a red cast or film that accretes on desert stones through contact with iron in the soils. The presence of rubification on the upward-facing surfaces of these stones, rather than the surfaces that are in contact with the soil, indicates that they were upturned or transported to their current location. The corresponding lack of rubification on the lower surfaces, which are in contact with the soil, indicates that it is unlikely that these stones have been in their current configuration since prehistoric times, though the exact rate of rubification varies according to environmental conditions (TS 2010an, p. 5-335, p. 5-475, p. 5-566).

The applicant states that a total of twenty-two (22) sites recorded within the project area were reported to contain historic-era archaeological remains. Eight (8) of these sites were recorded solely as historic archaeological sites, while the remaining fourteen (14) were recorded as multi-component sites containing both historic and prehistoric remains. The overwhelming majority (17 out of 22) of the historic sites/components identified within the project area are categorized as *Historic Refuse* scatters, which are defined as a sparse distribution of domestic, commercial, construction, or industrial debris (e.g., cans, bottles, ceramic tableware, milled lumber, machinery, appliances, etc.) that pre-date 1963. The remaining five (5) historic sites/components consist of *Historic Mining* remains (documented at two sites); *Historic Survey/Mapping Features* (documented at two sites), and a *Historic Linear Site* (one historic trail).

As indicated above, the majority of the resources identified within the project area are prehistoric lithic scatters that generally lack temporally diagnostic artifact types. Therefore, only broad timeframes could be applied to those sites ranging in age from the early prehistoric cultures (Paleoindian Period, circa 12,000 to 9,000 years before present) to the historical period. Only the sites that contain temporally diagnostic artifacts or features could be placed into chronological groups with any degree of precision or reliability. The applicant points out, however, that "diagnostic artifacts can provide valuable insights into the regional chronology, but information gathered exclusively through surface collection methods can be incomplete or unreliable" (TS 2010an, p. 6-2). "Additional information is, therefore, sometimes gathered using subsurface testing and analysis of artifacts by specialists to further refine site chronology" (TS 2010an, p. 6-2).

The applicant reports that the results of the survey, as well as previous research, in the Calico Solar project area revealed twenty-one (21) temporally diagnostic prehistoric artifacts (one of which was previously collected in 1990 for a different project), which indicate a broad time span of regional site use (TS 2010an, p. 6-23). Of the total temporally diagnostic artifacts in the project area, eighteen (18) occur at archaeological sites and three (3) are isolated finds. The projectile point types include the following: one (1) Elko Series projectile point (CA-SBR-13075); seven (7) Pinto Series projectile points (CA-SBR-6528, -5600, -13126, and isolate KRM-S1-ISO-001); one (1) Lake Mojave Series projectile point (CA-SBR-5600); four (4) Silver Lake Series projectile points (CA-SBR-13126/H, CA-SBR-1908); one (1) isolated Cottonwood Triangular point (P36-014748); and the base of one (1) isolated Desert-Side notched point (P36-014745). The groundstone consists of four (4) metates (CA-SBR-13007, -13443/H, -13349/H and -13061/13076), one (1) abrader (CA-SBR-13075) and two (2) manos (CA-SBR-13020, P36-014730). Two prehistoric pottery sherds were reported at site CA-SBR-1793. Some ceramics occur on private land outside the project area (i.e., NAP areas) and include one (1) Barstow buffware ceramic sherd (CA-SBR-13095) and four (4) Tizon brown sherds (P36-014829).

C.3.5.5 BUILT ENVIRONMENT SURVEY

Built Environment Field Survey Methodology

On August 19 and October 27 through 28, 2008, the applicant conducted a historic built environment survey for properties that appeared to meet the age criteria for consideration as potential historical resources (i.e., older than 45 years) within the built environment project area of analysis, which includes the project footprint and a CEC one-half-mile built-environment buffer. Following completion of the field survey, the applicant evaluated the properties for eligibility per NRHP and CRHR criteria. Properties younger than 45 years were noted, but not formally recorded or evaluated.

As part of the built environment survey the applicant contacted San Bernardino County Land Use Services, City of Barstow Community Development Department, and the Mojave River Valley Museum on September 15, 2008 to identify cultural resources within a one-mile radius around the project footprint that had been listed pursuant to ordinance or recognized by a local historical society or museum. To date, responses have not been received from the local agencies and historical society.

In addition to efforts to develop a historic context for the built environment, the applicant conducted site-specific and general primary and secondary research at the University of California at Riverside, Rivera and Science libraries; the SBAIC at the San Bernardino County Museum; San Bernardino County Recorder's office; San Bernardino County Assessor's office; and using numerous online resources. Thomas Taylor, Manager of Biological and Archaeological Services for Southern California Edison, provided site-specific information about the Pisgah Substation and the 12-kV and 220-kV transmission lines within the project area.

The applicant obtained historic maps from the University of California at Riverside science library and the Archaeological Information Center at the San Bernardino County Museum in Redlands. Maps obtained include 1955 15-minute U.S. Geological Survey quadrangles, five maps depicting the Old National Trails Highway, *Punnett Brothers Map of San Bernardino County* (1914), *Kremmerer's map of San Bernardino County* (1925), and *Thomas Brothers Settlers* and *Miner's Map of San Bernardino County* (1932). These maps were reviewed to identify possible unrecorded historical structures and archaeological sites within the project area and within a one-mile search radius.

The applicant conducted additional historic research in October 2009 in response to BLM/CEC Data Requests. As a result, the applicant updated information related to historic manganese mining in the general desert region, and provided more specific information for the Logan Mine.

<u>Results of Built Environment Survey</u>

Based on the historic built-environment field investigation, the applicant identified ten properties within the project area of analysis that meet the age criteria for consideration as potential historical resources (see Cultural Resources Table 6, below). Four of the properties are located within the area of direct impact, including Hector Road (CA-SBR-13118H), the Pacific Gas and Electric Pipeline (no trinomial), the Mohave Pipeline (no trinomial), and abandoned segments of the National Old Trails Road (CA-SBR-2910H). The remaining six resources are located within the one-half mile built-environment study area and would not be subject to direct impacts as a result of the project, but have been analyzed in terms of potential indirect effects. Two historic built linear resources occur within the project area of analysis: the National Old Trails Road/U.S. Route 66 (CA-SBR-2910H); and the Atlantic & Pacific Railroad/Atchison Topeka & Santa Fe Railroad (CA-SBR-6693H) (now the BNSF railroad). Segments of these linear resources had been previously recorded and evaluated outside the project limits. Some of the previously recorded segments (not within the project limits) were determined to be eligible for the NRHP and CRHR.

The Pacific Gas and Electric Pipeline and the Mojave Pipeline are natural gas pipelines that pass through the portions of the project area. Both of these pipelines were constructed prior to 1955; however, there are no visible features of either pipeline within the project area. In addition, the Advisory Council on Historic Preservation has exempted federal agencies from taking into account the effects of their undertakings on historic natural gas pipelines (Advisory Council on Historic Preservation 2002). The two pipelines would not be affected by the proposed project, and they are recommended as not eligible for the NRHP or CRHR under any criteria. As a result, the applicant did not prepare DPR 523 forms for either of these pipelines. A wood pole power line is located adjacent to Hector Road in the project area south of BNSF railroad. This power line is not historic-age (45 years old or older) and was not evaluated. Two additional steel tower transmission lines are located adjacent to the SCE 12kV transmission line and a wood pole power line is located adjacent to U.S. Route 66 within the half-mile buffer of the Project area of analysis. These resources are also not historic-age and were not evaluated.

CULTURAL RESOURCES TABLE 6:
Built-Environment Resources within the Calico Solar Project Area

Trinomial	Resource Name	Year Constructed	Description of Resource	Recommended Eligible by Applicant	Location
CA-SBR-2910H	National Old Trails Road	1912	remnants of historic road	No	Phase 2 and one half-mile buffer
CA-SBR-2910H	U.S. Route 66	1930s	historic highway	No/Yes (conflicting recommendation)	One half-mile buffer
CA-SBR-6693H	Atlantic & Pacific Railroad/Atchison, Topeka, & Santa Fe Railroad	1882-1883	historic railroad and associated bridge structures	Yes	One half-mile buffer
CA-SBR-13114H	SCE 12-kilovolt power line	1961	pine T-post utility pole transmission line	No	One half-mile buffer
CA-SBR-13115H	SCE 220-kilovolt North Transmission Line	1936-1939	single-circuit, steel lattice tower transmission line	Yes	One half-mile buffer
CA-SBR-13116H	SCE 220-kilovolt South Transmission Line	1939-1941	single-circuit, steel lattice tower transmission line	Yes	One half-mile buffer
CA-SBR-13117H	Pisgah Substation	1940	SCE switching station including switch gear, bus bars, and 3 structures used for relay and station battery equipment and storage	Yes	One half-mile buffer
CA-SBR-13118H	Hector Road	late 1930s to early 1950s	one-lane, graded dirt road	No	Phase 1 and Phase 2
CA-SBR-13119H	Pisgah Crater Road	late 1930s to early 1950s	asphalt paved road	No	One half-mile buffer

Trinomial	Resource Name	Year Constructed	Description of Resource	Recommended Eligible by Applicant	Location
N/A	Pacific Gas and Electric Pipeline	prior to 1955	natural gas pipeline	Exempt under Sec. 106. Not evaluated – no effect.	Phase 2 and one half-mile buffer
N/A	Mojave Pipeline	prior to 1955	natural gas pipeline	Exempt under Sec. 106. Not evaluated – no effect.	Phase 2 and one half-mile buffer

Key:
SCE- Southern California Edison

* Both the National Old Trails Road and 1930s alignment of U.S. Route 66 have been recorded under site number CA-SBR-2910H. Because remnants of both the 1912 alignment of the National Old Trails Road and the 1930s alignment of U.S. Route 66 are located within the Project area of analysis, these resources are listed separately and separate update forms were completed.

C.3.6 HISTORICAL SIGNIFICANCE OF THE CULTURAL RESOURCES INVENTORY

State and Federal regulatory programs require the BLM and the Energy Commission to consider the potential effects of the proposed action on historically significant cultural resources. Under the subject programs (CEQA, NEPA, and Section 106), formal evaluations of historical significance conclude the process of identifying which cultural resources in the inventory for the proposed action must be given further consideration. Cultural resources that can be avoided by construction may remain unevaluated. Unevaluated cultural resources that cannot be avoided are either tested to determine eligibility status, or they are treated as eligible when determining effects. The early phases of the typical planning process often results in the development of a preliminary cultural resources inventory that includes more resources than a proposed action would ultimately affect, because the preliminary inventory cannot take into account the final design of the facility. Staff here assumes that the construction, operation, maintenance, and decommissioning of the proposed action may wholly or partially destroy all archeological sites on the surface of the project area.

Historical Significance of Archaeological Resources

Individual Prehistoric Archaeological Resources

Staff believes that the presently available prehistoric archaeological site data reported by the applicant are too course in resolution to enable an adequate evaluation of the significance of these resources. Staff asserts that there is evidence to suggest that the data potential of the prehistoric resources within the project area of analysis has not necessarily been exhausted through recordation, as suggested by the applicant, and that additional investigation is warranted in order to more definitively draw conclusions regarding archaeological site significance.

On May 22, 2010, seven (7) of the 119 archaeological sites in the project area of analysis were revisited for the purpose of site evaluation by BLM archaeologist, James Shearer and his consultant, LSA archaeologist, Dr. Fredrick Lange. The seven sites examined include CA-SBR-13126; CA-SBR-13443/H; CA-SBR-13093; CA-SBR-1908/H; CA-SBR-13075; CA-SBR-13007; and CA-SBR-6528. No formal report documenting the details of the BLM's investigation was prepared; however, upon request, staff did receive a summary of the work via email from BLM archaeologist, James Shearer on July 2, 2010. The rationale for the selection of these seven arcaheological sites for evaluation appears to be based on the following: (1) the types of surface artifacts observed during site recordation (all sites are classified as *Complex Lithic Scatters,* with the exception of one); (2) the location of the sites in proximity to the Axial Channel/Inset Fan (which is considered to have a moderate sensitivity for subsurface archaeological deposits per the geoarchaeological analysis); (3) the presence of rock cluster features or potential hearths (because the rock cluster features are indeterminate and have not been formally evaluated, the BLM is assuming them to be eligible for the NRHP); and (4) the low degree of desert pavement development reported during the applicant's site recordation. The BLM conducted subsurface testing at two (2) of the seven sites that were revisited (CA-SBR-13126/H, and CA-SBR-13443/H). No test excavation work was conducted at the remaining five sites. A brief summary of the BLM's evaluation efforts at these seven sites is provided below and is based on the email the BLM provided to staff on July 2, 2010.

CA-SBR-13126/H – The BLM excavated five (5) "post-holes" (11-inch diameter) to a depth of 70 centimeters at CA-SBR-13126/H. The BLM reported that no cultural artifacts or organic staining (midden) were observed from the post-hole excavation, but that subsurface remains may exist in the portion of the site that lies outside the project area of analysis to the west. No mapping depicting the locations of the post-holes relative to the site area was provided to staff; therefore, staff is unable to comment on the adequacy of the placement of the post-holes. The BLM determined that the portion of the site within the project area of analysis is not eligible for nomination to the NRHP.

CA-SBR-13443/H – One (1) "post-hole" (11-inch diameter) was excavated to a depth of 70 centimeters at CA-SBR-13443/H. The BLM reported that in-situ fire-affected rock was recovered from 50 to 70 centimeters below the surface. On this basis, the BLM concluded that subsurface cultural remains exist in at least one portion of the site that also has groundstone and flaked stone assemblages on the surface. No mapping depicting the locations of the post-holes relative to the site area was provided to staff;

therefore, staff is unable to comment on the adequacy of the placement of the post-holes. The BLM has determined that this site is eligible for nomination to the NRHP.

CA-SBR-13093/H – The BLM has determined that the portion of CA-SBR-13093/H, which contains thirty-seven (37) rock cluster features, is eligible for nomination to the NRHP. The BLM has also determined that the remaining portions of the site, which contain complex lithic scatter loci, are non-contributing elements to the rock features and are, therefore, not eligible for nomination to the NRHP. The BLM conducted no subsurface testing at CA-SBR-13093/H.

CA-SBR-1908/H – The BLM has determined that the portion of CA-SBR-1908/H that contains 498 rock cluster features is eligible for nomination to the NRHP. The BLM has also determined that the remaining portions of the site, which contain lithic reduction scatter loci, are non-contributing elements to the rock features and are, therefore, not eligible for nomination to the NRHP. The BLM conducted no subsurface testing at CA-SBR-1908/H.

CA-SBR-13075 – The DPR site form prepared by the applicant indicated that there was a near absence of well-developed desert pavement surface at CA-SBR-13075; however, when the BLM revisited the site, they concluded that the site is covered by "moderate desert pavement development." On this basis, the BLM concluded that there is no potential for subsurface cultural artifacts and, therefore, determined that the site is not eligible for nomination to the NRHP. The BLM conducted no subsurface testing at CA-SBR-13075.

CA-SBR-13007 – The DPR site form prepared by the applicant indicated that the soils throughout the site show no development of desert pavement; however, when the BLM revisited the site, they concluded that the site area is coverd by "moderate desert pavement development that has been disturbed throughout by braided slope erosion." On this basis, the BLM concluded that there is no potential for subsurface cultural artifacts to occur at this site and, therefore, determined that the site is not eligible for nomination to the NRHP. The BLM conducted no subsurface testing at CA-SBR-13007.

CA-SBR-6528 – The DPR site form prepared by the applicant indicated that ten of the 27 loci are on poorly developed desert pavement surfaces, one is on loose sands with no desert pavement, and the rest are on moderately to well developed desert pavement. When the BLM revisited the site, they concluded that "the site area is covered by low to moderate desert pavement development." On this basis, the BLM concluded that there is no potential for subsurface cultural artifacts to occur at CA-SBR-6528 and, therefore, determined that the site is not eligible for nomination to the NRHP. The BLM conducted no subsurface testing at CA-SBR-6528.

In summary, the BLM conducted subsurface investigations at two (2) of the 119 archaeological sites in the project area of analysis/APE; one "post-hole" was excavated at CA-SBR-13443/H, and five (5) "post-holes" were excavated at CA-SBR-13126/H. Based on surface observations and geoarchaeological data, the applicant has applied the NRHP and CRHR criteria to each of the remaining 116 archaeological sites and has recommended that all remaining 116 sites are ineligible for the NRHP and the CRHR, as follows: (1) the sites are not associated with events that have made a significant contribution to the broad patterns of the history and cultural heritage of the United States or California (Criterion A/1); (2) the sites are not associated with the lives of persons significant to the nation's or California's past (Criterion B/2); (3) the sites do not embody distinctive characteristics of a type, period, region, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represents a significant and distinguishable entity whose components may lack individual distinction (Criterion C/3); and (4) based on the geology of the sites, there is low likelihood of buried archaeological remains. Thus, research potential of the 116 archaeological sites has been exhausted through recordation; therefore, the sites are not likely to yield information important to the prehistory or history of the nation or of California (Criterion D/4). Based on the post-hole sampling conducted at two (2) archaeological sites and surface observations at the remaining 117 sites, the BLM has determined that three (3) of the 119 archaeological sites in the project area of analysis/APE are eligible for the nomination to the NRHP. The remaining 116 archaeological sites in the project area of analysis have been recommended by the applicant, and determined by the BLM, to be ineligible for nomination to the NRHP.

On June 2, 2010, in response to concerns about impacts to both cultural and biological resources, the applicant submitted an alternative project layout, which reduced the original 8,230-acre project footprint to the current 6,215 acres (TS 2010ag). A substantial amount of the northern project boundary was removed along the base of the Cady Mountains to avoid biological resources. In addition, based on the BLM's NRHP eligibility determinations for cultural resources (described above), the applicant reconfigured the portions of the southern project area to avoid all or portions of the three archaeological sites determined eligible by the BLM (CA-SBR-13443/H, CA-SBR-13093/H, and CA-SBR-1908/H). As a result of the alternative site layout submitted by the applicant, CA-SBR-13443/H has been entirely excluded from the project area, and the majority of the two other sites (i.e., the portions containing the rock cluster features), CA-SBR-1908/H and CA-SBR-13093/H, have also been excluded from the project footprint. Only the "non-contributing" (lithic scatter) portions of these two sites remain within the project area of analysis. In addition, due to their proximity to the site areas targeted for avoidance and/or proximity to biological resources being avoided, ten (10) additional archaeological sites are now also excluded from the project footprint based on the applicant's June 2, 2010 alternative project layout. The ten additional archaeological sites now wholly excluded from the project footprint include: CA-SBR-4558H; CA-SBR-13013; CA-SBR-13028; CA-SBR-13029; CA-SBR-13030; CA-SBR-13054; CA-SBR-13105; CA-SBR-13107; P36-014578; SM-S1-005. A portion of site CA-SBR-13126/H is now also excluded from the project footprint.

As indicated above, subsurface archaeological site testing has been conducted at two (2) of the 119 archaeological sites identified within the initial project footprint. Due to the BLM's eligibility recommendations and the concomitant reconfiguration/reduction of the project footprint, ten (10) sites have been entirely excluded from the project footprint, and two (2) sites have been partially excluded. Of the ten (10) sites now excluded from the project, eight (8) are prehistoric, one (1) is historic, one (1) is multicomponent, and one (1) is indeterminate. Thus, 108 archaeological sites are currently entirely or partially within the most recent proposed project footprint and would be directly affected by the project. Among the 108 remaing archaeological sites, 100 are prehistoric sites (14 of which are multi-component sites with a minor historic component), seven (7) are historic sites, and one (1) is indeterminate. The applicant has recommended, and the BLM has determined, based on surface observations, that the data potential has been exhausted through recordation for all 108 archaeological sites within the project current footprint and are, therefore, not eligible for nomination to the NRHP/CRHR.

As archaeological remains constitute non-renewable resources that, once destroyed, are lost forever, staff believes that determinations of resource eligibility must be made with due caution. Based on the information provided, staff is unable to confidently conclude that all potentially significant datasets have been identified and that representative samples of archaeological data potential have been exhausted through recordation for the 100 remaining prehistoric archaeological sites in the project area, as recommended by the applicant. The applicant's eligibility recommendations and the BLM's eligibility determinations for the 100 prehistoric archaeological sites that would be directly affected by the project are derived from preliminary, in-field assessments, based on observations of artifacts and other cultural components visible on the surface (TS 2010an, p.6-15), as well as on the geoarchaeological sensitivity analysis conducted for the project. Based on the information provided, staff believes that additional data potential may exist and subsurface testing of structured samples of the different archaeological sites would be warranted in order to draw more reliable conclusions regarding prehistoric archaeological site eligibility for at least the CRHR.

The applicant has conducted no subsurface testing at the 100 prehistoric archaeological sites in the project area, and "more formal laboratory analyses of artifacts was beyond the scope of the Class III intensive field survey" (TS 2010an, p. 6-15). The applicant has further stated that "obsidian hydration and/or radiocarbon studies were also beyond the scope of the current survey; therefore, the chronological placement of the prehistoric and historic sites for this project relied on the few temporally diagnostic surface artifacts or specific features that could be correlated with a general timeperiod" (TS 2010an, p. 6-1). The applicant has also stated that, "because a variety of temporally diagnostic artifacts occurs at different sites across the entire project footprint, these prehistoric sites, when viewed as a whole, appear to represent multiple complexes over time. In addition, because the number of temporally diagnostic artifacts is extremely low and the data are based on surface information alone, the applicant states that research questions pertaining to site chronology cannot be fully addressed *without gathering further data"* (emphasis added; TS 2010an, p. 6-25). "Though temporally diagnostic artifacts were used to assign a chronological timeframe to sites within the project area, a temporal relationship among the sites cannot be determined due to the limited data available at this time" (TS 2010an, p. 6-27). The reconstruction of these relationships among the sites (if data are available) would be critical to the derivation of interpretive contexts for the individual archaeological sites and to the consideration of whether and how the individual sites may represent a larger district or landscape-scale resources.

The applicant's and the BLM's conclusions regarding site eligibility also rely heavily on the geoarchaeological sensitivity analysis; however, as stated in the geoarchaeological technical report, the analysis is "focused on identifying those portions of the project area that have the potential for harboring archaeological deposits *with no surface manifestation*" (emphasis theirs; SES 2009dd, DR 92-93, p. 1). Since there are, in fact, ample surface manifestations of archaeological sites in the project area, and there are indications, based on the geoarchaeological report, that some portions of the project area have at least some potential for subsurface deposits (e.g., the area of the axial channel landform and associated terraces), staff believes that some archaeological site sampling is warranted to confirm whether or not data potential has been exhausted at the archaeological sites that would be impacted by the project. Staff believes, based on the geoarchaeological report, that there is virtually no potential for deeply buried archaeological deposits with no surface manifestions; however, for those sites with surface manifestations that are distributed broadly across the project area, there does not appear to be sufficient evidence, based on the applicant's technical report, to dismiss these sites entirely without some degree of subsurface sampling.

The geoarchaeological report also states, "The lack of time-sensitive diagnostic artifacts across the Calico Solar project area makes it difficult to assess what sites are older, and thus more likely to contain buried artifacts, versus those that are younger and less likely to contain buried components. One corollary, which may prove useful, is the degree of weathering of surface artifacts. The longer the artifacts have been part of the desert pavement, the more patination and visible weathering from eolian abrasion on the surface of the artifact. As such, this theory would contend that sites with a large number of heavily weathered surface artifacts will have a higher number of subsurface artifacts than a site with relatively 'fresh' looking artifacts. Testing of this concept may prove beneficial during any Phase II (test) excavations at the Calico Solar project" (SES, 2009dd, DR-94, p. 23). Based on the information provided in the applicant's technical report, it appears that the applicant did periodically note the degree of artifact weathering; however, it does not appear that any structured analysis has occurred that would have tested the above concept.

What is compelling about the current project area in terms of substantiating staff's argument for some degree of site sampling is that: (1) a large number of formed artifacts were reported in the DPR forms for the sites in the project area; (2) being on public land, there is a high likelihood that unauthorized artifact collection (i.e., looting) has occurred in the project area (as reported in the Class III technical report), which may have skewed the surface visibility of lithic materials (particularly diagnostic artifacts) and correspondingly, any conclusions drawn about the sites based on surface observations alone; (3) the geology of the area is such that a sizable expanse of toolstone-quality material was available and actively exploited by prehistoric inhabitants over an apparently broad expanse of time, and the sites' constituents reflect the importance of lithic raw material procurement and initial treatment activities; and (4) while the project area of analysis was predominantly a lithic raw material procurement/assaying area, there is also evidence of other activities beyond primary lithic reduction (e.g., secondary/tertiary lithic reduction, late-stage bifacial tools, fire-affected rock, and groundstone artifacts). The sites in the project area do not uniformly reflect basic toolstone procurement only, and it appears that other activities were also occurring there. Thus, given the size and quantity of the pavement quarry area, staff believes an attempt to more accurately characterize the technology and reduction organization through structured sampling of the sites prior to their permanent destruction by the project's construction is warranted.

Staff acknowledges that sparse lithic scatters on desert pavement in the Mojave Desert have some degree of redundancy and may have a somewhat lower likelihood to contain substantial subsurface deposits; however, there is documented archaeological research in the project vicinity indicating that such sites should not be readily disregarded, especially over such a broad expanse of land. For example, based on pavement quarry studies at the Wood Canyon Quackenbush Lake Training Area, Marine Corps Air Ground Combat Center, in Twentynine Palms (just south of the Calico Solar Project area), archaeological researchers suggest that, “excavation should remain an important component of quarry evaluations, even for sites on what appears to be compacted desert pavement. The surface expression of many SRL (segregated reduction loci) features proved quite different than what was discovered below ground, not only in terms of material volumes, but in the size and type of flaking debris encountered” (Giambastiani and Basgall 1999, p. 174).

In addition, staff would like to point out that it is common professional practice in cultural resource management to conduct at least some degree of subsurface sampling of archaeological sites that may be directly and permanently affected by a proposed project (even for sparse lithic scatters), particularly considering the broad expanse of land and degree of surface manifestations of archaeological remains reported by the applicant in the project area. The lack of site testing, as in this case, is an exception to this common practice. Furthermore, regardless of the presence of substantial subsurface deposits, professional research indicates that pavement quarries/toolstone procurement areas, such as that found in the Calico Solar project area, have been found to have research value in their own right (see Giambastiani and Basgall 1999; Giambastiani et al. 2009; Bird, et al. 2009). As stated in one study, “From a regional perspective, the study of quarry phenomena in the Mojave Desert is still in its infancy. Despite recent advances in our understanding of Great Basin obsidian and chert quarries, detailed investigations of Mojave Desert cryptocrystalline quarries have been limited in both number and scope” (Giambastiani and Basgall 1999, p. 173). In addition, Giambastiani further states, “Because these kinds of sites appear simple and redundant at first glance, there is a tendancy to assume they are all the same and that they offer little to our understanding of prehistoric desert adaptations. This is simply not true. Like any archaeological work in the Mojave Desert, it requires effort to glean hidden data from quarry sites” (Giambastiani 2009, p. 85). Based on the technical documentation provided by the applicant, a review of the archaeological literature on pavement quarries in the Mojave Desert, as well as consultations with archaeological professionals with expertise in the Mojave region, staff believes that further investigation of the sites in the Calico Solar project area is warranted in order obtain additional data that would contribute to the study of prehistory in the Mojave Desert and that the lack of subsurface sampling of the archaeological sites that would be affected by the project is not appropriate, particularly given the size and scope of the Calico Solar project and the number of sites that would be permanently destroyed as a result.

Prehistoric Archaeological Landscape

Beyond the consideration of the individual archaeological sites in the project area of analysis, Energy Commission staff believes, contrary to the recommendations of the applicant, that the implementation the proposed action would permanently destroy a large portion of a prehistoric archaeological landscape that may reasonably exist on the project site. The permanent loss of this landscape would be a significant impact requiring mitigation.

Description of Landscape

1. The potential landscape appears to represent the prehistoric use of desert pavement cobbles for toolstone acquisition along what appears to have been a key travelway between Troy Lake and Broadwell Lake, both of which are large, dry prehistoric lake beds. The archaeological sites in the project area that would contribute to the significance of the landscape include approximately 100 of the 109 known prehistoric sites in that area. Widespread archaeological remains that evidence the assay and initial reduction of desert pavement cobbles typify the contributors to this landscape. The chronological data presently available, the relatively sparse collection of projectile points, would appear to indicate that the most active use of the landscape was from roughly 6500 BC to 4000 BC. Although toolstone acquisition and early-stage lithic reduction appear to characterize the primary behavioral patterns of the landscape's use, evidence is also infrequently present that reveals other modes of landscape use. The presence of formed, chipped stone tools, ground stone tools, ceramic sherds, and fire-affected rock (FAR) concentrations reveal potential evidence of tool manufacture, organic resource processing and consumption, and temporary habitation. Temporary habitation in the project area is further indicated by the presence of two cleared circle features, which represent potential house pit depressions (site CA-SBR-13093).

2. The portion of the potential prehistoric archaeological landscape in the project area occurs across the entire southern portion of the project area south of the BNSF Railroad tracks.

3. The broader landscape of which the portion in the project area is a part includes intact desert pavements along the toe of the Cady Mountains bajada and across the older alluvial landforms that parallel the axial channel, the flowline of which slopes down to Troy Lake. The archaeological landscape, as a whole, appears to be bounded to the north by the Cady Mountains bajada, to the south by the basalt flows that emenate radially from Pisgah Crater to the southeast, to the west by Troy Lake, and to the east by Broadwell Lake. The broader landscape would appear to cover roughly nine square miles, and the portion of it in the project area covers roughly six square miles, or 66% percent of the apparent broader landscape.

Preliminary Interpretation and Evaluation of the Landscape

1. The potential prehistoric archaeological landscape is a subtle but potentially significant resource that may reflect underappreciated patterns of prehistoric land use that were important to the economy and to the maintenance of the regional social fabric during particular periods in prehistory. The landscape retains sufficient integrity to convey this significance. It has the further potential to provide information necessary to the reconstruction of those economic and social patterns, and may also provide information important to the reconstruction of toolstone acquisition and lithic production trajectories in prehistory. The individual contributors to the landscape, and the landscape as a whole, appear to retain the physical integrity necessary to the recovery of such data on lithic technology.

2. The high frequency of the archaeological sites across the desert pavements bearing toolstone quality raw materials is striking. In fact, a secondary conclusion of the geoarchaeological analysis is that prehistoric site location within the Calico Solar project area seems to be largely dictated by the availability of these lithic raw materials (SES 2009dd, p. 22).

3. Though the individual archaeological sites that contribute to the landscape typically contain sparse scatters of assayed cobbles, cortical flakes, and hammerstones, the extensive coverage of the desert pavements in the project area with this debris and the apparent relative restriction of the distribution of the debris to shallow surface grades along what are today intermittent stream courses potentially attest, over a number of millennium, to the recurrent and selective use of this portion of the desert landscape.

4. Energy Commission staff has come to the conclusion that this potential cultural landscape is a significant archaeological resource requiring mitigation as proposed in **CUL-4** and **CUL-5**.

The Perspective of the Applicant/BLM on the Landscape

1. The comment on the landscape concept in the SA/DEIS was prepared by the BLM and reflects the perspective of the BLM and the applicant.

2. The argument against the significance of the landscape made in the SA/DEIS is derived from the applicant's technical report (TS 2010an, pp. 590-591) and is summarized as follows:

    a. Using the guidelines of the National Park Service and the State of California, the applicant states that a grouping of cultural resources and their setting must be historically or functionally related and visually convey a historical theme or environment to be considered eligible for listing in the NRHP or CRHR as a landscape. The applicant states that the bolson in which the project area of analysis is situated can be characterized as an archaeological landscape; however, in terms of a definable geographic area that can be distinguished from surrounding properties by changes such as density, scale, type, age, or style of sites (per National Park Service Guidelines), the applicant suggests that rich sources of tool stone are not confined to the project area, nor are they unique. Thus, the applicant concludes that the tool stone source and landscape is not well bounded and that similar formations occur throughout the southern California deserts that were used prehistorically.

    b. The applicant further argues that the characteristic theme of the archaeological landscape cannot be dated; it is presumed, but unknowable that this toolstone source was used throughout prehistory. Since only a handful of temporally diagnostic artifacts were identified during the archaeological survey, the period of significance of the landscape cannot be met, as required by the California and National Registers. The archaeological landscape, therefore, does not have the distinctive or significant qualities required for eligibility under Criterion C/3.

c. The lack of datable material at the sites within the project area precludes their consideration for eligibility under Criteria A/1 and B/2, as both criteria require information that could link the landscape with particular events and trends, or with historically significant people. Absent information about who used these sites within the sites and when they were used, neither of these criteria can be met.

d. Finally, the lack of datable material also severely limits the utility of the assemblages to address important research issues. Data from the lithic reduction sites in the project area can address only two, insignificant questions: what materials were being exploited and what reduction residue was produced? These are insignificant because: (1) the source material is well-documented and obvious, and (2) debris from lithic reduction is of predictable forms that can inform on the methods and products of reduction, unless, as is the case in the Project area of analysis, assemblages from different reduction episodes may be mixed. Components must be well dated to provide information about trends in resource procurement, artifact/tool forms, and technological changes through time. In fact, for a number of reasons, these issues can be addressed much more productively using data from sites where the tool stone was taken and used. First, the source locality only bears the residues of reduction, while the use site will bear evidence of the forms in which the stone arrived, and the types of tools manufactured. Second, diachronic changes in technology are best addressed using data from destination sites where components are well-dated, not at mixed tool stone procurement sites. Third, the presence of certain source materials in destination/use sites provides an indication of the direction and distances the materials traveled, either through trade or direct procurement; source sites rarely bear evidence of who used the tool stone. Lastly, destination sites that are well-dated, typically bear other artifacts and ecofacts that can inform on reasons why patterns of lithic resource procurement may change through time (e.g., climate change, resource stress, technological change, circumscribed territories, etc.). In sum, the lithic reduction sites and landscape do not have sufficient data potential to qualify for listing under Criterion D/4.

Energy Commission Staff Response to the BLM Perspective

1. Energy Commission staff disagrees with the conclusions of the BLM on the potential prehistoric archaeological landscape. Staff does not believe that suffient data have been provided to substantiate the applicant’s conclusions.

2. In order to refine the mitigation of the landscape, the additional data needed may include the following:

    a. An analysis of the geomorphic context of the boundary of the landscape would be necessary to enable comment on whether the apparent landscape boundary is a function of local geomorphic processes or cultural selection. For instance, are the archaeological sites coincident with all of the toolstone-bearing desert pavements that exist on the local natural landscape, other pavements having been eroded by more recent geomorphic processs, or does the archaeological site distribution evidence cultural selection of some desert pavements on the natural landscape and the non-use of other nearby pavements?

b. The applicant states that the characteristic theme of the archaeological landscape cannot be dated due to limited presence of temporally-diagnostic artifacts and/or absence of datable materials. Among the fifteen diagnostic projectile points collected from the surface of the project area, the majority fall into the Pinto Complex, which dates from 6,500 – 4,000 BC. Since the applicant has conducted no subsurface testing, there may be additional chronological data that have not yet been collected to be able to address questions of chronology. For instance, there are ways of looking at levels of artifact weathering and at technological patterns that can provide some relative measure of site age. Such observations may also lead to other questions about how pavement quarries were used and about their place in the settlement systems that incorporated them (see Giambastiani 2009, p. 85).

c. The applicant's contention that the archaeological sites in the project area are common and found to occur on many, if not most, desert pavements is not supported by any evidence or peer-reviewed studies. It is also important to point out that not all pavement quarries are equal. The archaeological literature on the subject suggests that the more common quarries tend to contain the remains of primary reduction and assaying (Giambastiani and Basgall 1999; Giambastiani et al. 2009; Giambastiani 2009). The quarry landscape in the Calico project area appears to be atypical in the sense that it has evidence of later stage lithic tool reduction, large numbers of formed artifacts, fire affected rock, and some groundstone, all of which indicate more complexity.

d. Have the data that are now in-hand from the investigations done for the present siting case been sufficiently analyzed to be able to determine the degree to which the archaeological sites that may contribute to the subject landscape may be able to inform us on the local organization of toolstone acquisition and processing? Are there other potential datasets from these sites that recordation efforts to date have not adequately captured?

3. Energy Commission staff provides for the collection of these types of data in **CUL–4** to refine the mitigation of this prehistoric archaeological landscape.

Conclusions Regarding Prehistoric Archaeological Resources

Regarding the significance of the prehistoric archaeological resources within the Calico Solar project area, staff concludes, on the basis of the available information provided by the applicant, the BLM, and other sources that it does not appear that prehistoric archaeological resource data potential has been adequately assessed or exhausted through recordation, as believed by the applicant. Staff recommends that further sampling of the prehistoric archaeological sites within the project area is warranted in order to refine the mitigation of these and potentially broader resources.

Staff proposes Conditions of Certification **CUL-4** and **CUL-5**, requiring a post-certification refinement study to complete the applicant's effort to mitigate CRHR- and NRHP-eligible prehistoric archaeological deposits that could be impacted by the project, a preference called out in CEQA. The study would provide the applicant with information upon which to base project design changes to avoid impacts to prehistoric archaeological sites, and to verify the potential presence of such deposits and thereby provide more refined mitigation measures, particularly a more refined archaeological monitoring protocol.

The proposed conditions of certification would address questions pertaining to the eligibility of the prehistoric sites within the project area and would provide for mitigative measures for any significant impacts, should any of the sites be determined eligible for the NRHP/CRHR.

Historical Archaeological Resources

Following the applicant's submittal of the June 2, 2010 alternative project layout, which reduced the original 8,230-acre project footprint to the current 6,215 acres (TS 2010ag), the total number of historical archaeological sites within the project area of analysis was reduced to seven (7) historical archaeological sites and twelve (12) multi-component sites containing historical archaeological remains in conjunction with prehistoric remains. Among these nineteen (19) sites, sixteen (16) are comprised of historical refuse deposits consisting of a sparse distribution of domestic, commercial, construction, or inductrial debris (e.g., cans, bottles, ceramic tableware, milled lumber, machinery, and appliances) that predates 1963. The three (3) remaining sites consist of a survey/mapping feature, mining remains, and a trail, respectively.

The applicant has applied the NRHP and CRHR criteria to each of the historical archaeological sites and has recommended that all are not eligible for the NRHP and the CRHR, based on the following: (1) the sites are not associated with events that have made a significant contribution to the broad patterns of the history and cultural heritage of the United States or California (Criterion A/1); (2) the sites are not associated with the lives of persons significant to the nation's or California's past (Criterion B/2); (3) the sites do not embody distinctive characteristics of a type, period, region, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represents a significant and distinguishable entity whose components may lack individual distinction (Criterion C/3); and (4) based on the geology of the sites, there is low likelihood of buried archaeological remains. Thus, research potential of the nineteen (19) archaeological sites has been exhausted through recordation; therefore, the sites are not likely to yield information important to the prehistory or history of the nation or of California (Criterion D/4).

In most cases, the applicant indicated that, while the dates of manufacture could be determined for some of the artifacts present in the historical refuse scatters, the time between their manufacture, initial use/consumption of the artifacts, and their ultimate disposal could not be determined, so the specific date of activities at these sites could not reliably be determined based solely on the presence of these artifacts observed.

Having reviewed the site information provided for the nineteen (19) historical archaeological sites/components, staff concurs with the applicant's recommendations that data potential at the historical archaeological sites has been exhausted through recordation and, therefore, all of the historical archaeological sites/components within the project area are not eligible for the NRHP/CRHR.

Historical Significance of Built-Environment Resources

To be eligible for the NRHP and/or CRHR, properties must be 50 years old (unless they have special significance) and have national, state, or local significance in American history, architecture, archaeology, engineering, or culture. They also must possess integrity of location, design, setting, materials, workmanship, feeling, and association, and meet at least one of four criteria:

- Criterion A/1: be associated with significant historical events or trends.
- Criterion B/2: be associated with historically significant people.
- Criterion C/3: have distinctive characteristics of a style or type, or have artistic value, or represent a significant entity whose components may lack individual distinction.
- Criterion D/4: have yielded or have potential to yield important information [Title 36, Code of Federal Regulations, Part 60; Title 14, California Code of Regulations, Chapter 11.5,Section 4852(b)(1)-(4)]).

The historic built environment survey identified 10 resources within the project area of analysis. Two of these resources are linear and previously recorded. Segments of these linear resources not within the project area have been previously determined eligible for listing in the NRHP and CRHP; these include the Atlantic & Pacific/Atchison, Topeka, & Santa Fe Railroad (CA-SBR-6693H), and National Old Trails Highway/U.S. Route 66 (CA-SBR-2910H).

The applicant recommends five of the historic built resources within the project area of analysis as eligible for listing on the NRHP and CRHR: US Route 66 (CA-SBR-2910H); (1) Atlantic & Pacific Railroad/Atchison, Topeka, & Santa Fe Railroad (CA-SBR-6693H); (2) the SCE 220-KV North Transmission Line (CA-SBR-13115H); (3) SCE 220-KV South Transmission Line (CA-SBR- 13116H); and (4) the Pisgah Substation (CA-SBR-13117H).

The following is a summary of the historic built-environment resources within the project area of analysis that have been recorded and evaluated or updated on the appropriate DPR 523 series forms. This summary has been drawn from the applicant's technical report (TS 2010an, p. 574-587).

National Old Trails Road (CA-SBR-2910H)

Within the project area of analysis, the National Old Trails Road consists of eight remnant segments of a batched mix oil road. The condition of the road segments is poor. Most of the road surface is crumbled, cracked, and has eroded away in places. Some segments are buried in sand, but may be partially intact.

According to the applicant, transportation resources may be evaluated in a conventional way, such as emphasizing their local, regional, or statewide significance or considering them from the perspective of their original design, but they may also be evaluated by cognitive aspects such as their ability to illustrate the experience of the period of pre-chain-dominated roadside businesses and a sense of travel before the interstate. In order to be eligible as a transportation resource, this resource must be able to reflect its association with the theme of automobile transportation during the early 20th century era. A resource's integrity is important in evaluating these properties. A resource must be able to reflect its association with the significant period of automobile travel, when buildings were generally of simple design and materials, reflecting the styles of the local area, and when businesses were small, individually owned properties. Buildings should be linked in some way to the roadway (physically, visually, etc.) and must remain in context, illustrating their importance in roadway-related business. In addition, there are physical components of the roadway which are also important to the resource's eligibility, including the feel of the open road (vistas, panoramas, lack of encumbrances); ability to drive long distances; sense of adventure; proliferation of independently-owned roadside businesses); sense of travel before multi-lane interstates and pre-pavement roadways.

Based on the historic context and evaluative considerations, the portions of Old National Trails Road in the project area of analysis would not be considered a contributing element to the potential significance of the entire Old National Trails Road alignment or considered an individually significant segment of Old National Trails Road. Foremost, within the six-mile segment of the roadway within the project area, there are no standing structures or architectural properties associated with Old National Trails Road, such as businesses, roadside attractions, automobile court, etc. There are no properties within the project area associated with the theme of automobile transportation in the Old National Trails Road era. Further, the portion of the former roadway within the project area does not reflect any important trend or accomplishment associated with road engineering, highway design, or construction. There are no major or significant erosion-control features or landscape modifications within the segment – rather than, just mundane utilitarian erosion control efforts which really do not contribute to the significance or the understanding of the roadway. There are no distinctive engineering features with the roadway in this segment. The general feeling of the open roadway within the desert in this segment has been affected by the modern non-historic visual and atmospheric intrusions, such as the multi-lane Interstate 40, wooden and metal lattice tower power lines, transmission lines, and a fairly large electrical substation with associated infrastructure. These intrusions have diminished the property's visual narrative, context, and feeling. This portion of Old National Trails Road is not contiguous with rest of the Old National Trails Road/U.S Route 66 system, and is not associated with events which reflect the important land use activities, traditional cultural activities, and development that has characterized (and is important) to San Bernardino County, California, and the nation. There are no important people or events associated with this segment of the roadway. In addition, the property does not have the potential to yield important information. Therefore, the applicant recommends that the portion of Old National Trails Road within the project area of analysis does not appear to be a contributing element to the significance of the entire National Old Trails Road/U.S. Route 66 system, and the portion within the project area does not appear to be individually eligible for the NRHP, CRHR, or considered a historical resource for purposes of CEQA. The applicant, therefore, recommends that the portion of the road within the project area of analysis does not appear to be considered historically significant.

The portion of Old National Trails Road within the project area does not appear to possess sufficient historic integrity of setting, feeling, materials, workmanship, and association to be considered eligible for listing to the NRHP, CRHR, or considered a historical resource for purposes of CEQA. The roadway's historic integrity aspects of setting and feeling were impacted by the addition of non-historic period elements (such as new built-up asphalt surfaces [highways and roads], wood and metal lattice transmission towers and a substation). Additionally, changes in the area's general character disrupt the original and historic-period physical features which characterize the roadway within the project area. While the portion of the roadway within the one-project area has retained some historic materials and fabric (e.g., oil batch surface is present in some areas), overall the replacement and addition of certain materials from outside of the historic period impacts the property's historic configuration and appearance. Accordingly, the loss of the property's original and historic-period setting and materials affects its ability to convey a specific historic feeling. In its current condition, the portion of the road within the project area does not exhibit signs of high workmanship, since the property does not express ways people fashioned their environment during the early twentieth century. The portion within the project area is representative of common utilitarian road construction and engineering from the early 20th century, and does not express a vernacular method of construction or highly sophisticated configurations. There is little physical evidence of the crafts of a particular culture or people from the period of significance. Lastly, the portion of the roadway within the project area does not have any association or direct link between important events or people and the property. The portion of the property in the project area was not the location or place for any important event or activity, and is not sufficiently intact or distinctive to convey any type of historic-period relationship.

In summary, the applicant recommends, and staff concurs, that the portion of the road within the project area does not appear to be individually eligible for listing to the NRHP, CRHR, or considered a historical resource for purposes of CEQA, and does not appear to be contributing element or significant related feature/component to the larger linear Old National Trails Road/U.S Route 66 system (if it is determined that such a resource exists). Further, the addition of a solar plant near the roadway would not create a new adverse effect or significant impact to the portion of the historic-period property within the project area.

U.S. Route 66 (CA-SBR-2910H)

U.S. Route 66 is located within the one-half mile built-environment area of analysis, but does not lie within the project footprint. It was originally constructed in the 1930s, south of the highway's original alignment, which was known as the National Old Trails Road. U.S. Route 66 in the vicinity of the project area is a contributing segment of the NRHP-eligible and CRHR-eligible U.S. Route 66. This segment of U.S. Route 66 has been previously evaluated as eligible for the NRHP under Criterion A as one of the first all-weather highways in the United States (TS 2010an, Route 66 DPR form, p. 2).

Within the one-half mile built environment area of analysis, U.S. Route 66 in consists of an approximately nine-mile segment of two-lane paved roadway that currently serves as a frontage road for Interstate 40. The applicant describes this segment of U.S. Route 66 as a relatively pristine segment of the roadway, with modern intrusions that have compromised its historical setting, including Interstate 40, power lines, transmission lines, and an electrical substation. It is in fair condition and shows evidence of maintenance and repair. (TS 2010an, p. 5-577).

Additionally, four previously unrecorded bridge structures on U.S. Route 66 are within the one-half mile built-environment area of analysis. These bridge structures were recorded and documented on the DPR 523 update form (TS 2010an, Route 66 DPR form, p.7). All four of the bridge structures retain sufficient historical integrity to be considered contributing elements to the highway.

The applicant's consultant used the following evaluative considerations to recommend the eligibility of the segment of Route 66 in the project area of analysis: According to those existing management contexts used by the applicant's consultant, eligible Route 66 resources include properties such as motels, gas stations, restaurants and cafes, and roadside attractions, that may be individually eligible for listing on the NRHP. In order to be eligible as a Route 66 resource, a resource must be able to reflect its association with the theme of automobile transportation in the Route 66 era. A resource must be able to reflect its association with the significant period of automobile travel, when buildings were generally of simple design and materials, reflecting the styles of the local area, and when businesses were small, individually owned properties. Buildings should be linked in some way to the roadway (physically, visually, etc.) and must remain in context, illustrating their importance in highway-related business. In addition, there are physical components of the roadway which are also important to the resource's eligibility, including the feel of the open road (vistas, panoramas, lack of encumbrances); ability to drive long distances; sense of adventure; proliferation of independently-owned roadside businesses); sense of travel before multi-lane interstates and pre-pavement roadways (TS 2010an, Route 66 DPR form, p. 11).

The applicant concluded, based on the evaluative considerations described above, that the portion of Route 66 in the project area of analysis would not be considered a contributing element to the potential significance of the entire Route 66 alignment or considered an individually significant segment of Route 66. This conclusion was reached due to the absence of standing structures or built environment properties are associated with Route 66, such as businesses, roadside attractions, automobile court, etc.; the absence of properties within the area of analysis associated with the theme of automobile transportation in the Route 66 era; and that the portion of the roadway within the project area of analysis does not reflect any important trend or accomplishment associated with road engineering, highway design, or construction. Additionally, the applicant concluded that there are no distinctive engineering features with the roadway in this segment, and that the general feeling of the open roadway within the desert in this segment has been affected by atmospheric intrusions, such as the multi-lane Interstate 40, wooden and metal lattice tower power lines, transmission lines, and a fairly large electrical substation with associated infrastructure. The evaluation also states that changes in the roadway (resurfacing, re-striping, built-up asphalt application, widened shoulders) diminish the feeling of an open adventures trip on a small one- to two-lane long distance highway. The evaluation concludes that the portion of Route 66 within the built-environment area of analysis does not appear to be a contributing element to the significance of the entire U.S. Route 66 system, and the segment within the one-half mile built-environment area of analysis does not appear to be individually eligible for the NRHP, the CRHR, and would not be considered a historical resource for purposes of CEQA (TS 2010an, Route 66 DPR form, p. 11–12).

However, the applicant was requested, in Data Request 106, to consider whether three historic districts should be defined within the area of analysis, including a "National Old Trials Road/U.S. Route 66 Historic District" (CEC 2009h, p.14). As part of this evaluation, the applicant concluded, incorporating the information above, that "the segment of U.S. Route 66 in the project area of analysis *retains historical integrity and is considered eligible*" (emphasis added, TS 2010an, p. 5-589). This contradicts the original conclusion reached by the applicant.

Staff was, therefore, prompted to further research the history, context and character-defining features of U.S. Route 66 due to the discrepancy in data described above, and disagrees with the context and criteria used to evaluate the segment of Route 66 within the project area of analysis. The context described above focuses solely on the architecture that resulted from the establishment of Route 66 as a major travel route, rather than the significance of Route 66 itself as a national highway. The Route 66 Corridor Preservation Program, established by National Park Service as a result of *Public Law 102-400, the Route 66 Study Act of 1990,* notes that the significance of Route 66 is as the nation's first all-weather highway linking Chicago and Los Angeles. It was the shortest, year-round route between the Midwest and the Pacific Coast at the time, reducing the distance by more than 200 miles. Route 66 is reflective of the origin and evolution of road transportation in the United States, and is representative of the transition from dirt track to superhighway. It linked the rural West to the more densely populated Midwest and Northeast, and came to symbolize the optimism that pervaded the nation's post World War II economic recovery. As noted on the Route 66 Corridor Preservation Program's website:

> "not only does Route 66 underscore the importance of the automobile as a technological achievement, but, perhaps equally important to the American psyche, it symbolized unprecedented freedom and mobility for every citizen who could afford to own and operate a car. Escalating numbers of motor vehicles and the rise of the trucking industry increased the need for improved highways. In response the federal government pledged to link small town U.S.A. with all of the metropolitan capitals" (http://www.nps.gov/history/rt66/HistSig/index.htm)

Additionally, the Route 66 Corridor Preservation Program commissioned the *Route 66 Corridor National Historic Context Study,* published in 2004. This context study details the national significance of Route 66, identifies the period of significance (1926-1970), and identifies the historic and architectural property types associated with it. The roadbed itself is identified as one of the associated property types. The context study notes that in the 50 years that Route 66 was a major highway, the roadbed changed extensively in construction and location. Its alignment was shifted to reduce curves and corners, widened, paved and repaired. The context study goes on to state,

> "In some instances the road continues to be used as a highway or service road that even runs along side the interstate that replaced it. By following the evolution

> of the road bed, thus, one gains a closer appreciation of not only the technology of highway construction and transportation engineering, but also the social implications of both
>
> Road segments that remain from the period of historic significance are valuable artifacts that serve to chart the changing social dynamics associated with Route 66. The materials, the designs, and the locations of these road segments reflect on the one hand new and changing technologies and the evolution of pavement design and traffic engineering, and on the other hand the social and economic circumstances that forced and shaped the roadway's course or alteration" (Cassity 2004, pp. 287–288).

The *Route 66 Corridor National Historic Context Study* also identifies those features that a road segment must retain in order to be considered eligible, including the original cross -section template (cut banks, fill slopes, roadbed, grade); original alignment or later realignment; and associated features such as bridges and culverts (even if they have been modified or replaced). The context study also states that those segments of road that have been widened after the end of the period of significance may still be included if they link other significant sections of the route, and, notably, that pavement is "an inherently fragile feature of highways and is routinely covered over and replaced" (Cassity 2004, pp. 289–290).

Based on the information from the *Route 66 Corridor National Historic Context Study* summarized above, staff has determined that the section of U.S. Route 66 in the project area of analysis would be a contributor to a larger U.S. Route 66 historic district, should such a resource be determined eligible, and that this section would therefore be considered a historic resource for the purposes of CEQA. This section of Route 66, as described in the original evaluation, is a pristine section of roadway. It is a realigned section of the road, which originally ran along the National Old Trails Road. It was realigned south to its existing location in the early 1930s to reduce sharp turns, steep grades and accommodate higher speeds. Also stated in the applicant's evaluation is that the section of Route 66 from Needles to Los Angeles, including this section, was the most travelled section of the highway and it was paved in 1934 (TS 2010an, Route 66 DPR form, p. 4). The road has been resurfaced and widened since its construction, and although the dates of these changes are not clear, staff is confident in the presumption that they took place within the identified Route 66 period of significance 1926-1970, as the road would have required those modifications to accommodate modern traffic.

This section of road also retains those character-defining features noted in the National Historic Context Study in order to be considered eligible: the original cross-section template, later (1934) realignment, and four associated single-span bridges that were constructed from 1939 to 1952 (Bridges located at postmiles 08-SBD-040-R31.37, 08-SBD-040-R32.26, 08-SBD-040-R33.11 and 08-SBD-040-R33.55).As stated in the original evaluation, these four bridges retain features that indicate they are likely an original features of Route 66, including the concrete decking, and are in good state of preservation (TS 2010an, Route 66 DPR form, page 8).

The original evaluation of the segment of Route 66 within the project area of analysis also notes that such the setting has been compromised by intrusions such as Interstate 40, wooden and metal lattice tower power lines, transmission lines, and a fairly large electrical substation with associated infrastructure. However, the Southern California Edison (SCE) 220-Kilovolt North and South Transmission Lines and the Pisgah Substation were all constructed between 1936 and 1941, beginning only two years after the construction of Route 66 in 1934. Interstate 40 was constructed in 1968, also within the national period of significance. The SCE 220 kV lines and the Pisgah Substation have been determined to be NRHP- and CRHR-eligible resources for their association with the Hoover Dam and their significance in the World War II effort (Criterion A/1). These resources would have been part of the Route 66 travel experience and landscape across this section of the Mojave Desert, and therefore would not compromise the integrity of Route 66.

Additionally, staff consulted with Kaisa Barthuli, Program Manager for the Route 66 Corridor Preservation Program, by phone on July 28, 2010. Ms. Barthuli stated that rural sections of Route 66, such as that found in the project area and in the eastern Mojave Desert in general, are particularly significant for the vast, open landscapes and viewsheds. Those landscapes and viewsheds are considered character-defining features of the travel experience of Route 66, which the program seeks to preserve. Moreover, the project area is included in the proposed Mojave Trails National Monument currently being heard by Congress, one purpose of which is the preservation of Route 66 (http://www.opencongress.org/bill/111-s2921/text).

In light of the above information, staff finds that the portion of Route 66 within the project area of analysis does contribute to the significance of Route 66, is potentially eligible for the NRHP and CRHR as a contributing resource to the larger Route 66 system under Criterion A/1 for its association as one of the first all-weather highways in the United States, and is therefore it is a historical resource for the purposes of CEQA. This section of Route 66 retains the character-defining features established in the national historic context statement and the Route 66 Corridor Preservation Program noted above. The open feeling of a desert highway has not been compromised by the construction of the SCE 220 kV lines and the Pisgah Substation, as they were constructed shortly after this section of Route 66 and would have been part of the landscape during the period of significance. It has been established at the national level that maintenance of the highway, including widening, repaving and restriping, also does not compromise the integrity of the resource. Considering the extant character-defining features and the integrity of the roadbed, staff finds that this section of Route 66 is a potential historical resource for the purposes of CEQA but mitigation for the impact on the viewshed of the resource is not feasible.

As detailed Section 5.13, Visual Resources, of the AFC, the project site is clearly visible to travelers on Route 66. Travelers “would have direct and immediate views to the site. Due to area topography, and the lack of vegetative screening adjacent to the interstate, with few exceptions, traveler views along I-40 are virtually unobstructed for over 20 miles in the vicinity of the site. Direct unobstructed traveler views from both the I-40 and U.S. Route 66 are available as the interstate approaches both the western and eastern boundaries of the site (SES 2008a, p. 5.13-6–7)

Subsequently, staff has determined that the installation of the proposed 34,000 solar dishes would result in a significant and unavoidable visual impact to a potential historical resource, U.S. Route 66. The installation of this large number of SunCatchers, consisting of an approximate 40-foot diameter solar concentrator dish that supports an array of curved glass mirror facets (TS 2010an, Route 66 DPR form, p. 1-3), will substantially alter the vast, open landscape that is a character-defining feature of this section of Route 66, as well as of the rest of Route 66 in the Mojave Desert. The travel experience of this section of Route 66—which is substantially unchanged since its construction—will be permanently impaired resulting in a unmitigable effect causing a substantial adverse change in the significance of a potential historical resources

On-site mitigation measures that would reduce the level of impact to less than significant are not available. The area is relatively flat and consists only of scrub vegetation. The historical significance of Route 66 in the Mojave is its view of the vast, unobstructed, flat expanse of desert landscape which would be impeded by any type of screening, either on the roadway itself or on the edge of the project site. Eliminating the first few rows of solar dishes would also not lessen the visual impact of the proposed project, as the views are unobstructed for approximately 20 miles.

Staff proposes condition of certification (**CUL-6)** requiring Historic American Landscape Survey (HALS) documentation, including photodocumentation, of the 9-mile segment of roadway and associated landscapes and viewsheds within the project area of analysis from the roadway. This level of documentation includes a historical description and large-format negatives that clearly depict the appearance of the property and areas of significance or the site, perspective-corrected and fully captioned. As noted above rural sections of Route 66, such as that found in the project area and in the eastern Mojave Desert in general, are particularly significant for the vast, open landscapes and viewsheds. Those landscapes and viewsheds are considered character-defining features of the travel experience through this section of Route 66.

Atlantic & Pacific/Atchison Topeka & Santa Fe Railroad [CA-SBR-6693H]

SBR-6693H is the railroad line that was originally built in 1883 for the Atlantic and Pacific Railroad Company. From 1890, the railroad was operated by the Atchinson, Topeka & Santa Fe Railroad until its merger in 1996 with the Burlington Northern Santa Fe Railway (BNSF). Between 1993 and 2002 portions of this site (none within the project area) have been given status codes 2S2 (individual property determined eligible for the NRHP by a consensus through Section 106 process; listed in the CR) and 6Y (determined ineligible for NR by consensus through Section 106 process, not evaluated for CR or Local Listing). SBR-6693H bisects the project area and is located within both phases of project construction.

The BNSF Railway (historically the Atlantic & Pacific/Atchison Topeka & Santa Fe Railroad) is located within the one-half mile built-environment area of analysis. In addition to the railroad track, associated historical artifacts include glass, metal, track and train parts, and railroad tableware. The Southern Pacific Railroad constructed a single track rail between Mojave and Needles to intercept the Atlantic & Pacific (A&P) Railroad tracks in Needles in an attempt to protect its California interests. The Southern Pacific constructed the Mojave to Needles branch between 1882 and 1883, working east from their station in Mojave. The railroad has been previously determined to be eligible for the NRHP and the CRHR under Criterion A (Criterion 1) for its association with the history of transportation in California. Although much of the railroad has been upgraded for continued use and few historical materials remain in place, the applicant states that it retains integrity of location and the level of significance established by the previous recordings. There are thirteen previously unrecorded bridge structures on the railroad within the one-half mile built-environment area of potential effects. These bridge structures were recorded and documented on the DPR 523 update form. Five of the bridge structures retain sufficient integrity to be considered contributing elements to the railroad. The other eight are either modern replacement bridges or have been highly modified.

Staff disagrees that the BNSF Railway (historically the Atlantic & Pacific/Atchison Topeka & Santa Fe Railroad) and five bridge structures within the project buffer are eligible under NRHP Criterion A and CRHR Criterion 1 for its association with the history of transportation in California, due to the replacement of historic materials with modern materials and resulting loss of integrity. Staff therefore recommends that the BNSF Railway is not a historic resource pursuant to CEQA.

Southern California Edison 12-Kilovolt Transmission Line (CA-SBR-13114H)

The SCE 12-kilovolt transmission line was constructed in 1961 as a rural distribution line. The line within the project area of analysis consists of fifteen 40-foot-tall utility poles, which are each 0.75 foot in diameter. The poles have a single T-post on the top with 3 ceramic insulators and 3 transmission lines. The poles are creosote-treated pine and each pole features an identification tag and an embossed nail on the left for height (40) and an embossed date nail (61) on the right. There also is an associated 207-foot-long historic transmission road and sparse historic trash in the vicinity of the transmission line.

The technical report concluded that 12-kv transmission line is not associated with any distinctive or significant event, persons design or construction, and all data potential has been accounted for during the recordation process. The 12-kv transmission line is modest example of a pine T-post utility pole transmission line of typical construction, which has been well-documented in the California and the west. The evaluation recommended, and staff concurs, that based on site investigations and historic research the SCE 12-kilovolt transmission line is recommended not eligible for the NRHP or the CRHR under any of the criterion for eligibility, and there is not a historic resource pursuant to CEQA.

Southern California Edison 220-Kilovolt North and South Transmission Lines (CA-SBR-13115H and CA-SBR-13116H)

The SCE 220-kilovolt North and South Transmission Lines are single-circuit transmission lines with lattice steel, wedge A-frame and metal-waisted tower structures. The evenly-spaced tower structures are approximately 75-feet-tall and include 3 conductor wires, 2 static wires, and insulators. The transmission lines originate at the SCE switchyard at the Hoover Dam and terminate in Chino, California. Two approximately 4.7-mile-long segments of the transmission lines were recorded within the historic built-environment one-half mile project area of analysis. Within the project area each tower structure has four legs, which are anchored in concrete footings. The transmission lines are located in a rural setting on property managed by the BLM.

The SCE 220-Kilovolt North Transmission Line was constructed between 1936 and 1939, using the same design and technology SCE had been using for its existing high-voltage transmission lines in southern California (including its Vincent 220-kilovolt line), and the design used by the Metropolitan Water District for its Hoover Dam line. The transmission line began receiving power from the Hoover Dam in 1939, after the completion of Hoover generating units A-6 and A-7 (Myers 1983; Schweigert and Labrum 2001). When World War II began in Europe, SCE planners anticipated an increase in demand for power in southern California. SCE began construction on a second transmission line, the SCE South 220-Kilvolt South Transmission Line (SCE South or Hoover-Chino No. 2), in 1939.

SCE North (CA-SBR-13115H) and SCE South (CA-SBR-13116H) take divergent courses from the SCE switchyard at the Hoover Dam but meet near Hemenway Wash in Nevada and run approximately parallel to each other from north of Boulder City, Nevada to Chino, California. SCE North and SCE South are parallel within the project area of analysis. Both SCE North and SCE South delivered electricity that was essential to war-time industries in Southern California. These industries included the Douglas, Vultee, and Northrup aircraft plants, Consolidated Steel, the Long Beach Naval Shipyard, Kaiser Steel, Alcoa, Columbia Steel, as well as automobile factories, tire plants, oil refineries, ordnance works, and military bases and depots (Myers 1983; Schweigert and Labrum 2001).

The SCE 220-Kilovolt North and South Lines are associated with the early operation of Hoover Dam and both played a significant role in providing electricity essential to World War II industries located in southern California. The Los Angeles Bureau of Power and Light transmission lines, the Edison Company Boulder Dam-San Bernardino Electrical Transmission Line, and the Metropolitan Water District Line, all of which provide Hoover Dam power to southern California, have all been determined eligible for the NRHP, and the Edison Company Boulder Dam-San Bernardino Electrical Transmission Line also is listed in the CRHR (Hatheway 2006; Myers 1983; Schweigert and Labrum 2001).

The SCE 220-Kilovolt North and South Lines were previously recorded in Nevada (site numbers 26CK6249 and 26CK6250) during the Boulder City/U.S. 93 Corridor Study, and were determined eligible for the NRHP by the Federal Highway Administration and Nevada State Historic Preservation Office (Federal Highway Administration 2005). Both the Southern California Edison 220-kilovolt North and South Lines are in-use and regularly maintained in the project area, but retain sufficient integrity to be considered for listing on the NRHP and CRHR. Because of the association of the transmission lines to the Hoover Dam and their significance in the World War II effort, the consultant recommended the SCE 220-Kilovolt North and South Lines as eligible for the NRHP under Criterion A and the CRHR under Criterion 1.

The transmission lines were constructed using the same design and technology SCE had been using for its existing high-voltage transmission lines in southern California. SCE and other southern California utilities companies were known as innovators in high-voltage systems (Hughes 1993). Further study would need to be conducted to determine the significance of the design to southern California utilities and how many examples of this type remain extant to determine if the SCE North and South transmission lines are eligible under Criterion C/Criterion 3.

The applicant states that research did not reveal any associations with any important persons (Criterion B/Criterion 2) and the transmission line does not have the potential to yield important information (Criterion D/Criterion 4).

Staff concurs with the above evaluation of the SCE 220-Kilovolt North and South Lines and recommends them as eligible for the NRHP and CRHR under Criterion A/1.

Pisgah Substation (CA-SBR-13117H)

The Pisgah Substation is a Southern California Edison switching station that was constructed in 1940 during the construction of the SCE South 220-Kilvolt South Transmission Line and is considered a component of the transmission line (personal communication, Thomas Taylor, Manager, Biological and Archaeological Resources, Southern California Edison, 18 September 2008). It shares its name with the railroad siding of Pisgah and Pisgah Crater, which are located in the vicinity. A switching station is an intermediate station, which has incoming and outgoing power lines of the same voltage. Unlike other substations, a switching station does not transfer power from a higher voltage to a lower voltage, but instead works to control increases and decreases in voltage.

In addition to the equipment associated with the function of the substation, including switch gears and bus bars, the Pisgah Substation also has three buildings, which house the relay station and battery equipment. The largest of these buildings is a rectangular brick building that faces southeast. The building has steel-frame fixed and casement windows. The main entrance is a single entry door with 15 lights, which is accessed by concrete steps with a metal railing. The hipped roof is clad with asphalt shingles and clay tile along the ridge lines.

The other two buildings are smaller and appear to be used for storage. The building located at the north corner of the substation is a wood-framed box-shaped structure with a hipped roof that has exposed rafter ends and is clad with clay tile. There is a wood roll-up door on the southeast side of the building, suggesting that it is used to store vehicles or larger equipment. The other building is located adjacent to the wood-framed building and is a brick, box-shaped structure with a hipped roof that has exposed rafter ends and is clad with clay tile. The windows are steel frame casements and the building is accessed by a single entry wood door. All of the buildings are in good condition and appear to be in-use.

The Pisgah Substation is not associated with distinctive or significant person, and the substation is of a typical design for its era and is not a rare surviving example (personal communication, Thomas Taylor, Manager, Biological and Archaeological Resources, Southern California Edison, 18 September 2008). However, this switching station is associated with the Southern California Edison 220-Kilovolt North and South Lines, which are recommended eligible for the NRHP and CRHR under Criteria A/1 (see above). Because the Pisgah Substation is a component of the transmission line, the consultant concluded that it is also eligible for the NRHP and the CRHR under Criterion

A/1, and as a historic resource pursuant to CEQA Staff concurs with the above evaluation.

Hector Road (CA-SBR-13118H)

Four segments of Hector Road were recorded within Phase 1 and Phase 2 of the project area of analysis. The Hector Road interchange on Interstate 40 provides access to the project area of analysis. South of the interchange, Hector Road is a two-lane paved roadway that extends south for a short distance to U.S. Route 66. North of the Interstate 40 interchange, Hector Road is reduced to one-lane, graded, dirt roadway. This segment of the roadway has been realigned since its original construction, and much of the historic segment of the road between Interstate 40 and the BNSF is not within the project area of analysis. An improved railroad crossing has been constructed at Hector Road, which remains locked with a gate and padlock and is only used by local traffic with access permission. The improved crossing includes crossing arms and slightly sloped asphalt ramps that bring the road up to railroad grade and back down to road grade level.

From the BNSF Railroad, Hector Road continues northward about one mile to the northwest corner of Section 3, Township 8 North, Range 6 East, and then continues eastward along the section line for three miles. At the northeast corner of Section 1, Township 8 North, Range 6 East, Hector Road turns to the southeast and continues across sections 6 and 8 until its junction with the SCE 220-kV transmission line road. This segment of the road is a one-lane, graded dirt road that appears to be maintained and frequently used. The route of Hector Road from the railroad to the transmission line road has not been modified since its original construction in the late 1930s or early 1950s. Sometime after 1955, Hector Road was extended about one-half mile southeast to a road that leads to the Black Butte manganese mine. Hector Road likely was constructed to provide access to mines in the Project vicinity. The road also could have been used to transport construction materials to the SCE 220-kV transmission line and the Pisgah Substation from the railroad.

Hector Road is a modest example of a typical one-lane dirt graded rural road. It is not associated with any distinctive or significant events, persons, design/construction, or has the potential to yield important information about the past. The road is representative of typical construction, which has been well-documented in California and the West.The consultant concluded, and staff concurs, that based on site investigations and historic research, Hector Road is not eligible for listing in the NRHP and CRHR, and would not be considered a historic resource pursuant to CEQA.

Pisgah Crater Road (CA-SBR-13119H)

Pisgah Crater Road currently runs between the SCE 220-kilovolt transmission line road to the Pisgah Crater, a volcanic cinder cone located south of the project area of analysis. U.S.G.S. 15-minute topographic quadrangles indicate that this road was extended sometime after 1955 because the map only depicts the road between Pisgah Crater south of U.S. Route 66 and a small segment north of U.S. Route 66 that terminates at the BNSF Railway. The segment of Pisgah Crater Road that is historic-age (45 years old or older) is paved with asphalt and is approximately 24 feet wide. The Pisgah Crater currently is being mined for aggregate and is located on private land. The road does not appear to be regularly maintained and likely is only sporadically used to access the mine.

The consultant recommended that Pisgah Crater Road is not associated with any distinctive or significant event, person, design, or construction, and the data potential has been accounted for during the recordation process. The majority of the road is located on private land and much of the crater has been destroyed by mining. No records were found to indicate that the Pisgah Crater was ever a well-known tourist destination for U.S. Route 66 travelers. The road is representative of typical construction and design, which has been well-documented in California and the west, and further study is unlikely to yield important information about the past. Therefore, staff concurs that Pisgah Crater Road is not eligible for listing in the NRHP or the CRHR and is not a historical resource pursuant to CEQA .

Pacific Gas and Electric and Mojave Pipelines

The Pacific Gas and Electric Pipeline and the Mojave Pipeline are natural gas pipelines that run through the Phase 2 portion of the project area. Both of these pipelines were constructed prior to 1955; however, there are no visible features of either pipeline in the project area. In addition, the Advisory Council on Historic Preservation has exempted federal agencies from taking into account the effects of their undertakings on historic natural gas pipelines (Advisory Council on Historic Preservation 2002). The two pipelines would not be affected by the proposed Project, and they are recommended as not eligible for the NRHP or CRHR under any criteria. DPR 523 forms were not completed for either pipeline.

Summary of historical significance of built environment

The applicant has recommended four of the historic built resources within the project area of analysis as eligible for listing in the NRHP and CRHR. These resources include the Atlantic & Pacific Railroad/Atchison, Topeka, & Santa Fe Railroad (CA-SBR-6693H), SCE 220-kilovolt (kV) North and South Transmission Lines (CA-SBR-13115H and 13116H), and the Pisgah Substation (CA-SBR-13117H). The applicant recommended that the remaining six built environment resources are not eligible for the NRHP or the CRHR.

The applicant has provided conflicting information regarding the eligibility recommendations for U.S. Route 66 (CA-SBR-2910H). The applicant has recommended that the portion of U.S. Route 66 within the project area of analysis (one-half-mile built environment buffer) does not appear individually eligible for listing to the NRHP or CRHR, is not considered a historical resource for purposes of CEQA, and does not appear to be contributing element or significant related feature/component to the larger linear U.S. Route 66 system. However, in response to Data Request 106, the applicant contradicts its conclusions regarding U.S. Route 66 by stating, "the segment of U.S. Route 66 in the Project area *retains historical integrity and is considered eligiblefor the NRHP/CRHR*" (emphasis added, TS 2010an, p. 5-589). Upon further research, staff finds that the portion of Route 66 within the project area of analysis does, in fact, contribute to the significance of Route 66, is potentially eligible for the NRHP and CRHR as a contributing resource to the larger Route 66 system under Criterion A/1 for its association as one of the first all-weather highways in the United States, and is therefore it is a historical resource for the purposes of CEQA.

Staff disagrees with the applicant that the BNSF Railway (historically the Atlantic & Pacific/Atchison Topeka & Santa Fe Railroad) and five bridge structures within the project buffer are eligible under NRHP Criterion A and CRHR Criterion 1 for its association with the history of transportation in California, due to the replacement of historic materials with modern materials and resulting loss of integrity. Staff therefore recommends that the BNSF Railway is *not* a historic resource pursuant to CEQA.

In summary, staff recommends four of the historic built resources within the project area of analysis as eligible for listing in the NRHP and CRHR. These resources include U.S. Route 66 (CA-SBR-2910H), the SCE 220-kilovolt (kV) North and South Transmission Lines (CA-SBR-13115H and 13116H, respectively), and the Pisgah Substation (CA-SBR-13117H). The remaining six historic built resources are recommended not eligible under any criterion of NRHP or CRHR. These resources include; the Atlantic & Pacific Railroad/Atchison, Topeka, & Santa Fe Railroad (CA-SBR-6693H), the 12-kV power line (CA-SBR-13114H), Hector Road (CASBR-13118H), Pisgah Crater Road (CA-SBR-13119H), Pacific Gas and Electric Company pipeline, and the Mojave Pipeline. Staff has identified a direct visual effect to U.S. Route 66 and proposes condition of certification **CUL-6**, which requires Historic American Landscape Survey (HALS) documentation of the significant desert landscape of Route 66 in the eastern Mojave Desert.

Ethnographic Resources

There are no known ethnographic resources within the footprint or viewshed of the proposed project area.

Historic Districts and Landscape Considerations

Federal and State Guidelines for Historic Districts

The National Park Service defines a historic district as "a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development" (U.S. Department of the Interior, National Park Service 2002:5). For a grouping of cultural resources to be considered eligible for listing in the NRHP as a district, those resources must be historically or functionally related and visually convey a historical theme or environment. In addition, the district must possess sufficient historical significance and integrity. Resources included within the boundaries of a historic district do not all need to have the level of significance necessary to be individually eligible for listing in the NRHP as long as the grouping of resources as a whole conveys sufficient significance within the related historic context. However, all individual resources must possess sufficient historical integrity (U.S. Department of the Interior, National Park Service 2002).

The boundaries of a historic district "must be a definable geographic area that can be distinguished from surrounding properties by changes such as density, scale, type, age, style of sites, buildings, structures and objects, or by documented differences in patterns of historic development or associations" (U.S. Department of the Interior, National Park Service 2002:6). District boundaries rarely are defined by planning or management boundaries, or by ownership parcels, but rather must be based on the spatial locations of the district's contributing properties (U.S. Department of the Interior, National Park Service 2002).

The California Code of Regulations defines historic districts as "unified geographic entities which contain a concentration of historic buildings, structures, objects, or sites united historically, culturally, or architecturally. Historic districts are defined by precise geographic boundaries. Therefore, districts with unusual boundaries require a description of what lies immediately outside the area, in order to define the edge of the district and to explain the exclusion of the adjoining areas" [Title 14, California Code of Regulations, Chapter 11.5, Section 4852(a)(5)].

The National Park Service defines a historic landscape is "a geographical area that historically has been used by people, or shaped or modified by human activity, occupancy, or intervention, and that possesses a significant concentration, linkage, or continuity of areas of land use, vegetation, buildings and structures, roads and waterways, and natural features" (U.S. Department of the Interior, National Park Service 1999:1-2).

Historic landscapes exhibit evidence of human use or activities and typically are one of the following types:

- agriculture (including various types of cropping and grazing),
- industry (including mining, lumbering, fish-culturing, and milling),
- maritime activities such as fishing,
- shell fishing, and shipbuilding recreation (including hunting or fishing camps),
- transportation systems,
- migration trails,
- conservation (including natural reserves), and
- sites adapted for ceremonial, religious, or other cultural activities, such as camp meeting grounds (U.S. Department of the Interior, National Park Service 1999:3).

Although the National Park Service recognizes the cultural landscape categories as descriptive terms, landscapes that are listed in or determined eligible for the NRHP are officially classified as districts or sites (Goetcheus 2002). The National Park Services classifies landscapes that are small with no buildings or structures as sites. Larger sites with numerous buildings, structures, and sites are classified as districts (U.S. Department of the Interior, National Park Service 1999). Because the National Park Service officially classifies landscapes as districts or sites, the potential landscapes within the Project area of analysis were evaluated pursuant to the federal and state guidelines described in Section 5.5.1.

In May 2002, BLM issued Information Bulletin 2002-101 to provide direction for incorporating consideration of cultural resources in their resource management plans (U.S. Department of the Interior, BLM 2002). In recognition of the influence that environmental factors have on the human occupation of any given region, the bulletin recommended that cultural resources be considered at a “landscape scale,” focusing on “continuity of geographic and cultural similarities and influences” more than on current administrative boundaries. Cultural landscapes, as discussed in Information Bulletin 2002-101, are developed as part of records reviews, cultural resource overviews, and cultural settings that are used as planning tools for the BLM. Cultural landscapes, as defined by the BLM, are therefore more applicable when discussing larger historic themes in a planning area, rather than in designating geographical areas to be evaluated for listing in the NRHP or CRHR as a site or district.

Southern California Edison Historic District

Resources that could be included in the potential SCE Historic District are the SCE 220-kV North and South Transmission Lines (CA-SBR-13115H and CA-SBR-13116H), Pisgah Substation (CA-SBR-13117H), and archaeological site CA-SBR-12992H.

The SCE 220-kV North and South Transmission Lines are single-circuit transmission lines, which originate at the SCE switchyard at Hoover Dam and terminate in Chino, California. Both transmission lines played a significant role in providing electricity essential to World War II industries located in southern California. The transmission lines were previously recorded in Nevada (site numbers 26CK6249 and 26CK6250) during the Boulder City/U.S. 93 Corridor Study, and the Federal Highway Administration and Nevada State Historic Preservation Office made a consensus determination that they are eligible for the NRHP. Both transmission lines are in service and are regularly maintained in the Project area of analysis, but they retain historical integrity. Because of the association of the transmission lines to Hoover Dam and their significance in the World War II effort, the SCE 220-Kilovolt North and South Lines were evaluated as eligible for the NRHP under Criterion A and the CRHR under Criterion 1.

The Pisgah Substation is an SCE switching station that was constructed in 1940 (personal communication, Thomas Taylor, Manager, Biological and Archaeological Resources, Southern California Edison, 18 September 2008). In addition to the equipment associated with the function of the substation, including switch gears and bus bars, the Pisgah Substation also has three buildings, which house the relay station and battery equipment. Because the Pisgah Substation is a component of the SCE 220-kV North and South Transmission Lines, the substation also was evaluated as eligible for the NRHP under Criterion A and for the CRHR under Criterion 1.

Archaeological site CA-SBR-12992H is a small, low density scatter of historic trash with approximately 750 items, including glass fragments, animal bone fragments, tableware, ceramics, cans, wire, leather, and wood. The site has four concentrations of historic refuse. The site is near the SCE North and South Transmission Lines, and may be the remains of a work camp related to the construction of the transmission lines and the Pisgah Substation. The site was evaluated as not eligible for the NRHP and CRHR because of the low quantity of artifacts, lack of integrity, low probability of subsurface artifacts and features, and little potential for the site to yield important information.

The SCE 220-kV North and South Transmission Lines and Pisgah Substation are historically and functionally related and visually convey a historic theme in the Project vicinity. Both resources also possess historical significance and integrity and were recommended as individually eligible for the NRHP and CRHR. No artifacts were found that directly associate archaeological site CA-SBR-12992H to the SCE facilities, but its proximity to the transmission lines suggests it is related. However, the archaeological site was evaluated as not eligible and would not be a contributor to the potential historic district.

Both the National Park Service and State of California definitions indicate that historic districts must have definable and precise boundaries and that these boundaries rarely are defined by planning or management boundaries, or by ownership parcels, but rather must be based upon the spatial locations of the district's contributing properties (Title 14, California Code of Regulations, Chapter 11.5, Section 4852(a)(5); U.S. Department of the Interior, National Park Service 2002). The SCE 220-kV North and South Transmission Lines are long, linear resources that extend more than 200 miles between Hoover Dam in Nevada to Chino, California. Only about 4.7 miles of the transmission lines were recorded as part of this Project within the historic built environment one-half mile buffer. Because the entire route of the transmission line was not studied as part of this Project, it is impossible to delineate a boundary that is not arbitrarily defined by the Project area of analysis. Therefore, according to the applicant, it appears inappropriate to define a district. Both transmission lines and the substation were recommended as individually eligible for listing in the NRHP and CRHR, and inclusion in a historic district would not upgrade their status for preservation purposes.

Atlantic & Pacific (Atchison Topeka & Santa Fe) Railroad Historic District

Resources that could be included in a potential Atlantic & Pacific (Atchison Topeka & Santa Fe) Railroad Historic District are the railroad (CA-SBR-6693H) and seven nearby refuse deposits. The Atlantic & Pacific Railroad was originally recorded as a historic resource in California in 1990. The Southern Pacific Railroad Company originally constructed the segment of the railroad in the Project vicinity as part of the Mojave to Needles branch in 1882 and 1883. In 1884, the Atlantic & Pacific Railroad, a subsidiary of the Santa Fe Pacific Railroad, leased the Mojave to Needles branch and purchased the single-track branch in 1911. In 1897, the branch was redesignated as the Santa Fe Pacific Railroad and later became known as the Atchison Topeka & Santa Fe Railway. In 1923, a second track was added. The railroad currently is used and maintained as the BNSF. In the Project area of analysis, the railroad has a double trackway on a raised, ballasted bed. The railroad has been previously evaluated as eligible for the NRHP and CRHR under Criterion A/1 for its association with the history of transportation in California. Although much of the railroad has been upgraded for continued use and few historical materials remain in place, the segment in the Project vicinity retains integrity of location. Thirteen previously unrecorded bridges were identified during the Class III intensive field survey along the railroad within the Project area of analysis and the one-half mile built environment buffer. Five of the bridges retain sufficient integrity to be considered contributing elements to the railroad. The other eight are either modern replacement bridges or have been highly modified.

As of 2006, about 1,800 railroad-related properties had been listed in the NRHP. Most of these properties included depots, railroad cars, and locomotives. The only listed railways are shorter spur lines (Railway Preservation Resources 2006). Historic railroad districts that have been established in other locations typically include buildings and structures, such as homes, depots, warehouses, and commercial buildings, which were built as a result of the railroad and rarely include the railroad structure itself as a contributing property. Both the National Park Service and State of California definitions indicate that historic districts must have definable and precise boundaries and that these boundaries rarely are defined by planning or management boundaries (Title 14, California Code of Regulations, Chapter 11.5, Section 4852(a)(5); U.S. Department of the Interior, National Park Service 2002). The railroad is a long, linear resource that extends across seven states, and only about 10.5 miles of the railroad were recorded as part of this Project within the historic built environment one-half mile buffer. Because the entire route of the railroad was not studied as part of this Project, it is impossible to delineate a boundary for a segment of the railroad in the Project vicinity that would not be arbitrarily defined by the Project and buffer areas. Therefore, it seems inappropriate to define a district.

URS reviewed the site descriptions for the seven historic refuse sites located in the vicinity of the railroad, including CA-SBR-13002/H, -13012H, -13014H, -13017H, -13023/H, -13101, and -13108H. Because the sites have few temporally diagnostic artifacts, it is unclear whether these sites are contemporaneous. In addition, the types of artifacts do not indicate clear associations with the railroad. Three of these sites were evaluated as not eligible for the NRHP and CRHR because of the low quantity of artifacts, lack of integrity, low probability of subsurface artifacts and features, and little potential to yield important information. Four of these sites (CA-SBR-13002/H, -13012H, -13014H, -13017H) were recommended as eligible for the NRHP and CRHR for their potential to yield important information and testing was recommended to provide the lead agency with additional data necessary to determine eligibility. The recommended limited subsurface testing at four of the historic refuse sites should be conducted to determine if additional information can be obtained to support the hypothesis that these sites are related to railroad activities or some other activity.

In summary, defining a railroad district seems inappropriate because any boundary on a segment of the railroad would be arbitrary, and the associations of the trash scatters have not been confirmed. The railroad in the Project area of analysis and the four trash scatters that have potential to yield important information were recommended eligible for listing in the NRHP and CRHR. Inclusion of those properties in a historic district would not upgrade their status for preservation purposes.

National Old Trails Road/U.S. Route 66 Historic District

Resources that could be included in the potential National Old Trails Road /U.S. Route 66 Historic District are extant segments of National Old Trails Road, U.S. Route 66, and two rock concentrations. (The CEC and BLM identified a third rock concentration, P36-014578, in their data request, but it is located well to the north of the highways in the vicinity of the Logan Mine and almost certainly is unrelated to the highways).

U.S. Route 66 in the Project historic built environment one-half mile buffer area is a two-lane, paved roadway that currently serves as a frontage road for Interstate 40. This segment was originally constructed in the 1930s, south of the highway’s original alignment, which was known as the National Old Trails Road. The National Old Trails Road in the Project area of analysis is represented by eight remnant segments of a batched mix oil road. The condition of the road segments is poor—most of the road surface is crumbled and cracked, and in places has eroded. Some segments buried by sand may be partially intact.

The National Old Trails Road was designated by “booster” organizations in 1912, and by the late 1920s much of the highway was either oiled or surfaced with gravel. In 1926, the National Old Trails Road was designated as U.S. Route 66, but in the 1930s the segment in the Project area of analysis was abandoned in favor of a route to the south, which is the current alignment of historical U.S. Route 66. Both the National Old Trails Road and 1930s alignment of U.S. Route 66 have been recorded under site number CA-SBR-2910H, and previously evaluated as eligible for the NRHP under Criterion A as one of the first all-weather highways in the United States. The segment of U.S. Route 66 in the Project area of analysis retains historical integrity and is considered eligible. The National Old Trails Road in the Project area of analysis is isolated, segmented, in generally poor condition, and is recommended as a non-contributing element of the highway.

Two rock clusters also were recorded (P36-014519 and P36-014520) along the abandoned segment of the National Old Trails Road. These rock concentrations are almost exactly 400 feet apart and both are approximately 250 feet from the centerline of the former alignment of the Old National Trails Road. The placement of the cairns and absence of known mining deposits in the area suggests that these rock clusters may have been survey markers associated with the highway. San Bernardino County was responsible for route planning at the time the Old National Trails Road was designated, and the route may or may not have been professionally engineered. No historical as-built drawings of the highway have been located, and thus, a direct association between the rock clusters and the highway remains ambiguous. The rock clusters are recommended ineligible for the NRHP and not significant historical resources eligible for listing in the CRHR.

Segments of U.S. Route 66 and the National Old Trails Road have been listed in the NRHP in several states. U.S. Route 66 related districts have been listed but they include properties such as roadside businesses related to the development of the highway within the boundaries of a specific town or locality. There are no such properties in the Project vicinity. A statewide inventory of U.S. Route 66 has not been conducted for California. If a historic district or multiple property listing of the highway was defined in California, the segment of the 1930s U.S. Route 66 in the Project vicinity probably would be considered a contributing element. However, defining a U.S. Route 66 district at the Project limits would be arbitrary for a highway that ran through Illinois, Missouri, Kansas, Oklahoma, Texas, New Mexico, Arizona, and California. Because the other associated properties have little historic value, there seems to be little justification for defining a National Old Trails Road/U.S. Route 66 Historic District.

Potential Early Twentieth Century Gravel Mining Landscape

CEC and BLM staff also recommended the consideration of a historical archaeological landscape that represents an early twentieth century gravel mining operation in the south-central portion of the Project area of analysis. As mentioned in the discussion of the National Old Trails Road, gravel was applied to sections of the road during improvement activities in the mid 1920s, and some of this gravel may have been obtained from the well developed desert pavements adjacent to the road alignment.

During the intensive survey of the Project area of analysis, cleared areas within the desert pavement were observed adjacent to the National Old Trails Road. The scarification pattern within these cleared areas includes linear tracks that are interspersed with regularly occurring gravel mounds. This pattern indicates that rakes or scraping sleds may have been used to collect gravel from the desert pavement, which may have been applied to the surface of the National Old Trails Road.

Research and site revisits have found no conclusive data to determine the age of the surface disturbance (cleared area) along the National Old Trails Road that occurs within the Project area of analysis. There have been several other past Projects (historic and modern) that may be attributed to the surface disturbance found within the Project area of analysis other than the National Old Trails Road, such as the BNSF railroad and three pipelines within the same area as the disturbances. Modern surface prospects also occur in the Project area of analysis. These modern prospects are found on modern maps (1982 U.S.G.S. 7.5-minute topographic quadrangles), and are absent from historic maps (1955 U.S.G.S. 15-minute quadrangles). In addition, the majority of surface deposits lack diagnostic material (documentation and/or datable cans/refuse). San Bernardino County was responsible for route planning at the time the National Old Trails Road was designated, and the route may or may not have been professionally engineered. No historical as-built drawings of the highway have been located, and thus, a direct association between surface disturbances remains ambiguous.

The National Park Service states that the boundaries of a district or landscape “must be a definable geographic area that can be distinguished from surrounding properties by changes such as density, scale, type, age, style of sites, buildings, structures and objects, or by documented differences in patterns of historic development or associations” (U.S. Department of the Interior, National Park Service 2002:6). While the spatial relationship between historic road and surface gravel mining disturbance is distinctive, the utilization of the surface for stone resources within the Project area of analysis cannot be well bounded. Human-caused disturbance of desert pavement is not unique to the Project area of analysis nor are the reasons for such disturbances unique, therefore it is not possible to effectively separate the effects of gravel mining for road construction from those of gravel mining for various other reasons. The desert pavement is ubiquitous in desert environments and has provided a source of easily accessible construction material throughout history. Such areas also were frequently mined in search of valuable ores or other materials in search of profit. Furthermore, similar historic disturbances of the pavements occur throughout the Mohave Desert as well as other Southern California deserts. Like the sources in the Project area of analysis, these were utilized throughout historic and modern times.

In summary, defining an early twentieth century gravel mining landscape seems inappropriate because the activity lacks sufficient data to be directly attributed to gravel mining for the construction and maintenance of the National Old Trails Road. Additionally, the surface mining activity cannot be clearly linked with the early twentieth century period because a number of historic and modern ground disturbing related Projects have taken place in this area over time, the lack of directly associated temporally diagnostic artifacts, and the absence of historical documentation providing location and time period for this specific activity.

The lack of datable material also severely limits the utility of cleared areas to address important research issues. Data from the mechanical or manual scraping, clearing, raking, and size sorting of desert pavement materials can only address two fairly insignificant questions: (1) what surface materials were collected for possible use in construction of the National Old Trails Road or other historic roads in the area and (2) where do these locations occur within the Project area of analysis? These are insignificant because the desert pavement material is well-documented and obvious, and the location of these activities has been thoroughly documented through the Class III intensive field survey.

The proposed early twentieth century gravel mining landscape cannot be distinguished from similar landscapes that occur throughout this portion of the Mohave Desert. Thus, the proposed historic gravel mining landscape in the Project area of analysis is not sufficiently bounded nor distinguished from surrounding areas to meet NRHP standards. If the entire roadway in the Project area of analysis was graveled during the 1920s road improvements, the adjacent terraces probably would not have provided a sufficient amount of aggregate rock required to surface the roadway, and gravel would have needed to be hauled in. If road crews did mine gravel from these cleared areas, it is more likely that the gravel was used to for small maintenance projects. It also is possible that the cleared areas were construction staging areas. If the cleared areas were proven to be directly associated with the road either through historical documentation or diagnostic artifacts, the areas were considered features of the road and documented on the appropriate DPR 523 series forms.

Archival research and site visits have found no evidence of historic period rest stops associated with National Old Trails Road within the Project area of analysis. Historic research indicates that travelers were able to make the trip from Needles to Barstow in two days. Most travelers stopped for the night in Ludlow, which about half way between the two cities. Desert travel stops located in between were typically located at water sources. Because the National Old Trails Road roughly paralleled the Santa Fe Railroad, these stops would have been at railroad sidings. It is unknown whether the rock cluster features found within the Project area of analysis can be associated with prehistoric or historic activities. These features may have been associated with the National Old Trails Road, but without associated diagnostic artifacts and/or datable features, it is difficult to determine a direct connection.

C.3.7 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Construction Impacts

To identify construction-related impacts to cultural resources that would need to be mitigated, staff first identifies all potential CRHR-eligible cultural resources. In the next step in its analysis, staff must evaluate the potential project impacts to the identified CRHR-eligible cultural resources to determine if these impacts are substantial and adverse. Staff then must recommend mitigation for substantial and adverse impacts on CRHR-eligible resources that cannot be avoided. Staff also must assess whether the proposed project has the potential to impact as-yet-unknown buried archaeological resources and recommend mitigation for impacts to previously unknown but CRHR-eligible resources discovered during construction, if impacts to such resources cannot be avoided.

Site Preparation and Construction Activities

Site preparation would be based on avoiding major washes and minimizing surface-disturbing activities. Also, areas of sensitive habitat and cultural resources would be avoided wherever possible. Brush trimming would be conducted between alternating rows of SunCatchers^{TM}. Brush trimming consists of cutting the top of the existing brush while leaving the existing native plant root system in place to minimize soil erosion. After brush has been trimmed, blading for roadways and foundations will be conducted between alternating rows of SunCatchers^{TM} to provide access to individual SunCatchers^{TM}. Blading would consist of removing terrain undulations and would be limited to 3 feet in cut and 3 feet in fill. The blading operations would keep native soils within 100 feet of the pre-development location, with no hauling of soils across the site. Paved roadways would be constructed as close to the existing topography as possible, with limited cut-and-fill operations to maintain roadway design slope to within a maximum of 10%. Minor grading would also be required for building foundations and pads and parking areas in the Main Services Complex and substation areas. The clearing, blading, and grading operations would be undertaken using standard contractor heavy equipment. This equipment would consist of, but not be limited to, motorgraders, bulldozers, elevating scrapers, hydraulic excavators, tired loaders, compacting rollers, and dump trucks.

From the preliminary geotechnical investigations, it is expected that lightly loaded equipment and structures, including some of the equipment foundations in the substation yard, small equipment such as the fire water pump and standby generator, the support structures for the water treatment plant and hydrogen storage area, and the transmission line lattice steel towers would be supported on shallow footings. Shallow footings would be continuous strip and isolated spread footings.

The majority of each SunCatcher^{TM} would be supported by a single metal pipe foundation that is hydraulically driven into the ground. These foundations are expected to be approximately 20 feet long and 24 inches in diameter. Shallow drilled pier concrete foundations of approximately 36 inches in diameter and an embedment depth with a minimum socketed depth into rock of 6 feet would be used for hard and rock-like ground conditions.The buildings and major structures such as yard tanks would be supported on shallow spread and continuous footings or mat-type foundations. Deep foundations would be required for heavy items, such as the power transformers at the electrical substation.

Materials and Equipment Staging Area. A100-acre lay down yard will be cleared on the southeast corner of the project site where SunCatchers will be assembled. Assembly buildings will be constructed adjacent to the Main Services Complex for the onsite assembly of the SunCatchers. The assembly buildings will be decommissioned and salvaged for re-use once all Calico Solar SunCatchers have been installed. SunCatchers will be installed in the area vacated by the removal of the construction laydown areas and assembly buildings when construction is completed.

Trenching for Buried Linear Facilities (Pipelines, Transmission Lines). SunCatcher systems will be tied together by an underground cable system.

Demolition of Structures on the Project Site or Along Linear Facilities. No demolition would occur on the project site or along linear facilities.

Alterations to Old Substations or Transmission Lines to Upgrade for More Capacity. Final design and construction of transmission facilities and reliability upgrades at the SCE Pisgah Substation and the Pisgah-Lugo 230 kV Transmission Line (should they be required) will be completed by Southern California Edison.

Addition of New and Incompatible Structures in an Old Neighborhood (even an Industrial One), or in the Rural Setting of an Old Agricultural Landscape, or in an Old Transmission Line Corridor, Affecting the Integrity of Setting and Feeling. With the presence of gas pipelines, historic roads, railroad line, transmission lines, and a substation, the project area is currently an open and relatively undeveloped landscape.

Operations Impacts

Liquid Wastes. SunCatcher mirror washing, operations dust control, potable water use, and water treatment under regular maintenance routines will require an average of 33.4 gallons of raw water per minute, with a daily maximum requirement of 56.6 gallons of raw water per minute during the summer peak months each year, when each SunCatcher receives a single mechanical wash. Road and SunCatcher area long-term maintenance would include:

- Temporary soil stabilization (SS) techniques, such as scheduling construction sequences to minimize land disturbance during the rainy and non-rainy seasons and employing BMPs appropriate for the season; preserving existing vegetation by marking areas of preservation with temporary orange propylene fencing; using geotextiles, mats, plastic covers, or erosion control blankets to stabilize disturbed areas and protect soils from erosion by wind or water; using earth dikes, drainage swales, or lined ditches to intercept, divert, and convey surface runoff to prevent erosion; using outlet protection devices and velocity dissipation devices at pipe outlets to prevent scour and erosion from storm water flows; and/or using slope drains to intercept and direct surface runoff or groundwater to a stabilized water course or retention area.
- Sediment Control (SC) techniques, such as using silt fences, straw bales, and/or fiber rolls to intercept and slow the flow of sediment-laden runoff such that sediment settles before runoff leaves the site.
- Wind Erosion (WE) control by applying water or dust palliatives, as required, to prevent or alleviate windblown dust.
- Tracking Control (TC) techniques to limit track-out, such as using stabilized points of entering and exiting the project site and stabilized construction roadways on the site.
- Other measures, as appropriate, to comply with the regulations.

Project Closure and Decommissioning

SES recognizes that development of a final termination and restoration strategy will be a collaborative process with the BLM and the CEC. Prior to authorization it is anticipated that more clarity related to this effort will be directed by the BLM. Following is a brief discussion of concepts that may be more fully considered in the development of a termination and restoration strategy for the project.

- Although the project setting for this project does not appear, at this time, to present any special or unusual closure problems, it is impossible to foresee what the situation will be in 30 years or more when the project ceases operation.
- To ensure adequate review of a planned project closure, the project owner would submit a proposed facility closure plan to the CEC and BLM for review and approval at least 12 months (or other period of time agreed to by the FAO) prior to commencement of closure activities.
- In order to ensure that public health and safety and the environment are protected in the event of an unplanned temporary facility closure, it is essential to have an on-site contingency plan in place. The on-site contingency plan will help to ensure that all necessary steps to mitigate public health and safety impacts and environmental impacts are taken in a timely manner. The project owner would submit an on-site contingency plan for the FAO review and approval. The plan would be submitted no less than 60 days (or other time agreed to by the FAO) prior to commencement of commercial operation.
- In addition, consistent with requirements under unplanned permanent closure addressed below, the nature and extent of insurance coverage, and major equipment warranties must also be included in the on-site contingency plan. In addition, the status of the insurance coverage and major equipment warranties must be updated in the annual compliance reports.

SES continues to develop the design for the project, and will coordinate with all required agencies as part of the CEC/BLM permitting process. It is SES's understanding that a bond will be required for the SES Calico Solar Project.

Identification and Assessment of Direct Impacts on Archaeological Resources and Recommended Mitigation

On June 2, 2010, in response to concerns about impacts to both cultural and biological resources, the applicant submitted an alternative site layout, which reduced the original 8,230-acre project layout to 6,215 acres (see TS 2010ag). A substantial amount of the northern project boundary was removed along the base of the Cady Mountains to avoid biological issues. In addition, based on the BLM's NRHP eligibility determinations for cultural resources, the applicant reconfigured portions of the southern project area to avoid all or portions of the three sites determined eligible by the BLM (CA-SBR-13443/H, CA-SBR-13093/H, and CA-SBR-1908/H). As a result of the alternative site layout submitted by the applicant, CA-SBR-13443/H has been entirely excluded from the project area, and the majority of the two other sites, CA-SBR-1908/H and CA-SBR-13093/H (the portions containing the unevaluated/indeterminate rock cluster features), have been excluded from the project footprint. The portions (consisting of lithic remains) of these two sites that the BLM determined to be "non-contributing" would remain within the project area and would be subject to direct impacts. In addition, due to their proximity to the site areas being avoided and/or their proximity to biological resources being avoided, ten (10) additional archaeological sites and a portion of one (1) site have also been excluded from the project area as a result the applicant's June 2, 2010 alternative project layout. The ten additional archaeological sites fully excluded from the project footprint include: CA-SBR-4558H; CA-SBR-13013; CA-SBR-13028; CA-SBR-13029; CA-SBR-13030; CA-SBR-13054; CA-SBR-13105; CA-SBR-13107; P36-014578; SM-S1-005. In addition, site CA-SBR-13126/H has been partially excluded from the project footprint.

In a consultation letter to the State Historic Preservation Officer (SHPO), dated July 22, 2010, the BLM determined that the identification efforts, reports, and the applicant's recommendations for the proposed Calico Solar project are adequate to identify historic properties that may be located within the project area and to support the BLM's decision process. The BLM has determined that three sites, CA-SBR-1908/H, CA-SBR-13093/H, and CA-SBR-13443/H, are eligible for inclusion to the NRHP under Criterion D. The applicant reconfigured the project layout to avoid all or portions of these sites, and consequently, the BLM has issued a finding of no adverse effect to historic properties and has sought concurrence from the SHPO accordingly.

On the contrary, CEC staff concludes that the construction of the proposed 6,215-acre solar thermal power facility may wholly or partially destroy the majority of surface archaeological resources identified by the applicant in the proposed project area. While efforts have been made to avoid three (3) sites determined eligible by the BLM, there are 100 surface prehistoric archaeological sites in the current project footprint that staff believes have not yet been adequately investigated or evaluated in terms of potential to yield data important to the study of prehistory. In addition, beyond the consideration of the individual archaeological sites in the project area of analysis, staff believes, contrary to the recommendations of the applicant, that the implementation the proposed action has the potential to destroy a large portion of a potential prehistoric archaeological landscape that may exist in the project area.

Although staff is presently unable to identify precisely which of the different archaeological resources are historically significant and is, therefore, also unable to to articulate the exact character of the effects that the construction of the proposed facility would have on such resources, staff does clearly foresee that the construction of the proposed facility could, under CEQA, have a significant effect on the environment. Although the specific programs and protocols do not presently exist, it is possible to describe the performance standards that would be used to ensure that the resolution of significant effects to historically significant archeological resources is adequate, as well as the types of measures that can be used to resolve such effects.

As noted in Section C.3.3 above, the analytical process for cultural resources involves five steps: 1) determination of the geographic extent of the project area of analysis; 2) creation of an inventory of the known cultural resources within that area; 3) assessing the historical significance of those known resources; 4) assessing the effects of the project on significant resources; and 5) resolving significant effects on significant cultural resources, and endeavoring to ensure that all significant effects are mitigated. The first and second steps of the analytical process for archaeological resources have been completed. The proposed conditions of certification would set forth provisions for completion of the remaining steps of the process by requiring the project owner to collect the necessary surface and subsurface data on the resources sufficient to develop formal recommendations of historical significance, assess effects to significant resources, and implement mitigation measures that meet the standards for the resolution of significant effects to significant cultural resources. In addition, Energy Commission licensing decisions and BLM right-of-way grant decisions also typically identify the likelihood of encountering previously unknown resources and contain provisions that require specific procedures to ensure that any effects to these resources can be resolved.

Cultural resources that are found to be significant on the basis of their information value (principally archaeological deposits) would be subject to treatments which would variably be to actively avoid all or part of subject deposits, to record and preserve representative samples of the unique spatial or associative information that is intrinsic to the depositional history of each deposit, to collect and curate representative samples of material culture assemblages, to provide for the preparation and dissemination of professional technical publications and public interpretative materials, and to develop and implement plans to foster the long-term historic preservation of subject deposits. Archaeological resources in the project area of analysis that may be subject to unique treatment plans may include archaeological landscapes and/or districts, in addition to individual archaeological sites.

Mitigation measures for adverse effects to the information values of archaeological resources may include, but are not limited to, the following. The performance standard that any such mitigation measure must meet would be that the results of the mitigation effort would be able to evidence the recovery and curation of a representative sample of the information for which each adversely affected archaeological deposit was significant, and to demonstrate efforts to disseminate that information in the public interest.

- Physical avoidance of archaeological resources, wherever feasible, through, individually or in combination, project redesign, fencing or other methods of conspicuous demarcation, and monitoring;
- When physical avoidance is infeasible, the recovery of a representative sample of the information for which subject archaeological resources have been found to be significant;
- Professional and public dissemination of the results of data recovery investigations through, among other methods, the presentation of papers at professional conferences, the preparation of literature or film for public release, the development of education modules for public school use, and the development of museum exhibits and attendant catalogs;
- Preparation of applications and formal nomination of significant archaeological resources to the CRHR and the NRHP; and
- Recovery and repatriation of human remains in consultation with local Native American representatives.

Staff proposes conditions of certification **CUL-1** through **CUL-5** and **CUL-7** through **CUL-10** to resolve potential significant effects to archaeological sites within the Calico Solar project area.

Identification and Assessment of Direct Impacts on Ethnographic Resources and Recommended Mitigation

No ethnographic resources were identified in the Calico Solar project area of analysis.

Identification and Assessment of Direct Impacts on Built-environment Resources and Recommended Mitigation

The applicant has recommended four of the historic built resources within the project area of analysis as eligible for listing in the NRHP and CRHR. These resources include the Atlantic & Pacific Railroad/Atchison, Topeka, & Santa Fe Railroad (CA-SBR-6693H), SCE 220-kilovolt (kV) North and South Transmission Lines (CA-SBR-13115H and 13116H), and the Pisgah Substation (CA-SBR-13117H). The applicant recommends that the remaining six built environment resources are not eligible for the NRHP or the CRHR.

The applicant has provided conflicting information regarding the eligibility of U.S. Route 66 (CA-SBR-2910H). The applicant has recommended that the portion of U.S. Route 66 within the project area of analysis (one-half-mile built environment buffer) does not appear individually eligible for listing to the NRHP or CRHR, is not considered a historical resource for purposes of CEQA, and does not appear to be contributing element or significant related feature/component to the larger linear U.S. Route 66 system. However, in response to Data Request 106, the applicant contradicts its conclusions regarding U.S. Route 66 by stating, "the segment of U.S. Route 66 in the Project area *retains historical integrity and is considered eligiblefor the NRHP/CRHR*" (emphasis added, TS 2010an, p. 5-589). Upon further research, staff finds that the portion of Route 66 within the project area of analysis does, in fact, contribute to the significance of Route 66, is potentially eligible for the NRHP and CRHR as a contributing resource to the larger Route 66 system under Criterion A/1 for its association as one of the first all-weather highways in the United States, and is therefore it is a historical resource for the purposes of CEQA.

Staff disagrees with the applicant that the BNSF Railway (historically the Atlantic & Pacific/Atchison Topeka & Santa Fe Railroad) and five bridge structures within the project buffer are eligible under NRHP Criterion A and CRHR Criterion 1 for its association with the history of transportation in California, due to the replacement of historic materials with modern materials and resulting loss of integrity. Staff therefore recommends that the BNSF Railway is *not* a historic resource pursuant to CEQA.

In summary, staff recommends four of the historic built resources within the project area of analysis as eligible for listing in the NRHP and CRHR. These resources include U.S. Route 66 (CA-SBR-2910H), the SCE 220-kilovolt (kV) North and South Transmission Lines (CA-SBR-13115H and 13116H, respectively), and the Pisgah Substation (CA-SBR-13117H). The remaining six historic built resources are recommended not eligible under any criterion of NRHP or CRHR. These resources include; the Atlantic & Pacific Railroad/Atchison, Topeka, & Santa Fe Railroad (CA-SBR-6693H), the 12-kV power line

(CA-SBR-13114H), Hector Road (CASBR-13118H), Pisgah Crater Road (CA-SBR-13119H), Pacific Gas and Electric Company pipeline, and the Mojave Pipeline. Staff has identified a direct visual effect to U.S. Route 66 and proposes condition of certification **CUL-6**, which requires Historic American Landscape Survey (HALS) documentation of the significant desert landscape of Route 66 in the eastern Mojave Desert.

Staff has determined that the installation of the proposed 34,000 solar dishes would result in a significant and unavoidable visual impact to a historic resource, U.S. Route 66. The installation of this large number of SunCatchers, consisting of an approximate 40-foot diameter solar concentrator dish that supports an array of curved glass mirror facets (TS 2010an, Route 66 DPR form, p. 1-3), will substantially alter the vast, open landscape that is a character-defining feature of this section of Route 66, as well as of the rest of Route 66 in the Mojave Desert. The travel experience of this section of Route 66—which is substantially unchanged since its construction—will be permanently impaired. This impact is unmitigable, and should the project be approved, cannot be avoided.

There does not appear to be available mitigation on-site that would reduce the level of impact to less than significant. The area is relatively flat and consists only of scrub vegetation. The significance of Route 66 in the Mojave is the view of the vast, unobstructed, flat expanse of desert landscape which would be impeded by any type of screening, either on the roadway itself or on the edge of the project site. Eliminating the first few rows of solar dishes would also not lessen the visual impact of the proposed project, as the views are unobstructed for approximately 20 miles.

Consequently, staff proposes condition of certification (**CUL-6)** requiring Historic American Building Survey (HABS) Level III photodocumentation of the 9-mile segment of roadway and associated landscapes and viewsheds within the project area of analysis from the roadway. This level of photodocumentation includes large-format negatives that clearly depict the appearance of the property and areas of significance or the site, perspective-corrected and fully captioned. Undertaking the HALS recordation activities prior to certification would not affect the project's certification prospects in any way. The applicant undertaking such activities would do so, at their own risk, as a means of advantaging their schedule.

Identification and Assessment of Indirect Impacts and Recommended Mitigation

There is potential for indirect effects to sites in the exclusion areas especially due to increased traffic during construction. It is also possible that project area grading could increase the amount of sheet washing and water runoff during heavy rainfall and indirectly cause damage to sites outside the project area.

Operation Impacts

Many impacts described above as part of construction also apply to the operation phase. During operation of the proposed power plant, repair of a buried utility or other buried infrastructure could require the excavation of a large hole. Such repairs have the potential to impact previously unknown subsurface archaeological resources in areas unaffected by any original trench excavation. The measures proposed under **CUL-1**, **CUL-2**, and **CUL-8** through **CUL-10** would provide for mitigating impacts to previously unknown archaeological resources during the construction of the plant and linear facilities would also serve to mitigate impacts from repairs occurring during operation of the plant.

Project Closure and Decommissioning

Re-excavation and removal of SunCatchers™ and ancillary facilities could impact cultural resources. Conditions of Certification **CUL-1**, **CUL-2**, and **CUL-8** through **CUL-10** would provide for mitigating impacts to cultural resources encountered during project decommissioning activities.

C.3.8 REDUCED ACREAGE ALTERNATIVE

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

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

The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1** (TS 2010 ag). This area was designed to avoid sensitive cultural resources and areas that were mapped as occupied tortoise habitat (live tortoise and/or active burrows and sign).

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

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

C.3.8.1 SETTING AND EXISTING CONDITIONS

Please refer to subsection C.3.4 for a discussion of the proposed action. Whereas the setting and existing conditions of the Reduced Acreage alternative are the same as Phase 1 of the proposed project, the Reduced Acreage alternative would occupy only 31 percent of the proposed project area. The specific locations of SunCatchers for the Reduced Acreage alternative would avoid sensitive cultural and biological resources, as well as desert washes as part of the construction of a 275 MW solar facility within the proposed project area.

Regional Setting

The regional setting of the Reduced Acreage alternative is the same as Phase 1 of the proposed project. Please refer to subsection C.3.4 for the proposed action.

Environmental Setting

Please refer to "Environmental Setting" subsection C.3.4.3 for proposed action.

Cultural Setting

Please refer to "Cultural Setting" subsection C.3.4.4 for proposed action.

Cultural Resources Inventory

A records search and Class III inventory were performed by the applicant in the above Cultural Resources Inventory section for the proposed reduced acreage alternative. Twenty-four (24) cultural resources have been identified and recorded as a result of the cultural resources inventory in the project area of analysis for this alternative and are depicted in Cultural Resources Table 7 below.

CULTURAL RESOURCES TABLE 7:
Cultural Resources Site in Reduced Acreage Alternative

Site Designation	Cultural Context	Site Taxonomy	Location within Project area of analysis	Potential for Buried Deposits Based on Geomorphologic Landform
CA-SBR-12991 (DRK-012)	Prehistoric	Lithic Reduction Scatter	Phase 1	Low
CA-SBR-13002/CA-SBR-13003/H (DRK-134/DRK-136/H)	Multi-Component	Lithic Reduction Scatter, Historical Refuse, Fire Affected Rocks and/or Hearths	Phase 2	Low
CA-SBR-13012H (DRK-155H)	Historic	Historical Refuse, Fire Affected Rocks and/or Hearths	Phase 2	Low
CA-SBR-13014H (DRK-163H)	Historic	Historical Refuse	Phase 2	Low
CA-SBR-13016 (DRK-167)	Prehistoric	Lithic Reduction Scatter	Phase 2	Very Low

CULTURAL RESOURCES TABLE 7:
Cultural Resources Site in Reduced Acreage Alternative

Site Designation	Cultural Context	Site Taxonomy	Location within Project area of analysis	Potential for Buried Deposits Based on Geomorphologic Landform
CA-SBR-13017H (DRK-168H)	Historic	Historical Refuse	Phase 2	Low
CA-SBR-13022/CA-SBR-13024 (DRK-175/DRK-177)	Prehistoric	Complex Lithic Scatter	Phase 2	Very Low
CA-SBR-13048 (LTL-017)	Prehistoric	Complex Lithic Scatter	Phase 2	Very Low
CA-SBR-13072 (RAN-168)	Prehistoric	Lithic Reduction Scatter	Phase 2	Very Low to Moderate
CA-SBR-13073 (RAN-169)	Prehistoric	Complex Lithic Scatter	Phase 2	Low
CA-SBR-13074 (RAN-170)	Prehistoric	Complex Lithic Scatter	Phase 2	Low
CA-SBR-13078 (RAN-177)	Prehistoric	Lithic Reduction Scatter	Phase 2	Very Low
CA-SBR-13086 (RSS-005)	Prehistoric	Lithic Reduction Scatter	Phase 2	Very Low
CA-SBR-13096 (SGB-013)	Prehistoric	Lithic Reduction Scatter	Phase 1	Low
CA-SBR-13097 (SGB-017)	Prehistoric	Lithic Reduction Scatter	Phase 1	Low
CA-SBR-13349/H (RSS-006/ SGB-112/ SGB-114/SGB-118/SGB-127/H)	Multi-Component	Complex Lithic and Groundstone Scatter, Historical Refuse	Phase 2	Very Low
CA-SBR-13443/H (DRK-176/RAN-175/H)	Multi-Component	Complex Lithic and Groundstone Scatter, Historical Refuse	Phase 2	Very Low to Moderate
CA-SBR-2910H (National Old Trails Road/U.S. Route 66)	Historic- Built	remnants of historic road/historic highway	Phase 2 and One half-mile buffer	N/A
CA-SBR-6693H (Atlantic & Pacific Railroad/Atchison, Topeka, & Santa Fe Railroad)	Historic- Built	historic railroad and associated bridge structures	One half-mile buffer	N/A
CA-SBR-13114H (SCE 12-kilovolt power line)	Historic- Built	pine T-post utility pole transmission line	One half-mile buffer	N/A

CULTURAL RESOURCES TABLE 7:
Cultural Resources Site in Reduced Acreage Alternative

Site Designation	Cultural Context	Site Taxonomy	Location within Project area of analysis	Potential for Buried Deposits Based on Geomorphologic Landform
CA-SBR-13115H (SCE 220-kilovolt North Transmission Line)	Historic- Built	single-circuit, steel lattice tower transmission line	One half-mile buffer	N/A
CA-SBR-13116H (SCE 220-kilovolt South Transmission Line)	Historic- Built	single-circuit, steel lattice tower transmission line	One half-mile buffer	N/A
CA-SBR-13117H (Pisgah Substation)	Historic- Built	SCE switching station including switch gear, bus bars, and 3 structures used for relay and station battery equipment and storage	One half-mile buffer	N/A
CA-SBR-13118H (Hector Road)	Historic- Built	one-lane, graded dirt road	Phase 1 and Phase 2	N/A

C.3.8.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

A. Identification analysis is based on the three following observations:

1. Whereas testing has not been completed, a subset of sites may qualify for the NRHP and CRHR.
2. Given the low quantity and density of cultural resources present, it may be possible to avoid known cultural resources by project construction.
3. The potential exists for buried archaeological deposits.

B. The alternative is anticipated to have the following effects/impacts:

1. Significant effect per NEPA.
2. Significant impact per CEQA.
3. Adverse effect per Section 106 of the NHPA.

When resource evaluations have been completed, impacts will be assessed. The observation and identification of 119 archaeological sites suggests use of the project landform in the past. Severity and extent of impacts may be reduced given the presence of fewer cultural resources within this alternative, which is much reduced from the original size of the project. If impacts are deemed significant, conditions of certification **CUL-1** through **CUL-5** and **CUL-7** through **CUL-10** would reduce impacts to a less than significant level; however, significant visual impacts to U.S. Route 66 would remain unmitigable.

C.3.8.3 CEQA LEVEL OF SIGNIFICANCE

The Reduced Acreage alternative would result in a reduction of impacts to cultural resources; however, this alternative would also result in significant impacts under CEQA. The implementation of Conditions of Certification, **CUL-1** through **CUL-10**, is anticipated to reduce the severity of impacts to some cultural resources to a level below significance under CEQA. However, it is still anticipated that this alternative would result in significant and unmitigable visual impacts to U.S. Route 66.

C.3.8.4 CUMULATIVE IMPACTS

This alternative would result in the conversion of 2,600 acres of undeveloped open space with an industrial utility use. When compared to the proposed action, this alternative would result in approximately 69 percent less land conversion to industrial uses. However, the cumulative effects of this amount of land conversion along with all other existing, planned, and proposed projects would result in adverse cumulative land conversion.

C.3.9 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.3.10 NO ACTION ALTERNATIVE

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

C.3.10.1 NO PROJECT/NO ACTION ALTERNATIVE #1:

<u>No Action on the Calico Solar Project Application and on CDCA Land Use Plan Amendment</u>

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

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

- The impacts of the proposed project would not occur.

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

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

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

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

C.3.10.2 NO PROJECT/NO ACTION ALTERNATIVE #2:

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

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

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

C.3.10.3 NO PROJECT/NO ACTION ALTERNATIVE #3:

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

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

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

C.3.11 PROJECT-RELATED FUTURE ACTIONS - CULTURAL RESOURCES AND NATIVE AMERICAN VALUES

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

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar project, and to identify mitigation measures that could lessen such impacts that a level that is not significant.

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

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.

- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar project.

C.3.11.1 Environmental Setting

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

Cultural Resources Overview. The Lugo-Pisgah project area is located in the western Mojave Desert where numerous large-scale inventory projects have been conducted. In part, these projects have defined a cultural chronology for the area that spans the last 12,000 years (SES 2008a). Ethnographically, the project area is centered on the traditional lands of the Serrano, a Numic speaking group related to the Shoshone. Between these earliest and latest Native American periods is a rich cultural history. The Mojave Desert is suggested to have been the area of principal point of origin for the migration of the Numic language group, which spread northeastward into the Great Basin and eventually the northern Colorado Plateau. Many of the distinctive projectile point types described for the Great Basin and Southwest culture areas may have originated in the broad geographic area of the Mojave Desert.

Native American history begins with the Clovis culture, the earliest substantively established cultural period in the Western Hemisphere and the only “classic” Paleoindian period represented in the project area. Dated from 10,000 to 8,000 B.C., the Clovis period is represented by distinctive spear points with a central flute or groove on either side of the point. These points are extremely well made and have been found in association with extinct Pleistocene megafauna. Because of the emphasis Clovis people placed on their hunting technology, researchers have tended to interpret Clovis as geared specifically towards big game hunting. In recent years this assumption has been challenged with increasing evidence towards a broader spectrum subsistence strategy (SES 2008a).

The transition from the Pleistocene to the Holocene is marked by significant environmental changes that resulted in equally significant changes in human settlement and subsistence strategies. The Lake Mojave Complex follows Clovis and subsumes several other named complexes, including the Western Pluvial Lakes Tradition and the San Dieguito Complex, among others. Again, the Mojave Complex is represented by a distinct projectile point that tapers to a rounded base. Dates of the complex are ca. 8000 to 6000 B.C. The period is associated with relatively wet conditions and periodic lake recharge in the region. Material culture for the period is dominated by a stone tool technology geared towards a forager-like subsistence strategy. Such a strategy reflects the frequently changing environmental conditions and patchy resources that would be available necessitating frequent settlement shifts.

Changing environmental conditions to more arid, present-day conditions, marks the transition to the Middle Holocene and the Pinto Complex, which overlaps slightly with the preceding Lake Mojave Complex, and persists to about 3000 B.C. There is broad similarity with the Lake Mojave Complex, especially in toolstone selection and overall technology; however, the Pinto Complex begins the first extensive use of milling tools presumed to reflect the intensification of vegetal processing. An emphasis towards plant resources probably reflects a more predictable biotic environment. The range of settlements across the landscape also suggests more predictable subsistence resources and characterizes the complex overall as spatially extensive.

A new complex has been recently defined based on archaeological work within the Twentynine Palms area (SES 2008a). Although acknowledged as spatially confined for the time being, future work will undoubtedly extend the range of the Deadman Lake Complex. The associated assemblage is described with contracting stemmed or lozenge-shaped projectile points, battered cobbles and core tools, biface technology, and milling stones. Preliminary dating places the complex from 7500 to 5200 B.C. An occupation hiatus is suggested for the period between 3000 and 2000 B.C. Population density was very low (based on known archaeological sites) and large-scale abandonment is presumed for the Mojave Desert. After 2000 B.C. is the Gypsum Complex, represented by well-known projectile point styles, including the contracting stemmed Gypsum, Elko series, and Humboldt series projectile point types. Few excavated components are known from the project area despite the wide settlement pattern represented by these distinctive projectile point styles.

Following the Gypsum Complex, by A.D. 200 the Rose Springs Complex marks the introduction of the bow and arrow technology and significant population increase (SES 2008a). Rose Spring projectile points are smaller and were presumably hafted as arrow points. Environmental conditions were wetter and cooler during this period allowing Rose Spring settlement patterns to shift back to the Mojave Desert. Material culture is diverse and extensive and is often found as well developed middens. Architecture is first recognized during this period including wickiups and pit houses. Obsidian procurement was emphasized, as well. Settlement patterns appear to have been oriented initially towards permanent streams and lake margins and by the end of the period, or about A.D. 1000, settlements shifted to more ephemeral water sources as large-body lakes began to desiccate. The persistence of the Medieval Climatic Anomaly may have stressed an already expanding population resulting in the end of the complex by A.D. 1100.

The Late Prehistoric period extends from the close of the Rose Springs Complex ca. A.D. 1100 and ends with the ethnographically described groups occupying the area at contact in the 16th century. It is during this period that Ancestral Puebloan groups are known to have exploited turquoise mines and probably interacted with resident Numic speaking Paiute and Shoshone groups. Numic material culture includes Desert Side-notched and Cottonwood Triangular projectile points, buff and brown ware ceramics, ornaments, milling tools, and rock art. Although interaction spheres have been posited for the region, no clear cultural partitioning is evident so far in the archaeological record despite the linguistic divergence. Obsidian procurement was greatly reduced in the southern and eastern portion of the Mojave Desert perhaps indicating increasing regionalization during this period. It is during this period that the postulated Numic expansion took place out of the Mojave Desert northeastward into the Great Basin. A return of warm and dry conditions, coupled with linguistic evidence, suggest this expansion began sometime before A.D. 1000 (SES 2008a).

Spanish settlement of southern California did not take place until the first mission was established in 1769. At the time, California had the highest Native American population in North America speaking over 300 dialects. The Serrano, a Shoshonean group, were the primary inhabitants of the project area. Serrano lived in large square communal houses and practiced an extensive trade network with the coast. Secularization of the Spanish missions in 1834 led to the development of large ranchos that extended into the interior from the coast. Ranchos often forced Native American groups into a form of indentured servitude. These closed, fortified communal settlements continued after non-Mexican immigrants entered the region. Upon statehood in 1850, industrialization began with the building of railroads, including the Atchison, Topeka & Santa Fe (AT&SF), mining, and the development of military installations (SES 2008a).

Potential Cultural Resources. To date, no formal file and literature review and no intensive cultural resources inventory has taken place in the area of potential effect along the Lugo-Pisgah ROW. SCE would conduct cultural surveys as part of its CPCN application and PEA that will be submitted to the CPUC for the 850 MW Full Build-Out. As such, the identification of affected cultural resources is limited to broad generalities until such time that an intensive cultural resources inventory can be completed.

Based on the cultural resources overview presented above, it can be expected that a number of prehistoric cultural resources would be identified during inventory for the proposed area of the 850 MW Full Build-Out upgrades. The 275 MW Early Interconnection upgrades would require substantially less ground disturbance and the chance of encountering cultural resources would be reduced. Likely locations for prehistoric archaeological sites include the edges of intermittent drainages, such as those that drain into Antelope Valley near the western end of the project area and ultimately the terraces above the Mojave River. East of the Mojave River it is expected that the number of prehistoric resources will decrease as the corridor extends across Apple and Fifteen-Mile Valleys. However, the many ephemeral drainages that bisect these areas are relict stream channels that could have archaeological sites in association. The margins of both Rabbit Lake and Lucerne Lake also have the potential to contain prehistoric resources. Sites along relict stream channels and desiccated lake margins could include prehistoric campsites and resource processing localities.

Potential historic resources include both the Pisgah and Panoche/Lugo substations, if more than 45-years old, and the 220 kV transmission line that is to be replaced by the new 500 kV line. If these resources meet the age criteria for consideration then a qualified architectural historian must document the resources on appropriate Department of Parks and Recreation (DPR) forms and assess the significance and potential impact to these resources. Other potential historic resources include the crossing of the AT&SF Railroad (two locations) and the California Aqueduct. Numerous other transmission lines would also be crossed.

C.3.11.2 Environmental Impacts

Impacts to cultural resources are unknown pending a formal file and literature review and intensive inventory. Since the proposed 500 kV transmission line corridor would follow an existing ROW for much of its proposed length, it is possible that impacts to cultural resources would be lower due to prior impacts. New construction would have the potential to adversely affect cultural resources from ROW/access road construction, blading, equipment storage, pole placement, substation expansion and line installation.

Ground disturbance, the presence of vehicles driving over the top of sites and the installation of new towers could damage archaeological resources. After the work area is defined and after archaeological and historic surveys are complete in any areas that have not been protocol-level surveyed previously by SCE, archaeological sites or historic resources within the built environment may be identified. Depending on when they were built, if the existing SCE 220 kV line or the Pisgah and Panoche/Lugo Substations are determined eligible for the National Register of Historic Places (NRHP), the upgrades and removal effort would result in an impact to historical resources. Other potential historic resources include the crossing of the AT&SF Railroad (two locations) and the California Aqueduct. Whether the impact is significant would need to be determined after the line, substations and/or other infrastructure are evaluated.

Some new lines would be installed in places where there were none previously, and some existing overhead lines would have structures retrofitted and replaced along existing lines. The trench for undergrounding for the Pisgah-Gale fiber optic cable (under the 275 MW Early Interconnection) would normally be excavated in an existing underground cable trench or in a new 600-foot-long trench near the SCE Pisgah Substation, and trenching would not come within 12 inches from any existing fence, wall, or outbuilding associated with an adjacent property. Therefore, there would be no potential to adversely impact the physical condition of existing above-ground cultural resources. The only potential to adversely impact existing above-ground cultural resources would arise from a change in the visual setting of the property due to the addition of taller poles or new poles, new overhead lines, and new substation equipment depending on the location in the project area.

Any potential for the project to impact cultural resources would be limited to undiscovered below-ground cultural deposits. It is possible that buried cultural deposits could be encountered during ground disturbing project activities including trenching for the installation of underground fiber optic cables, during ground disturbance associated with the removal or installation of transmission structures, or ground disturbance associated with the expansion at the Pisgah Substation. The 275 MW Early Interconnection upgrades would require substantially less ground disturbance than the 850 MW Full Build-Out, and the chance of impacting cultural resources would be reduced.

C.3.11.3 Mitigation

During the CEQA/NEPA environmental permitting process, cultural resources sites would likely be identified and then would be avoided by vehicles and construction activities. After the construction area has been identified and after work for Section 106 has been completed, archaeological sites should be evaluated for eligibility for listing in the NRHP or California Register of Historic Resources (CRHR) if it appears that any would be affected by the project. Sites that have been evaluated as “not eligible” would warrant no further consideration and avoidance would not be required. Sites that have not been evaluated and sites that are considered “potentially eligible” should be treated as eligible resources pending formal evaluation. If found to meet age and significance criteria, the historic resources identified above, including the substations and the existing 220 kV transmission line, would require Level 1 Historic American Engineering Records (HAER) be completed in order to mitigate adverse effects. The crossing of the AT&SF railroad, other historic transmission lines, and the California Aqueduct would likely result in the determination of no adverse effect.

Data recovery should be conducted as a recommended mitigation measure for archaeological sites that are recommended as eligible to the CRHR or NRHP and would be impacted by the project. Monitoring of project-related excavation within an archaeological site is not appropriate mitigation and may destroy the site. SCE should comply with provisions of the National Historic Preservation Act and should consult with a California State Historic Preservation Officer regarding appropriate mitigation should any cultural materials be encountered during construction or other ground-disturbing activities.

In the event of a site discovery during project implementation, all work would stop in the immediate area in order to afford time for documentation, evaluation, and consultation between the lead federal agency, the California State Historic Preservation Officer (SHPO), and all consulting tribes if a discovery is aboriginal in origin. Consultation with the above entities would ensue regardless of whether the discovery is located on private or federal lands. If consultation determines that the discovery is eligible for the NRHP, a consideration of effects should be undertaken pursuant to 36 CFR 800.5 of the National Historic Preservation Act (NHPA, 1966, as amended). If consultation results in a determination of adverse effects to a historic property, mitigation measures would be proposed and implemented following consultation with the California SHPO, the lead federal agency, the Advisory Council on Historic Preservation (ACHP), and all consulting Tribes, if necessary. Avoidance would be the preferable mitigation measure in all instances.

C.3.11.4 Conclusion

While SCE would attempt to avoid effects to known cultural sites, it is possible that the corridors have sensitive cultural resources that may not be avoidable and could be affected. This Staff Assessment/EIS concludes that it would be possible to mitigate all impacts to cultural resources to less than a significant level and to implement recommended measures that apply to cultural resources. Known sensitive areas would be avoided, construction activities would be monitored and other appropriate mitigation similar to the Conditions of Certification identified in the **Cultural Resources and Native American Values** section of the Staff Assessment/EIS would be implemented.

C.3.12 CUMULATIVE IMPACTS

Section B.3, Cumulative Scenario, provides detailed information on the potential cumulative solar and other development projects in the project area. Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis for the proposed project. In summary, these projects are:

- Renewable energy projects on BLM, State, and private lands, as shown on **Cumulative Figures 1 and 2** and in **Cumulative Tables 1A and 1B.** Although not all of those projects are expected to complete the environmental review processes, or be funded and constructed, the list is indicative of the large number of renewable projects currently proposed in California.
- Future development projects in the immediate Newbury Springs/Ludlow area are shown on **Cumulative Impacts Figure 3,** Newbury Springs/Ludlow **Existing and Future/Foreseeable Projects, and Cumulative Tables 2 and 3**. Table 2 presents existing projects in this area and Table 3 presents future foreseeable projects in the Newbury Springs/Ludlow Area. Both tables provide the project names, types, locations and statuses

These projects are defined within a geographic area that has been identified by the Energy Commission and BLM as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all resource elements or environmental parameters. Most of these projects have, are, or will be required to undergo their own independent environmental review under CEQA and/or NEPA. Even if the cumulative projects described in Section B.3 have not yet completed the required environmental processes, they were considered in the cumulative impacts analyses in this SA/Draft EIS.

<u>Geographic Scope of Analysis</u>

The geographic area considered for cumulative impacts on cultural resources is the Calico Solar Project area (Newbury Springs/Ludlow area).

<u>Effects of Past and Present Projects</u>

For this analysis, the following projects or developments are considered most relevant to effects on cultural resources (refer also to Section B.3, Table 2):

Project	Location
Twentynine Palms Marine Corps Air Ground Combat Center (MCAGCC)	Morongo Basin (to the south of project site)
SEGS I and II	Near Daggett (17 miles west of project site)
CACTUS (formerly Solar One and Solar Two)	Near Daggett (to the west of project site)
Mine	2 miles west of project site along I-40
Mine	14 miles west of project site along I-40

Cultural resources in the geographic area have been impacted by past and currently approved projects as follows:

1. Because cultural resources are non-renewable, the removal or destruction of any resource results in a net loss of resources

2. Existing development in the Newbury Springs/Ludlow area and the surrounding areas has resulted in the removal or destruction of cultural resources, which has resulted in a net loss of resources in these areas

Effects of Reasonably Foreseeable Future Projects

Cultural resources are also expected to be affected by the following reasonably foreseeable future projects as follows (refer also to Section B.3, Table 3):

SES Solar Three (CACA 47702)
SES Solar Six (CACA 49540)
SCE Pisgah Substation Expansion
Pisgah-Lugo transmission upgrade
Twentynine Palms Expansion
Broadwell BrightSource (CACA 48875)
Wind project (CACA 48629)
Wind Project (CACA 48667)
Wind project (CACA 48472)
Twin Mountain Rock Venture
Solar thermal (CACA 49429)
Proposed National Monument (former Catellus Lands)
BLM Renewable Energy Study Areas
SES Solar Three (CACA 47702)
SES Solar Six (CACA 49540)
SCE Pisgah Substation Expansion
Pisgah-Lugo transmission upgrade
Twentynine Palms Expansion
Broadwell BrightSource (CACA 48875)
Wind project (CACA 48629)
Wind Project (CACA 48667)
Wind project (CACA 48472)
Twin Mountain Rock Venture
Solar thermal (CACA 49429)
Proposed National Monument (former Catellus Lands)
BLM Renewable Energy Study Areas

Contribution of the Calico Solar Project to Cumulative Impacts

Construction. The construction of the Calico Solar Project would probably result in permanent adverse impacts related to the removal or partial destruction of archaeological resources on the project site during construction-related ground disturbance. The construction of the proposed project would also result in unmitigable adverse impacts to several built-environment resources, particularly a contributing segment of U.S. Route 66, due to the profound visual intrusion of the project on the landscape. It is further expected that the construction of some or all of the foreseeable cumulative projects which are not yet built may also result in the permanent, potentially unmitigable, adverse impacts as a result of the removal or partial destruction of the archaeological resources on the sites for those projects and as a result of the visual intrusion of some of these projects on Mojave Desert vistas. As a result, the construction of the Calico Solar Project and other foreseeable cumulative projects will contribute to permanent long term, potentially unmitigable, adverse impacts as a result of of the physical degradation of and visual intrusion on significant cultural resources on those sites and an overall net reduction in cultural resources in the area.

Operation. During operation of the Calico Solar Project, cultural resources on and in the immediate vicinity of the project site may experience increased vandalism as a result of improved access to the project site, illegal collection of artifacts, and/or destruction of resources by vehicles traveling on the site. Similar impacts may also occur as a result of some or all of the cumulative projects, as more people come into this area associated with those new land uses. As a result, the Calico Solar Project and the other cumulative projects may contribute to a cumulative adverse impact on cultural resources as a result in increased access to the area and the potential for increased vandalism, illegal collection of artifacts, and/or destruction of resources during operation related activities.

Decommissioning. The decommissioning of the Calico Solar Project may result in adverse impacts to cultural resources as a result of ground disturbance, increased vandalism, illegal collection of artifacts, and/or destruction of resources by vehicles traveling on the site or during demolition and removal of the project facilities. Similar impacts are not anticipated as a result of most of the other cumulative projects as the removal of those land uses may not result in increased vandalism, illegal collection of artifacts, and/or destruction of resources by vehicles traveling on those sites or during demolition and removal of those land uses. As a result, decommissioning the Calico Solar Project is not anticipated to contribute to a cumulative adverse impact on cultural resources beyond the contribution of the project that would occur as a result of the construction and operation of the project.

C.3.13 COMPLIANCE WITH LORS

If the Conditions of Certification (**CUL-1** through **CUL-10**) are properly implemented, the proposed Calico Solar Project would result in a less than significant impact under CEQA and resolve effects under Section 106 of the NHPA on known and newly found cultural resources. The project would therefore be in compliance with the applicable state laws, ordinances, regulations, and standards listed in Cultural Resources Table 1.

The County of San Bernardino's General Plan has general language promoting the county-wide preservation of cultural resources. The Condition of Certification requires specific actions not just to promote but to effect historic preservation and mitigate impacts to all cultural resources in order to ensure CEQA compliance. Consequently, if Calico Solar, LLC implements these conditions, its actions would be consistent with the general historic preservation goals of the County of San Bernardino.

C.3.14 NOTEWORTHY PUBLIC BENEFITS

The Calico Solar project provides an opportunity to study cultural resources over a broad expanse of land that may not otherwise be investigated. Staff does believe that if the conditions of certification were implemented, the resulting acquisition of data would contribute to the knowledge of prehistory in the Mojave Desert. Thus, data recovery may provide some public benefits by advancing scientific understanding about the prehistory of the Mojave Desert.

C.3.15 RESPONSES TO COMMENTS

California Unions for Reliable Energy (CURE) submitted the following comments pertaining to the cultural resource analysis in a letter dated June 4, 2010.

CURE Comment 1: *The Staff Assessment (SA) must be revised and recirculated for public comment. The Revised SA will contain many new analyses and mitigation measures for significant unresolved issues. Indeed, that is the very purpose of the Revised SA. For example, the Revised SA will include wholly new mitigation measures for cultural resources never seen before by the public. The addition of this significant new information, which has not yet been analyzed and disclosed in a report by Staff, requires that the Revised SA be recirculated for public review and comment. The purpose of recirculation is to give the public and other agencies an opportunity to evaluate the new data and the validity of conclusions drawn from it. Consequently, the plan to include numerous additional analyses and mitigation measures in the Revised SA without renoticing and recirculating the revised document for public review and comment violates CEQA. The SA is being revised to inform the public and decision makers of the project's significant impacts and to avoid or reduce environmental damage when possible by requiring alternatives or mitigation measures. Thus, Staff, after receiving the necessary information from the Applicant, must draft and circulate a complete SA for public review and comment. The Committee must revise the schedule to incorporate this legally mandated procedure.*

> **Staff Response:** The applicant has worked with staff to provide additional follow-up data. These data, in combination with information provided earlier by the applicant, including the AFC and other documents cited in the SA/DEIS, and by staff's additional independent research, provide a suitable basis for CEQA analysis, as presented in this SSA. Staff also notes that the Energy Commission's certification process provides for additional future opportunities for public comment on the project as revised and the environmental analysis. Recirculation of the SA/DEIS is not required.

CURE Comment 2: *The applicant fails to set forth the environmental setting for the Lugo to Pisgah Transmission Line. The applicant has not yet informed the CEC where the new 500 kV transmission line that is required to enable the project's power to enter the grid or the new 100-acre substation will be located. Neither has the applicant provided biological or cultural surveys of the area that will be impacted by this transmission line and substation, as requested by Staff. Because the location and description of these transmission upgrades have not been provided by the applicant, the* *environmental impacts of these facilities and the necessary mitigation cannot be determined. Without this information about the project's proposed (and required) transmission upgrades, staff simply cannot provide and adequate basis for the Committee to make the findings required for certification of the project (e.g., compliance with all laws and regulations, and adequate mitigation of impacts); nor can staff issue a valid SA.*

> **Staff Response:** Section C.3.11 of the SSA examines the potential impacts of the future SCE transmission line project, which would be related to the Calico Solar Project, under the separate jurisdiction of the California Public Utilities Commission. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed, and are discussed in the SSA based on available information. As a separate project under another agency's jurisdiction, the SCE upgrades will also be the subject of a more detailed CEQA analysis in the future, based on a more specific project description than is now available.

CURE Comment 3: *The SA must disclose and analyze all potentially significant impacts to cultural resources. Because the applicant failed to provide necessary information, staff could not effectively evaluate the Project's impacts in the SA. Cure states that the Commission's environmental review must describe the mitigation measures to minimize significant effects. Formultaion of mitigation measures should not be deferred unitl some future time; however, measure may specify performance standards which would mitigate the significant effect of the project and which may be accomplished in more than one specified way.*

> **Staff Response:** Staff's analysis and recommended conditions of certification have been extensively revised based on updated and refined cultural resource data from the Draft Final Class III Cultural Resources Technical Report provided by the applicant in June 2010 (TS 2010an). Staff's analysis of the updated cultural resource data has disclosed all potentially significant impacts to cultural resources.

CURE Comment 4: *The SA only discusses impacts to archaeological and historical artifacts and completely omits any analysis of impacts to traditional cultural properties (i.e., properties of significance to tribes today that may or may not be tied to specific artifacts). After the SA was published, tribal members expressed a desire to bring Tribal elders out to the site to identify potential traditional cultural properties. Local tribes have not had an opportunity to participate in the review of the technical data from the survey efforts and so they have not had an opportunity to identify significant impacts to traditional cultural properties. Staff must give tribal members and knowledgeable individuals an opportunity to identify significant cultural resources on the project site, and in area near the site that would be impacted by the project development, as part of the project's potentially significant impacts under CEQA. It is improper for the SA to conclude that an adequate survey of cultural resources has been completed when a whole class of resources, traditional cultural properties, has not yet been studied. The SA must be revised to identify, analyze and mitigate potentially significant impact to all cultural resources on the project site, including traditional cultural properties.*

Staff Response: No traditional cultural properties have been identified in or near the Calico Solar project area of analysis. The BLM has been consulting with tribal representatives regarding concerns and/or knowledge of cultural resources within the Calico Solar project since August 2007. In July 2008, the applicant requested a search of the Sacred Lands File from the Native American Heritage Commission, and no Native American cultural sites were identified as a result of that search. Energy Commission staff has also consulted with tribal members regarding the project and found that, while tribal members are concerned about the treatment of cultural resources identified by the applicant within the project area, they have expressed no specific knowledge of traditional cultural properties within or near the project area of analysis. On June 13, 2010, the BLM hosted a project site field visit specifically for the tribal representatives. Tribal members reiterated concerns about the treatment of cultural resources; however, to date, no traditional cultural resources have been identified in or near the project area of analysis.

CURE Comment 5: *The SA indicates that all impacts to cultural resources will be mitigated through the preparation of a Programmatic Agreement (PA) pursuant to Section 106 of the National Historic Preservation Act (NHPA). The PA is an agreement that would be drafted prior to project approval that would defer the resolution of project impacts to after project approval. This is contrary to the statutory requirements of Section 106. If the PA is developed to mitigate significant impacts to cultural resources, the PA must fully consider the impact to cultural resources and propose mitigation for those impacts PRIOR to the issuance of any license for the project.*

Staff Response: In lieu of the PA, staff has prepared Conditions of Certification that include mitigation measures to address significant impacts to cultural resources under CEQA.

C.3.16 CONCLUSIONS AND RECOMMENDATIONS

This supplemental staff assessment has been prepared in response to the applicant’s reduction to the original 8,230-acre project footprint to avoid cultural and biological impacts (TS 2010ag), as well as in response to comments received from the public about the proposed project. This supplement relies on the information provided in the “Draft Final Class III Cultural Resources Technical Report” completed by the applicant and submitted to the BLM in June 2010. A total of 119 archaeological sites and ten built-environment (architectural) resources were identified within the Calico Solar project’s cultural resources area of analysis. The applicant has recommended, and the BLM has made the determination, that three (3) archaeological sites and five (5) built-environment properties within the project area are eligible for the National Register of Historic Places (NRHP) and the California Register of Historical Resources (CRHR). The BLM further appears to have found, under the National Environmental Policy Act (NEPA), that the proposed action would not have a significant impact on the environment, as that action relates to cultural resources, and that, under Section 106 of the National Historic Preservation Act (NHPA), the proposed action, or undertaking, would not adversely affect significant cultural resources, or historic properties.

Energy Commission staff, by contrast, believes that the data on which the applicant's and the BLM's conclusions are based are not adequate to definitively draw conclusions regarding resource eligibility. Energy Commission staff, therefore, believes that an as yet unquantified number of individual archaeological sites are potentially eligible for listing in the California Register of Historical Resources (CRHR), that three archaeological districts and landscapes have the potential to be eligible, that the effects of the proposed action on any of these resources that are conclusively recommended to be eligible would be significant, and that the Commission's adoption of proposed conditions of certification **CUL–1** through **CUL–5** and **CUL–7** through **CUL–10** would reduce these effects to a less than significant level. Energy Commission staff more definitively recommends that four built-environment resources are eligible for listing in the CRHR; however, notwithstanding the Commission's adoption of condition of certification **CUL–6** to reduce significant visual effects to one of those built-environment resources (a segment of historic U.S. Route 66), the effects are unmitigable and would not be reduced to a less than significant level.

C.3.17 PROPOSED CONDITIONS OF CERTIFICATION

CUL-1 Prior to the start of ground disturbance (includes "preconstruction site mobilization," "ground disturbance," and "construction grading, boring, and trenching," as defined in the General Conditions for this project), the project owner shall obtain the services of a Cultural Resources Specialist (CRS) and one or more alternate CRSs (at the project owner's option).

The CRS shall manage all cultural resources monitoring, mitigation, curation, and reporting activities in accordance with the Conditions of Certification (Conditions). The CRS may elect to obtain the services of Cultural Resources Monitors (CRMs) and other technical specialists, if needed, to assist in monitoring, mitigation, and curation activities. The project owner shall ensure that the CRS makes recommendations regarding the eligibility for listing in the California Register of Historical Resources (CRHR) of any cultural resources that are newly discovered or that may be affected in an unanticipated manner. No ground disturbance shall occur prior to Compliance Project Manager (CPM) approval of the CRS and alternates, unless such activities are specifically approved by the CPM.

Approval of a CRS may be denied or revoked for reasons including but not limited to non-compliance on this or other Energy Commission projects. After all ground disturbance is completed and the CRS has fulfilled all responsibilities specified in these cultural resources conditions, the project owner may discharge the CRS, if the CPM approves. With the discharge of the CRS, these cultural resources conditions no longer apply to the activities of this power plant.

CULTURAL RESOURCES SPECIALIST

The resumes for the CRS and alternate(s) shall include information demonstrating to the satisfaction of the CPM that their training and backgrounds conform to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal

Regulations, part 61 (36 C.F.R., part 61). In addition, the CRS shall have the following qualifications:

1. The CRS's qualifications shall be appropriate to the needs of the project and shall include a background in anthropology, archaeology, history, architectural history, or a related field;

2. At least three years of archaeological or historical, as appropriate (per nature of predominant cultural resources on the project site), resource mitigation and field experience in California; and

3. At least one year of experience in a decision-making capacity on cultural resources projects in California and the appropriate training and experience to knowledgably make recommendations regarding the significance of cultural resources.

The resumes of the CRS and alternate CRS shall include the names and telephone numbers of contacts familiar with the work of the CRS/alternate CRS on referenced projects and demonstrate to the satisfaction of the CPM that the CRS/alternate CRS has the appropriate training and experience to implement effectively the Conditions.

CULTURAL RESOURCES MONITORS

CRMs shall have the following qualifications:

1. a B.S. or B.A. degree in anthropology, archaeology, historical archaeology, or a related field, and one year experience monitoring in California; or

2. an A.S. or A.A. degree in anthropology, archaeology, historical archaeology, or a related field, and four years experience monitoring in California; or

3. enrollment in upper division classes pursuing a degree in the fields of anthropology, archaeology, historical archaeology, or a related field, and two years of monitoring experience in California.

CULTURAL RESOURCES TECHNICAL SPECIALISTS

The resume(s) of any additional technical specialist(s), e.g., historical archaeologist, historian, architectural historian, and/or physical anthropologist, shall be submitted to the CPM for approval.

Verification:

1. At least 45 days prior to the start of ground disturbance, the project owner shall submit the resume for the CRS, and alternate(s) if desired, to the CPM for review and approval.

2. At least 10 days prior to a termination or release of the CRS, or within 10 days after the resignation of a CRS, the project owner shall submit the resume of the proposed

new CRS to the CPM for review and approval. At the same time, the project owner shall also provide to the proposed new CRS the AFC and all cultural resources documents, field notes, photographs, and other cultural resources materials generated by the project. If no alternate CRS is available to assume the duties of the CRS, a monitor may serve in place of a CRS so that ground disturbance may continue up to a maximum of 3 days without a CRS. If cultural resources are discovered then ground disturbance will remain halted until there is a CRS or alternate CRS to make a recommendation regarding significance.

3. At least 20 days prior to ground disturbance, the CRS shall provide a letter naming anticipated CRMs for the project and stating that the identified CRMs meet the minimum qualifications for cultural resources monitoring required by this Condition.

4. At least 5 days prior to additional CRMs beginning on-site duties during the project, the CRS shall provide letters to the CPM identifying the new CRMs and attesting to their qualifications.

5. At least 10 days prior to any technical specialists, other than CRMS, beginning tasks, the resume(s) of the specialists shall be provided to the CPM for review and approval.

6. At least 10 days prior to the start of ground disturbance, the project owner shall confirm in writing to the CPM that the approved CRS will be available for onsite work and is prepared to implement the cultural resources conditions.

CUL-2 Prior to the start of ground disturbance, if the CRS has not previously worked on the project, the project owner shall provide the CRS with copies of the AFC, data responses, confidential cultural resources reports, and the Final Staff Assessment (FSA) for the project. The project owner shall also provide the CRS and the CPM with maps and drawings showing the footprints of the power plant, all linear facility routes, all access roads, and all laydown areas. Maps shall include the appropriate USGS quadrangles and a map at an appropriate scale (e.g., 1:2400 or 1" = 200') for plotting cultural features or materials. If the CRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the CRS and CPM. The CPM shall review map submittals and, in consultation with the CRS, approve those that are appropriate for use in cultural resources planning activities. No ground disturbance shall occur prior to CPM approval of maps and drawings, unless such activities are specifically approved by the CPM.

If construction of the project would proceed in phases, maps and drawings not previously provided shall be provided to the CRS and CPM prior to the start of each phase. Written notice identifying the proposed schedule of each project phase shall be provided to the CRS and CPM.

Weekly, until ground disturbance is completed, the project construction manager shall provide to the CRS and CPM a schedule of project activities for the following week, including the identification of area(s) where ground disturbance will occur during that week.

The project owner shall notify the CRS and CPM of any changes to the scheduling of the construction phases.

Verification:

1. At least 40 days prior to the start of ground disturbance, the project owner shall provide the AFC, data responses, confidential cultural resources documents, and the FSA to the CRS, if needed, and the subject maps and drawings to the CRS and CPM. The CPM will review submittals in consultation with the CRS and approve maps and drawings suitable for cultural resources planning activities.

2. At least 15 days prior to the start of ground disturbance, if there are changes to any project-related footprint, the project owner shall provide revised maps and drawings for the changes to the CRS and CPM.

3. At least 15 days prior to the start of each phase of a phased project, the project owner shall submit the appropriate maps and drawings, if not previously provided, to the CRS and CPM.

4. Weekly, during ground disturbance, a current schedule of anticipated project activity shall be provided to the CRS and CPM by letter, e-mail, or fax.

5. Within 5 days of changing the scheduling of phases of a phased project, the project owner shall provide written notice of the changes to the CRS and CPM.

CUL-3 Changes to the proposed project or to the character of its construction, operation, and maintenance that may become necessary subsequent to the approval of the project, were such approval to occur, may in turn require the re-consideration of the extent of the original project area. Where such changes indicate the need to alter the original project area to include additional lands that were not elements of analysis during the certification process, the effects of any proposed changes on historical resources that may be on such lands would need to be taken into account. Changes in the character of the construction, operation, and maintenance of the proposed project may include such actions as decisions to use non-commercial borrow or disposal sites.

Upon the recognition that proposed changes to the project would require the use of lands that were not a part of the original project area of analysis, the project owner shall ensure that the CRS surveys any such lands for cultural resources and record each newly found resource on DPR 523 Series forms. Exceptions would be made to this protocol in cases where cultural resources surveys no greater than five years in age are documented for the entirety of the subject lands and approved by the CPM. Where new cultural resources surveys are warranted, the project owner shall convey the results of such surveys, along with the CRS's recommendations for further action, to the CPM, who will determine whether further action is necessary. If the CPM determines that historical resources may be present and that any such resource may be subject to a substantial adverse change in its significance, the project owner shall ensure that the CRS provides the CPM with substantiated recommendations on whether each such resource is eligible for listing in the CRHR and recommendations for the resolution of any such significant effects. The CRS, the project owner, and the CPM shall then confer on said recommendations, and, upon the concurrence of the CPM with those recommendations, the project owner shall ensure that the CRS proceeds to implement them, and reports on the methods and the results of any such work in the final Cultural Resources Report (CRR) (**CUL-8**).

Verification:

1. Upon the recognition that proposed changes to the project or to the character of the construction, operation, and maintenance of the project would require the use of lands that were not a part of the original project area, the project owner shall notify the CRS and CPM. The project owner shall then provide, for CPM review and approval, documentation of any cultural resources surveys five years or less in age that exist for the additional lands.

2. At least 105 days prior to the use of the new additional project area lands, in the absence of any such cultural resources surveys or when the extant cultural resources surveys do not cover the entirety of the lands to be added to the project area, the project owner shall ensure that the CRS surveys the additional lands for cultural resources, notifies the project owner and the CPM of the results of the new cultural resources survey, and recommends further action.

3. No more than 15 days subsequent to the receipt of the information in verification 2, **CUL-3**, above, the CPM shall determine whether historical resources may be present and whether any such resources may be subject to substantial adverse changes in significance.

4. At least 60 days prior to the use of the new additional project area lands, if the CPM determines that historical resources may be subject to substantial adverse changes in significance, the project owner shall ensure that the CRS provides the CPM with substantiated evaluations, based on archival and field research, on whether each such resource is eligible for listing in the CRHR and recommendations for the resolution of any potential significant effects.

5. For no longer than 15 days, the project owner, the CRS, and the CPM shall confer about the above evaluations and recommendations, and, upon the concurrence of the CPM with those evaluations and recommendations, the project owner shall ensure that the CRS proceeds to resolve any significant effects pursuant to the above recommendations prior to the use of the new additional project area lands.
6. The project owner shall ensure that the CRS reports on the methods and the results of all such work in the CRR (**CUL-7**).

CUL-4 Prior to the preparation of the Cultural Resources Monitoring and Mitigation Plan (CRMMP), pursuant to **CUL-5**, the project owner shall develop, prepare, and implement a series of protocols the purposes of which will be to gather and analyze information to refine the assessments of the historical significance of the archaeological resources in the project area of analysis. The project owner shall first prepare and submit, for the review and approval of the CPM, a final draft of an archaeological resource taxonomy that splits out the individual archaeological resources in the project area of analysis into objectively similar archaeological site types or site type groups, and that delimits, as appropriate, groups of individual resources, such as districts or landscapes, that relate unifying prehistoric and historic themes. The initial basis for the taxonomy of individual archaeological resources should be the taxonomy in the "Cultural Resource Site Taxonomy" subsection of the published SSA for this project. Subsequent to CPM approval of the final draft of the archaeological resource taxonomy, the project owner shall prepare and submit, for the review and approval of the CPM and consistent with the guidance found in the February 1990 "Archaeological Resource Management Reports (ARMR): Recommended Contents and Format" and the February 1991 "Guidelines for Archaeological Research Designs," separate protocols for the CRHR evaluation of each archaeological site type or site type group in the CPM-approved, final archaeological resource taxonomy and for each archaeological district, landscape, or other large-scale archaeological resource in the subject taxonomy. Among the large-scale resources that the project owner shall explicitly consider in the final draft of the archaeological resource taxonomy are a prehistoric archaeological landscape that encompasses the numerous and diverse individual prehistoric archaeological sites across the desert pavements in the southern portion of the project area, a potential historical archaeological gravel mining district over roughly the western to west-central portion of the project area, and the archaeological remnants of the segment of the National Trails Road in the project area that may be a contributing element to a National Trails Road historic district.

Each CRHR evaluation protocol shall include, at a minimum, the following elements:

1. A background research section which develops interpretive contexts germane to each protocol and which presents information on previous research in the vicinity of the project area, generally, and on previous research on the specific resource types under consideration in the respective protocols.

2. An evaluation phase research design which, in the case of protocols prepared for individual archaeological resource types or type groups, should include a rationalized sample of the resources in a type or type group, rather than a protocol structured to sample 100 percent of the population of a type or type group, and which explicitly takes into account extant information on the subject resources.

3. A detailed and explicit field methodology tailored to acquire the data necessary to address specific research questions.

4. Provisions for visual and specialized laboratory analyses of recovered cultural materials.

5. Provisions for visual and specialized laboratory analyses of chronometric samples, and organic remains and residues.

Where defensible relative to archaeological theory, the project owner may submit documents that, within a single document, tier several separate evaluation protocols from common background research. In such documents, the project owner would develop and present germane prehistoric or historic contexts and present a general review of previous archaeological research in the project area vicinity before laying out the specific evaluation protocols for particular archaeological resources by reviewing previous archaeological research specific to a resource type, type group, or large-scale resource, and then developing and presenting custom research designs for those particular resources.

Subsequent to the completion of the implementation of each protocol, the project owner shall prepare and submit, for the review and approval of the CPM, separate reports on the results of the implementation of each protocol, on the analysis and interpretation of that data, and on the CRHR evaluation of the resource type, type group, or large-scale resource that a subject protocol addresses.

Each CRHR evaluation report shall include, at a minimum, the following elements:

1. Synopses of the background research section, evaluation phase research design, field methodology, and material culture, chronometric, and organic analyses as set out in the relevant original evaluation protocol.

2. A detailed, explicit, illustrated presentation of the results of the field and laboratory work done under the relevant protocol.

3. An analysis and behavioral interpretation of data from previous research, and of field and laboratory data acquired as the result of the implementation of the relevant protocol.

4. Formal evaluation of the specific resource types relative to the CRHR program.

The project owner may lump the evaluation reports into report documents that reflect any prior approved protocol documents that contain more than one protocol.

<u>Verification:</u>

1. At least 150 days prior to the start of ground disturbance, the project owner shall submit a final draft of the archaeological resource taxonomy for the project area of analysis to the CPM for review and approval.

2. At least 120 days prior to the start of ground disturbance, the project owner shall have submitted all CRHR evaluation protocols to the CPM for review and approval.

3. At least 60 days prior to the start of ground disturbance, the project owner shall have submitted all CRHR evaluation reports to the CPM for review and approval.

CUL-5 Prior to the start of ground disturbance, the project owner shall submit the CRMMP, as prepared by or under the direction of the CRS, to the CPM for review and approval. The CRMMP shall follow the content and organization of the draft model CRMMP, provided by the CPM, and the authors' name(s) shall appear on the title page of the CRMMP. The CRMMP shall identify general and specific measures to minimize potential impacts to sensitive cultural resources. Implementation of the CRMMP shall be the responsibility of the CRS and the project owner. Copies of the CRMMP shall reside with the CRS, alternate CRS, each CRM, and the project owner's on-site construction manager. No ground disturbance shall occur prior to CPM approval of the CRMMP, unless such activities are specifically approved by the CPM.

The CRMMP shall include, but not be limited to, the following elements and measures:

1. The following statement included in the Introduction: "Any discussion, summary, or paraphrasing of the Conditions of Certification in this CRMMP is intended as general guidance and as an aid to the user in understanding the Conditions and their implementation. The conditions, as written in the Commission Decision, shall supersede any summarization, description, or interpretation of the conditions in the CRMMP. The Cultural Resources Conditions of Certification from the Commission Decision are contained in Appendix A."

2. A proposed general research design that includes a discussion of archaeological research questions and testable hypotheses specifically applicable to the project area, and a discussion of artifact collection, retention/disposal, and curation policies as related to the research questions formulated in the research design. The research design will specify that the preferred treatment strategy for any buried archaeological deposits is avoidance. Specific mitigation plans shall be prepared and submitted, for the review and approval of the CPM, for any unavoidable significant effects to archaeological resource types, type groups, or large-scale archaeological resources determined by the process in **CUL-4** to be eligible for listing in the CRHR. Specific mitigation plans shall also be prepared and submitted, pursuant to **CUL-6**, for the review and approval of the CPM, for the unmitigable significant effects that the project will have on U.S. Route 66, and for any other significant effects that the project may have on other significant built-environment resources. Prescriptive treatment plans for construction-related discoveries may also be included in the CRMMP for limited archaeological resource types.

3. Specification of the implementation sequence and the estimated time frames needed to accomplish all project-related tasks during the ground-disturbance and post-ground–disturbance analysis phases of the project.

4. Identification of the person(s) expected to perform each of the tasks, their responsibilities, and the reporting relationships between project construction management and the mitigation and monitoring team.

5. A description of the manner in which Native American observers or monitors will be included, the procedures to be used to select them, and their role and responsibilities.

6. A description of all impact-avoidance measures (such as flagging or fencing) to prohibit or otherwise restrict access to sensitive resource areas that are to be avoided during ground disturbance, construction, and/or operation, and identification of areas where these measures are to be implemented. The description shall address how these measures would be implemented prior to the start of ground disturbance and how long they would be needed to protect the resources from project-related effects.

7. A statement that all encountered cultural resources over 50 years old shall be recorded on Department of Parks and Recreation (DPR) 523 forms and mapped and photographed. In addition, all archaeological materials retained as a result of the archaeological investigations (survey, testing, data recovery) shall be curated in accordance with the California State Historical Resources Commission's *Guidelines for the Curation of Archaeological Collections*, into a retrievable storage collection in a public repository or museum.

8. A statement that the project owner will pay all curation fees for artifacts recovered and for related documentation produced during cultural resources investigations conducted for the project. The project owner shall identify three possible curation facilities that could accept cultural resources materials resulting from project activities.

9. A statement that the CRS has access to equipment and supplies necessary for site mapping, photography, and recovery of any cultural resource materials that are encountered during ground disturbance and cannot be treated prescriptively.

10. A description of the contents, format, and review and approval process of the final Cultural Resource Report (CRR), which shall be prepared according to ARMR guidelines.

Verification:

1. Upon approval of the CRS proposed by the project owner, the CPM will provide to the project owner an electronic copy of the draft model CRMMP for the CRS.
2. At least 30 days prior to the start of ground disturbance, the project owner shall submit the CRMMP to the CPM for review and approval.

3. At least 30 days prior to the start of ground disturbance, in a letter to the CPM, the project owner shall agree to pay curation fees for any materials generated or collected as a result of the archaeological investigations (survey, testing, data recovery).

4. Within 90 days after completion of ground disturbance (including landscaping), if cultural materials requiring curation were generated or collected, the project owner

shall provide to the CPM a copy of an agreement with, or other written commitment from, a curation facility that meets the standards stated in the California State Historical Resources Commission's *Guidelines for the Curation of Archaeological Collections*, to accept the cultural materials from this project. Any agreements concerning curation will be retained and available for audit for the life of the project.

CUL-6 Prior to the start of ground disturbance the project owner shall complete Historic American Landscape Survey (HALS) documentation of the 9-mile long segment of U.S. Route 66 and associated landscapes and viewsheds within the project area from the roadway. The project owner shall ensure that photodocumentation is submitted to the California Historical Resources Information System (CHRIS) and to the Historic American Landscape Survey (HALS) Program. The project owner shall be responsible for any associated curation fees.

Documentation shall adhere to the established HALS recordation guidelines and be undertaken and completed by a historian meeting the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 C.F.R., part 61) and a qualified architectural photographer. The resumes of the historian and architectural photographer shall include the names and telephone numbers of contacts familiar with their work on referenced projects and demonstrate to the satisfaction of the CPM that the historian and architectural photographer have the appropriate training and experience to effectively implement this condition. The applicant may undertake the HALS recordation activities prior to certification. The applicant undertaking such activities would do so, at their own risk, as a means of advantaging their schedule.

The project owner shall submit the final HALS documentation to the CPM for review and approval. The final HALS report and documentation shall be provided in the format specified by the HALS guidelines. The applicant may undertake the HALS recordation activities prior to certification. The applicant undertaking such activities would do so, at their own risk, as a means of advantaging their schedule.

The HALS documentation shall be used to develop an interpretive display adjacent to the project in an area easily accessible by the public. The interpretative display shall display photographs of the project site and include a written history of Route 66 and its significance in the eastern Mojave, to be reviewed and approved by the CPM prior to installation. The project owner shall maintain the interpretive display for the life of the project.

<u>Verification:</u>

1. At least 60 days prior to the start of ground disturbance, the project owner shall submit the resume for the historian and architectural photographer to the CPM for review and approval.

2. At least 45 days prior to the start of ground disturbance, the project owner shall submit the research design for the HALS report and documentation to the CPM for review and approval.

3. At least 15 days prior to the start of ground disturbance, the project owner shall submit the draft HALS report to the CPM for review and approval. If any reports have previously been sent to the CHRIS and/or the HALS, then receipt letters from the CHRIS and/or HALS or other verification of receipt shall be included in an appendix.

4. Within 10 days after CPM approval of the HALS report, the project owner shall provide documentation to the CPM confirming that copies of the final report have been provided to the SHPO, the CHRIS, and the HALS.

5. At least 60 days prior to the completion of Phase 1 construction, the project owner shall submit the interpretive display design and text to the CPM for review and approval.

CUL-7 The project owner shall submit the final Cultural Resources Report (CRR) to the CPM for approval. The final CRR shall be written by or under the direction of the CRS and shall be provided in the ARMR format. The final CRR shall report on all field activities including dates, times and locations, results, samplings, and analyses. All survey reports, Department of Parks and Recreation (DPR) 523 Series forms, data recovery reports, and any additional research reports not previously submitted to the California Historical Resource Information System (CHRIS) and the State Historic Preservation Officer (SHPO) shall be included as appendices to the final CRR.

If the project owner requests a suspension of ground disturbance and/or construction activities, then a draft CRR that covers all cultural resources activities associated with the project shall be prepared by the CRS and submitted to the CPM for review and approval on the same day as the suspension/extension request. The draft CRR shall be retained at the project site in a secure facility until ground disturbance and/or construction resumes or the project is withdrawn. If the project is withdrawn, then a final CRR shall be submitted to the CPM for review and approval at the same time as the withdrawal request.

Verification:

1. Within 30 days after requesting a suspension of construction activities, the project owner shall submit a draft CRR to the CPM for review and approval.

2. Within 90 days after completion of ground disturbance (including landscaping), the project owner shall submit the final CRR to the CPM for review and approval. If any reports have previously been sent to the CHRIS, then receipt letters from the CHRIS or other verification of receipt shall be included in an appendix.

3. Within 10 days after CPM approval of the CRR, the project owner shall provide documentation to the CPM confirming that copies of the final CRR have been provided to the SHPO, the CHRIS, the curating institution, if archaeological materials

were collected, and to the Tribal Chairpersons of any Native American groups requesting copies of project-related reports.

CUL-8 Prior to and for the duration of ground disturbance, the project owner shall provide Worker Environmental Awareness Program (WEAP) training to all new workers within their first week of employment at the project site, along the linear facilities routes, and at laydown areas, roads, and other ancillary areas. The training shall be prepared by the CRS, may be conducted by any member of the archaeological team, and may be presented in the form of a video. The CRS shall be available (by telephone or in person) to answer questions posed by employees. The training may be discontinued when ground disturbance is completed or suspended, but must be resumed when ground disturbance, such as landscaping, resumes.

The training shall include:

1. A discussion of applicable laws and penalties under the law;

2. Samples or visuals of artifacts that might be found in the project vicinity;

3. A discussion of what such artifacts may look like when partially buried, or wholly buried and then freshly exposed;

4. A discussion of what prehistoric and historical archaeological deposits look like at the surface and when exposed during construction, and the range of variation in the appearance of such deposits;

5. Instruction that the CRS, alternate CRS, and CRMs have the authority to halt ground disturbance in the area of a discovery to an extent sufficient to ensure that the resource is protected from further impacts, as determined by the CRS;

6. Instruction that employees are to halt work on their own in the vicinity of a potential cultural resources discovery and shall contact their supervisor and the CRS or CRM, and that redirection of work would be determined by the construction supervisor and the CRS;

7. An informational brochure that identifies reporting procedures in the event of a discovery;
8. An acknowledgement form signed by each worker indicating that they have received the training; and

9. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

No ground disturbance shall occur prior to implementation of the WEAP program, unless such activities are specifically approved by the CPM.

Verification:

1. At least 30 days prior to the beginning of ground disturbance, the CRS shall provide the training program draft text and graphics and the informational brochure to the CPM for review and approval.

2. At least 15 days prior to the beginning of ground disturbance, the CPM will provide to the project owner a WEAP Training Acknowledgement form for each WEAP-trained worker to sign.

3. Monthly, until ground disturbance is completed, the project owner shall provide in the Monthly Compliance Report (MCR) the WEAP Training Acknowledgement forms of workers who have completed the training in the prior month and a running total of all persons who have completed training to date.

CUL-9 The project owner shall ensure that the CRS, alternate CRS, or CRMs monitor full time all ground disturbance at the project site, along the linear facilities routes, and at laydown areas, roads, and other ancillary areas, to ensure there are no impacts to undiscovered resources and to ensure that known resources are not impacted in an unanticipated manner.

Full-time archaeological monitoring for this project shall be the archaeological monitoring of earth-removing activities for as long as the activities are ongoing. Where excavation equipment is actively removing dirt and hauling the excavated material farther than fifty feet from the location of active excavation, full-time archaeological monitoring shall require at least two monitors per excavation area. In this circumstance, one monitor shall observe the location of active excavation and a second monitor shall inspect the dumped material. For excavation areas where the excavated material is dumped no farther than fifty feet from the location of active excavation, one monitor shall both observe the location of active excavation and inspect the dumped material.

A Native American monitor shall be obtained to monitor ground disturbance in areas where Native American artifacts may be discovered. Contact lists of interested Native Americans and guidelines for monitoring shall be obtained from the Native American Heritage Commission. Preference in selecting a monitor shall be given to Native Americans with traditional ties to the area that shall be monitored. If efforts to obtain the services of a qualified Native American monitor are unsuccessful, the project owner shall immediately inform the CPM. The CPM will either identify potential monitors or will allow ground disturbance to proceed without a Native American monitor.

The research design in the CRMMP shall govern the collection, treatment, retention/disposal, and curation of any archaeological materials encountered.

On forms provided by the CPM, CRMs shall keep a daily log of any monitoring and other cultural resources activities and any instances of non-compliance with the Conditions and/or applicable LORS. Copies of the daily monitoring logs shall be provided by the CRS to the CPM, if requested by the CPM. From these logs, the CRS shall compile a monthly monitoring summary report to be included in the MCR. If there are no monitoring activities, the summary report shall specify why monitoring has been suspended.

The CRS or alternate CRS shall report daily to the CPM on the status of the project's cultural resources-related activities, unless reducing or ending daily reporting is requested by the CRS and approved by the CPM.

In the event that the CRS believes that the current level of monitoring is not appropriate in certain locations, a letter or e-mail detailing the justification for changing the level of monitoring shall be provided to the CPM for review and approval prior to any change in the level of monitoring.

The CRS, at his or her discretion, or at the request of the CPM, may informally discuss cultural resources monitoring and mitigation activities with Energy Commission technical staff.

Cultural resources monitoring activities are the responsibility of the CRS. Any interference with monitoring activities, removal of a monitor from duties assigned by the CRS, or direction to a monitor to relocate monitoring activities by anyone other than the CRS shall be considered non-compliance with these Conditions.

Upon becoming aware of any incidents of non-compliance with the Conditions and/or applicable LORS, the CRS and/or the project owner shall notify the CPM by telephone or e-mail within 24 hours. The CRS shall also recommend corrective action to resolve the problem or achieve compliance with the Conditions. When the issue is resolved, the CRS shall write a report describing the issue, the resolution of the issue, and the effectiveness of the resolution measures. This report shall be provided in the next MCR for the review of the CPM.

Verification:

1. At least 30 days prior to the start of ground disturbance, the CPM will provide to the CRS an electronic copy of a form to be used as a daily monitoring log.

2. Monthly, while monitoring is on-going, the project owner shall include in each MCR a copy of the monthly summary report of cultural resources-related monitoring prepared by the CRS and shall attach any new DPR 523A forms completed for finds treated prescriptively, as specified in the CRMMP.

3. At least 24 hours prior to implementing a proposed change in monitoring level, the project owner shall submit to the CPM, for review and approval, a letter or e-mail (or some other form of communication acceptable to the CPM) detailing the CRS's justification for changing the monitoring level.

4. Daily, as long as no cultural resources are found, the CRS shall provide a statement that "no cultural resources over 50 years of age were discovered" to the CPM as an e-mail or in some other form of communication acceptable to the CPM.

5. At least 24 hours prior to reducing or ending daily reporting, the project owner shall submit to the CPM, for review and approval, a letter or e-mail (or some other form of communication acceptable to the CPM) detailing the CRS's justification for reducing or ending daily reporting.

6. No later than 30 days following the discovery of any Native American cultural materials, the project owner shall submit to the CPM copies of the information transmittal letters sent to the Chairpersons of the Native American tribes or groups who requested the information. Additionally, the project owner shall submit to the CPM copies of letters of transmittal for all subsequent responses to Native American requests for notification, consultation, and reports and records.

7. Within 15 days of receiving them, the project owner shall submit to the CPM copies of any comments or information provided by Native Americans in response to the project owner's transmittals of information.

CUL-10 The project owner shall grant authority to halt ground disturbance to the CRS, alternate CRS, and the CRMs in the event of a discovery. Redirection of ground disturbance shall be accomplished under the direction of the construction supervisor in consultation with the CRS.

In the event that a cultural resource over 50 years of age is found (or if younger, determined exceptionally significant by the CPM), or impacts to such a resource can be anticipated, ground disturbance shall be halted or redirected in the immediate vicinity of the discovery sufficient to ensure that the resource is protected from further impacts. Monitoring and daily reporting, as provided in other conditions, shall continue during the project's ground-disturbing activities elsewhere. The halting or redirection of ground disturbance shall remain in effect until the CRS has visited the discovery, and all of the following have occurred:

1. The CRS has notified the project owner, and the CPM has been notified within 24 hours of the discovery, or by Monday morning if the cultural resources discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday morning, including a description of the discovery (or changes in character or attributes), the action taken (i.e., work stoppage or redirection), a recommendation of CRHR eligibility, and recommendations for data recovery from any cultural resources discoveries, whether or not a determination of CRHR eligibility has been made.

2. If the discovery would be of interest to Native Americans, the CRS has notified all Native American groups that expressed a desire to be notified in the event of such a discovery.

3. The CRS has completed field notes, measurements, and photography for a DPR 523 "Primary" form. Unless the find can be treated prescriptively, as specified in the CRMMP, the "Description" entry of the DPR 523 "Primary" form shall include a recommendation on the CRHR eligibility of

the discovery. The project owner shall submit completed forms to the CPM.

4. The CRS, the project owner, and the CPM have conferred, and the CPM has concurred with the recommended eligibility of the discovery and approved the CRS's proposed data recovery, if any, including the curation of the artifacts, or other appropriate mitigation; and any necessary data recovery and mitigation have been completed.

Verification:

1. At least 30 days prior to the start of ground disturbance, the project owner shall provide the CPM and CRS with a letter confirming that the CRS, alternate CRS, and CRMs have the authority to halt ground disturbance in the vicinity of a cultural resources discovery, and that the project owner shall ensure that the CRS notifies the CPM within 24 hours of a discovery, or by Monday morning if the cultural resources discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday morning.

2. Within 48 hours of the discovery of a resource of interest to Native Americans, the project owner shall ensure that the CRS notifies all Native American groups that expressed a desire to be notified in the event of such a discovery.

Unless the discovery can be treated prescriptively, as specified in the CRMMP, completed DPR 523 forms for resources newly discovered during ground disturbance shall be submitted to the CPM for review and approval no later than 24 hours following the notification of the CPM, or 48 hours following the completion of data recordation/recovery, whichever the CRS decides is more appropriate for the subject cultural resource.

C.3.14 REFERENCES

The “(tn: 00000)” in a reference below indicates the transaction number under which the item is catalogued in the Energy Commission’s Docket Unit. The transaction number allows for quicker location and retrieval of individual items docketed for a case or is used for ease of reference and retrieval of exhibits cited in briefs and used at Evidentiary Hearings.

The “(tn: 00000)” in a reference below indicates the transaction number under which the item is catalogued in the Energy Commission’s Docket Unit. The transaction number allows for quicker location and retrieval of individual items docketed for a case or is used for ease of reference and retrieval of exhibits cited in briefs and used at Evidentiary Hearings.

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C.3.15 CULTURAL RESOURCES GLOSSARY

AFC	Application for Certification
ARMR	Archaeological Resource Management Report
CCS	Cryptocrystalline silicate (Cryptocrystalline silicates are rocks such as flint, chert, chalcedony, or jasper that contain a high percentage of silica (SiO^2), the primary compound that composes quartz.)
CEQA	California Environmental Quality Act
CHRIS	California Historical Resources Information System
Conditions	Conditions of Certification
CPM	Compliance Project Manager
CRHR	California Register of Historical Resources
CRM	Cultural Resources Monitor
CRR	Cultural Resource Report
CRS	Cultural Resources Specialist
DPR 523	Department of Parks and Recreation cultural resources inventory form
FAR	Fire-affected rock
FSA	Final Staff Assessment
Historical resource	A cultural resource, for the purpose of CEQA, listed in, or determined to be eligible for listing in, the California Register of Historical Resources (PRC § 21084.1). Subsumed in present analysis under “important historic and cultural aspects of our national heritage.”
Historic property	A cultural resource, for the purpose of Section 106, included in, or eligible for inclusion in the National Register of Historic Places (36 CFR § 800.16(l)(1). Subsumed in present analysis under “important historic and cultural aspects of our national heritage.”
HRMP	Historical Resources Management Plan
Important historic and cultural aspects of our national heritage	A broadly inclusive term for historically significant cultural resources that encompasses the concepts of “historical resource” and “historic property.”
LORS	Laws, ordinances, regulations, and standards
MCR	Monthly Compliance Report

MLD	Most Likely Descendent
NAHC	Native American Heritage Commission
NRHP	National Register of Historic Places
OHP	California Office of Historic Preservation
Programmatic agreement	An agreement document negotiated and drafted under Section 106 of the National Historic Preservation Act of 1969
Project area	The project site, the rights-of-way of all linear and other ancillary power facility features, construction laydown areas, and non-commercial borrow sites
Project area of analysis	The project area and all further areas in which the proposed project has the potential to directly or indirectly affect cultural resources
Project site	The principal proposed plant site parcel or main plant site of which the power block area and the solar thermal field would occupy the majority of that area
Proposed action	Equivalent in present analysis to “proposed project” and “undertaking.” The “proposed action” and other “alternative actions” are developed under NEPA to meet a specified purpose and need.
Proposed project	Equivalent in present analysis to “proposed action” and “undertaking.” A “project,” pursuant to 14 CCR § 15378, “means the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment.”
PSA	Preliminary Staff Assessment
SHPO	State Historic Preservation Officer
Staff	Energy Commission cultural resources technical staff
Undertaking	Equivalent in present analysis to “proposed action” and “proposed project.” An undertaking, pursuant to 36 CFR § 800.16(y), “means a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval.”
WEAP	Worker Environmental Awareness Program

C.11 – TRAFFIC AND TRANSPORTATION

Testimony of Marie McLean; James Jewell; and Alan Lindsley, AIA

C.11.1 SUMMARY OF CONCLUSIONS

- SunCatcher Mirrors have the potential to significantly affect train crews and motorists on 1-10; Route 66; and Hector Road. Consequently, staff has proposed conditions of certification designed to reduce those impacts to less than significant.
- Crossing BNSF Railway's tracks has the potential to significantly affect access to and exit from the project for emergency vehicles, workers, visitors, and delivery persons. Staff has proposed conditions of certification designed to reduce those impacts to less than significant.
- With implementation of proposed conditions of certification, the Calico Solar Project as proposed would cause no significant direct or cumulative traffic and transportation impacts and would comply with all applicable LORS related to traffic and transportation.

C.11.2 INTRODUCTION

In the Traffic and Transportation analysis, staff focuses on:

1. Whether construction and operation of the Calico Solar Project would result in traffic and transportation impacts under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA)

2. If the project would be in compliance with applicable laws, ordinances, regulations, and standards (LORS).

In its analysis, staff identifies potential impacts related to the construction and operation of the Calico Solar Project on the surrounding transportation systems and roadways and, when applicable, proposes mitigation measures.

C.11.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Significance criteria are based on the California Environmental Quality Act (CEQA) Guidelines, the CEQA Environmental Checklist Form, and on performance standards determined by federal, state, and local agencies. Those performance standards, incorporated in CEQA Guidelines for transportation/traffic, are included in this section as part of **Traffic and Transportation Table 2,** Laws, Ordinances, Regulations, and Standards (LORS).

TRAFFIC AND TRANSPORTATION Table 1
CEQA Environmental Checklist Form—Transportation/Traffic

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
TRANSPORTATION/TRAFFIC — Would the project:				
A. Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation, including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths and mass transit?		X		
B. Conflict with an applicable congestion management program, including, but not limited to level-of-service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?		X		
C. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?				X
D. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?		X		
E. Result in inadequate		X		

emergency access?				
F. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?				X

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Staff uses LORS as significance criteria to determine if the proposed Calico Solar Project would have a significant adverse impact on the environment. Those LORS are used to assess a CEQA impact, when necessary, because CEQA guidelines and checklist specifically refer to the performance standards and thresholds established by federal, state, and local agencies. See **Traffic and Transportation Table 1** for the CEQA checklist pertaining to this project.

The federal, state, and local performance standards and thresholds applicable to the proposed project are listed in **Traffic and Transportation Table 2,** which follows. If this project were not to conform to those LORS, the project could result in a significant CEQA impact.

TRAFFIC AND TRANSPORTATION Table 2
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
Code of Federal Regulations (CFR), Title 14, Aeronautics and Space; Part 77, Objects Affecting Navigable Airspace (14 CFR 77)	Includes standards for determining physical obstructions to navigable airspace; information about requirements for notices, hearings, and requirements for aeronautical studies to determine the effect of physical obstructions to the safe and efficient use of airspace.
*Code of Federal Regulations (*CFR*)*, Title 49, Subtitle B, Sections 171-177; Sections 350-399; Appendices A-G Other Regulations Relating to Transportation	Includes procedures and regulations pertaining to interstate and intrastate transport (including hazardous materials program procedures) and as well as safety measures for motor carriers and motor vehicles operating on public highways.
Code of Federal Regulations (CFR); Title 49, Part 209 to Part 244*; Federal Railroad Safety Act of 1970 (FRSA)*	Act granted the Federal Railroad Administration rulemaking authority over all areas of railroad safety. Violations of federal safety laws are regulations are reported by FRA inspectors or by states in which violation was noted.
State	
California Vehicle Code (CVC), Division 2, Chapter 2.5, Div. 6; Chap. 7, Div. 13; Chap. 5, Div. 14.1; Chap. 1 and 2, Div. 14.8, Div. 15	Pertains to licensing, size, weight, and load of vehicles operated on highways; safe operation of vehicles; and transporting hazardous materials.
California Streets and Highways Code, Division 1, Chapter 3; Division 2, Chapter 5.5	Pertains to regulations for care and protection of state and county highways.

California Health and Safety Code; Section 25160 et seq.	Pertains to operators of vehicles transporting hazardous materials.
California Fire Code, Section 902.2.1 et.seq.	*Pertains to requirements for constructing an access road for fire department and other emergency vehicle access.*
California Streets and Highway Code, Section 117; Section 660-695; Section 700-711; Section 1450; 1460 et seq.; and 1480 et. Seq.	Pertains to regulating rights-of-way encroachments and granting permits for encroachment on state highways and freeways and on county roads.
California Public Utilities Code, Section 1201-1220	Pertains to constructing and operating rail road crossings.
Local	
San Bernardino County Comprehensive Transportation Plan	Identifies transportation improvements and strategies to enhance system performance and achieve emission reductions to meet air quality requirements and serves as a basis for action programs to be implemented through the Congestion Management Program.
San Bernardino County Congestion Management Program, 2007	Requires all counties to develop a Congestion Management Plan designed to develop and implement comprehensive strategies needed to develop appropriate responses to transportation needs. Mandated by *Government Code Section* 65088, the CMP defines a network of state highways and arterials, level of service (LOS) standards and related procedures, and provides technical justification for the approach.
San Bernardino General Plan, Circulation and Infrastructure Element, Desert Region	Pertains to public policies and strategies for the transportation system in San Bernardino County, including those pertaining to transportation routes, terminals, and facilities; construction of extensions of existing streets; and levels of services (LOS).
San Bernardino Traffic Code, Section 52.0125	Pertains to requirements for oversize and overweight vehicles.

C.11.4 PROPOSED PROJECT

C.11.4.1 SETTING AND EXISTING CONDITIONS

The project site is located in San Bernardino County and was originally proposed on approximately 8,230 acres of land owned by the United States government and managed by the US Department of Interior, Bureau of Land Management. To avoid damaging environmental resources, approximately 1,000 acres on the northern part of the project site was eliminated.

Access to the site is off Hector Road, north of Interstate 40, 17 miles east of Newberry Springs and 115 miles east of Los Angeles in the Mojave Desert. The project consists of 29 contiguous parcels; and the Burlington Northern Santa Fe (BSNF) railroad bisects the site from west to east.

In the project area, I-40 is a primary east/west regional arterial beginning at the Interstate-15 interchange in the city of Barstow and heading east towards Arizona and eventually ending at the concurrence of U.S. Route 117 and North Carolina Highway 132 in Wilmington, North Carolina.

In the project area, I-40 is classified as a freeway with two lanes in each direction. Access to the site from I-40 is the Hector Road interchange. See **Traffic and Transportation Figure 1**, Local Transportation Network.

The proposed project would utilize SunCatchers— a 40-foot tall, 25-kilowatt-electrical (kWe) solar dish developed by Stirling Energy Systems. The SunCatcher system consists of a unique radial solar concentrator dish structure that supports an array of curved glass mirror facets.

Those mirrors are designed to automatically track the sun, collect and focus or concentrate its solar energy onto a patented power conversion unit (PCU). The PCU is coupled with and powered by a Stirling engine that generates power grid-quality electricity.

Originally, the applicant planned to construct its project in two phases: a 500-MW facility (Phase 1) and an additional 350 megawatt facility (Phase II). However, the applicant subsequently revised the project to align the output of Phase I with the capacity of the Southern California Edison (SCE) transmission system prior to the completion of a 500 kV upgrade to the Lugo-Pisgah Transmission line. Consequently, today Phase I would be limited to 275 MW, with the remaining 575 MW to be constructed as part of Phase II.

The project would consist of two laydown areas for each phase of the project—a 26-acre laydown site located on the southeast corner of phase-one site. The second laydown area, which consists 14 acres, will be located next to the main services complex. Other features and facilities associated with the proposed project—the majority of which are located on the proposed project site or construction laydown area)—include:

- Approximately 34,000 SunCatchers and associated equipment and infrastructure within a fenced boundary
- An onsite, 14.4-acre main services complex located in the north eastern portion of the Phase I section of the project site for administration and maintenance activities. The complex would include buildings, parking and access roads (SES 2008f page 3-62 and Figure 3-4)
- An onsite, 2.8-acre 850-MW Calico Solar Project substation located in the southern portion of the Phase I section of the site (SES 2008f page 3-62 and Figure3-4)

Local Highways and Roads

The following roads are located in the vicinity of the project, Interstate 40, Route 66, and Hector Road. Information about each road follows. See **Traffic and Transportation Figure 2**.

Interstate 40 (I-40)

Interstate 40, an east-west interstate freeway, is located south of the Calico Solar Project site. I-40 begins at the I-15 interchange in the city of Barstow, San Bernardino County, and heads east towards Arizona. Interstate 40 ends at the concurrence of U.S. Route 117 and North Carolina Highway 132 in Wilmington, North Carolina.

Interstate 40 is the major access road to and from the Calico Solar Project. A four-lane highway, two lanes in each direction, I-40 has six feet of shoulder on both sides and a wide center median. It is posted at 70 miles per hour (mph) in the vicinity of the site. The existing average daily traffic (ADT) near the vicinity of the Calico Solar Project site is 15,600 vehicles per day; 43% is truck traffic.

Temporary and permanent access to the project site will be through the Hector Road exit off I-40. The roadway segment north of the interchange is currently unpaved. The northbound and southbound approach at the double-track BNSF at-grade railroad crossing is newly improved with asphalt surface aprons.

Hector Road is currently gated on both the northbound and southbound approaches. Access is controlled and determined by BNSF.

See information about Hector Road in this section for additional information on access to the project site.

National Trails Highway (Route 66)

Route 66 is located south of the Calico Solar Project site and runs parallel to I-40. Route 66, a 2,448-mile roadway once known as the Main Street of America, runs west to east from Santa Monica, California, to Chicago, Illinois, wending its way through Arizona, New Mexico, Texas, Oklahoma, Kansas, and Missouri before ending in Chicago. This east-west, two-lane highway is located approximately 300 feet south of the project site.

Hector Road

Hector Road within the I-40 interchange is paved and controlled by Caltrans. North of the Caltrans right-of-way (ROW) the pavement extends for about 750 feet as a 24-foot roadway controlled by San Bernardino County. From the end of this San Bernardino County-controlled segment to the gated BNSF crossing is an unpaved, unnamed route that extends for about 24 feet.

The Hector Road interchange will be used for both temporary and permanent access to the project site. The existing average daily traffic (ADT) on Hector Road near the vicinity of the project site is 31 vehicles per day. Information about temporary and permanent access to the site is included in the next section.

Access Roads

According to the applicant, a temporary construction access road will be constructed from Hector Road, an existing road off Interstate 40 (I-40). The road will extend for approximately one mile from the Hector Road interchange and continue to the existing gated railroad crossing owned by BNSF Railway. Workers, visitors, and delivery persons will need to cross the BNSF's tracks to get to the project site. See **Traffic and Transportation Figure 1.**

The temporary access road used for construction will be located within the north side of the BNSF right-of-way from the existing crossing and extend one to two miles. Access to the project site will be over BNSF Railway's tracks.

According to the applicant, a permanent access road will also be constructed within BNSF's right-of-way. The permanent road will be used beginning October 2011, the date of expected completion of the bridge across the BNSF tracks. Staff has analyzed the construction of the permanent access road in the Construction Impacts and Mitigation Section of this document.

Until October 2011, the temporary access road will be used by workers and visitors as well as for delivery of hazardous materials and other supplies. In addition, it will be used for access by fire trucks and ambulances. After October 2011, the applicant expects the new access road and bridge across the BNSF's tracks to be constructed and operating and used by workers, visitors, and delivery persons to gain access to the site.

According to the applicant, both the temporary and permanent access roads will have two 12-foot travel lanes with 3-foot shoulders and exceed the minimum design requirements of the American Association of State Highway and Transportation Officials (AASHTO).

Bureau of Land Management Routes

Presently, open BLM routes traverse the Avoidance of Donated and Acquired Lands Alternative area. Those routes would be closed if the proposed project is approved, limiting transportation through the area.

<u>Public Transportation</u>

Public transportation consists of rail services, bicycle and pedestrian facilities, and airports. Information about those forms of public transportation follows.

Rail Service

The Burlington Northern Santa Fe Railway (BNSF) provides long-haul freight service throughout the United States over a 32,000-mile route. Near the project site, BNSF operates a double-track railroad line through the project site from east to west. See **Traffic and Transportation Figure 1** for the BNSF route intersecting the project site. AMTRAK's Southwest Chief route from Los Angeles to Chicago travels on the BNSF rail line through the project site.

Bicycle and Pedestrian Facilities

Neither bicycle nor pedestrian facilities are located in the project vicinity. Instead, bicycle and pedestrian circulation is limited to shoulders of rural highway and county roads and is not allowed on freeways such as I-40.

Airports

Three airport facilities are located in the general vicinity of the Calico Solar Project:

1. Barstow-Dagget Municipal Airport, located approximately 19 miles west of the project site

2. Twentynine Palms Airport, owned and operated by San Bernardino County, located approximately 32 miles southeast of the project site.

3. Bicycle Lake Army Airfield, a private-use facility, located approximately 34 miles northwest of the project site

Federal Aviation Administration (FAA) Regulation Part 77 contains specific requirements pertaining to objects affecting navigable airspace. However, that FAA regulation does not apply to the Calico Solar Project because the project is not located within 20,000 feet or less of a public use or military airport and will not contain an object 200 feet above ground level.

C.11.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The direct and indirect impacts of the proposed CSP on the transportation system are examined in this section. The assessment of transportation-related impacts is based on evaluations and technical analyses designed to compare the pre-CSP conditions to the post-CSP conditions. The assessment is based on CEQA Guidelines and the Environmental Checklist Form as well as applicable LORS. See Section C.11.3 "Methodology and Thresholds for Determining Environmental Consequences."

Studied Intersections and Road Segments

The following locations on the surrounding roadway network were reviewed to determine level of service (LOS) criteria.

1. Interstate 40, West of Hector Road

2. Interstate 40 West-Bound Ramp at Hector Road Intersection

3. Interstate 40, East of Hector Road

4. Interstate 40 East-Bound Ramp, at Hector Road Intersection

5. Hector Road, North of I-40, Westbound ramps, east of project site

6. Hector Road, South of I-40 10, Eastbound ramps, Mesa Drive

7. National Trails Highway, West of Hector Road

8. National Trails Highway, East of Hector Road

9. Hector Road and National Trails Highway Intersection

San Bernardino County and the State of California use the LOS criteria to assess the performance of its street and highway system and the capacity of roadway segments. The county's as well as the state's threshold standards policy requires that LOS C or better be maintained on roadway segments under their jurisdiction.

The level-of-service standards for the Calico Solar Project as required by San Bernardino County and the State of California are as follows:

LOS C or better on roads and conventional highways located in San Bernardino County's Desert Region, the location of the Calico Solar Project.

LOS C or better on Interstate 40, the primary access road to the project site.

A significant impact would exist if the Calico Solar Project were to cause intersection operations to exceed the accepted LOS standards on a state, county, or federal roadway.

Direct/Indirect Impacts and Mitigation

Determinations of the direct and indirect impacts of the CSP are based significance criteria included in the CEQA guidelines and checklist as well as the applicable laws, ordinances, regulations, and standards, which are incorporated by reference into the CEQA standards. See "Methodology and Thresholds for Determining Significance" in this document.

To address direct and indirect impacts and mitigation, two project scenarios have been evaluated:

1. Construction phase impacts and mitigation
2. Operations phase impacts and mitigation

Construction Phase Impacts and Mitigation

Potential traffic impacts associated with the construction of the CSP were evaluated for both construction workforce traffic and construction truck traffic. Most traffic would occur during the construction phases.

Access to Site

Access to the site will change during the construction period. Initially, as reported by the applicant, access will be provided through a temporary access road designed to cross BNSF Railway's train tracks. Access to this temporary road will be from the Hector Road exits off I-40. BNSF's rail lines are heavily used by its freight trains. The trains, some of which are approximately 10,000 feet long, cross the tracks approximately every fifteen minutes from both directions.

Beginning in October 2011, the applicant has indicated that access to the site will change because of the construction of a new, permanent access road, designed to use the same exit off Hector Road as the temporary access road. However, this permanent access road, located west of the temporary road, would be designed to cross a newly-constructed bridge over BNSF's tracks and continue on to the Main Services Complex.

See **Traffic and Transportation Figure 1**. Information about the temporary and access road and the permanent access road follows.

Temporary Access Road

The temporary access route will provide the only access to the site during at least the first ten months of construction. The applicant must secure permission from BNSF Railway to construct a temporary access road across its right-of-way.

Staff is recommending Condition of Certification **TRANS-1,** which requires the applicant to obtain an easement from BNSF Railway to construct the road on its right-of-way before construction begins. Condition of Certification **TRANS-1** also requires that this road be constructed as an all-weather road so emergency vehicles may have access to the site.

In addition, because this access route intersects with BNSF Railway's tracks and has no crossing arms, this intersection could pose a danger to workers, delivery persons, and flaggers. In addition, the frequency of the trains could result in traffic backing up or stacking on Interstate 40 as workers wait in vehicles for the train to pass and to cross the tracks. The same scenario could occur as workers leave the site.

For example, during the peak construction period, approximately 731 workers are projected to be working on the site. Assuming the worst possible scenario, with each worker driving in his or her own vehicle and crossing the track at five miles per hour, it could take approximately 12 hours for all workers to cross the tracks. That is, approximately 15 workers could cross the track before another train would go by. And workers would need to wait approximately another fifteen minutes or so for the train to pass.

Those calculation are based on BNSF Railway's every 15-minute train schedule and length of the two-mile train; the fact that flaggers are directing traffic; and the occasional stops and starts that will occur as workers as well as delivery personnel ask questions of or otherwise speak to the flaggers. However, even if the time to cross is cut in half or three-quarters, the time needed to get workers to the site could result in a significant impact due to stacking as well as to the safety of workers.

Consequently, staff has recommended Condition of Certification **TRANS-2,** which includes provisions designed to reduce traffic on I-40 during critical commute times and ensure safe crossing of the BNSF Railway tracks.

Staff also notes that the temporary access road proposed by the applicant will also be used for access to the site by emergency vehicles. However, because of the nearly two-mile length of each BNSF Railway train and the frequency with which the trains run—every fifteen minutes—the time an emergency vehicle may to wait to cross the tracks could result in a significant impact to a worker, visitor, or delivery person who needs emergency treatment.

Emergency response times are generally within the six-minute to ten-minute range. If an emergency vehicle is attempting to gain access to the project site while workers are also trying to enter or while a BNSF Railway train is traveling on the tracks, the response time could be increased by as much as fifteen minutes or more. See the section on **Worker Safety/Fire Protection** for information about mitigation measures for emergency response times.

Permanent Access Road

According to the applicant, a permanent access road will be constructed within BNSF's right-of-way. Workers, visitors, and delivery persons will use the same Hector Road access to the permanent access road as they will use for the permanent road. According to the applicant, this permanent road will be used beginning October 2011, the date of expected completion of the bridge across the BNSF tracks.

Staff is recommending Condition of Certification **TRANS-1** to require the applicant to obtain an easement from BNSF Railway to construct a permanent all-weather road and bridge across BNSF Railway's tracks and to ensure bridge is constructed according to the California Public Utilities Commission's standards.

Because of the mitigated significant impacts resulting from the use of the temporary access road, staff recommends that the applicant consider building the permanent access road as soon as possible.

Parking

According to the applicant, parking for workers will be provided in the14-acre construction laydown area adjacent to 14.4-acre main services complex as well as the 26-acre laydown and staging areas immediately south of the Main Services Complex. In addition, employees may be moved to and from the site from surrounding areas and/or the laydown parking areas, in shuttles or other mass conveyance vehicles or both.

In the previous section, "Access to the Site," staff notes the difficulties that may be encountered by the necessity to cross BNSF Railway's tracks to gain access to the parking lot during the first phase of construction.

Consequently, staff is proposing Condition of Certification **TRANS-2**, which requires, among other things, the applicant to develop a parking and staging plan for workforce and construction vehicles that takes into account any impediments that may occur because of the need to cross BNSF Railway's tracks.

Construction Workforce

Construction of the CSP would be completed over an approximately 48-month period beginning in 2010 and ending in 2014. The construction work force will peak during month 16 at approximately 731 workers per day in month seven (2011) and average approximately 400 workers over the course of construction.

Construction of the transmission line is expected to require a limited crew with fewer than 25 workers during peak periods. However, the transmission line construction schedule will not coincide with the peak of plant site construction employment.

During the four-year construction period, the project is expected to employ an average of 400 workers per month. However, during the peak construction month, 731 workers will be on-site daily. To evaluate the worst-case scenario, the traffic analysis is based on the assumption that no workers would carpool and all workers would arrive during the morning peak period (7 AM to 9 AM) and depart during the evening peak period (4 PM to 6 PM).

Consequently, staff has proposed Condition of Certification **TRANS-2**, a traffic control plan to ensure stacking does not occur on the highways and safety provisions are put in place to ensure safe crossing by

1. Work schedules and end-of-shift departure plans to ensure stacking does not occur on roads or intersections.

2. Flaggers to ensure safe crossing of BNSF Railway's tracks by workers, visitors, and delivery persons accessing the site.

3. Parking and staging plan for workforce and construction vehicles. The plan is to be designed to take into account any impediments that may occur because of the need to cross BNSF Railway tracks. In developing this plan the applicant is required to consider off-site parking and staging in designated areas and the use of buses to transport workers to and from the construction site.

4. Once the bridge is constructed, a parking and staging plan to require all project-related parking to occur on-site or in designated off-site parking areas and that staging occurs on-site in a specifically-defined area.

Peak Construction for Workers

During peak construction, the daily round trips for workers would total 1,462 trips, 731 inbound in morning and 731 outbound in evening.

The construction workforce, to be drawn from the surrounding local and regional area, including San Bernardino County and Riverside County, is expected to commute to the site. Approximately 20% of the workers are expected to travel east on I-40; approximately 80%, west on I-40.

The following roads and intersections will be used to travel to and from the project site. **See Traffic and Transportation Figure 1**.

1. Interstate 40, West of Hector Road

2. Interstate 40, East of Hector Road

3. Hector Road, North of I-40

4. Hector Road, South of I-40

5. National Trails Highway (Route 66), West of Hector Road

6. National Trails Highway (Route 66), East of Hector Road

The temporary intersection at Hector Road off I-40, which is controlled by a stop sign, has the potential to result in congestion on I-40 as workers travel to and from the construction site. Consequently, staff is recommending Condition of Certification

TRANS-2, a traffic control plan, which includes provisions for eliminate congestion at intersections and off-ramps. Without this traffic control plan, stacking could occur on intersections and off-ramps needed to enter or exit the project site and levels of service on I-40 east and west and National Trails Highway, east and west, could fall to unacceptable levels.

This traffic control plan is designed to allow the project owner to devise a work schedule and end-of-shift departure plan to ensure that (1) stacking does not occur on intersections needed to enter and exit the project site and (2) levels of service for both I-40 and National Trails Highway are maintained at acceptable levels.

In addition the traffic control plan provides for the project owner to stagger work shifts; implement off-peak work schedules; and restrict travel to and departure from the project site to ten or fewer vehicles every three minutes during peak travel hours on I-40. The project owner also has the opportunity to provide incentive programs to encourage workers to carpool or use a van or bus service or both.

With implementation of this condition, all roads and intersections during peak-hour construction are projected to operate at least LOS C or better during peak-hour construction.

See **Traffic and Transportation Table 3**, 2011 Peak Hour Roadway Traffic Volumes, Design Capacities, and Levels of Service Without Project; **Traffic, and Transportation Table 4,** 2011 Peak Roadway Traffic Volumes With Project; **Traffic and Transportation Table 5**, 2011 Peak Hour Intersection Volumes With Project; and **Traffic and Transportation Table 6**, 2011 Peak Hour Intersection Volumes Without Project, which follow.

Traffic and Transportation Table 3
2011 Peak Hour Roadway Traffic Volumes
Design Capacities, and Levels of Service Without Project

2011 Existing Conditions without Calico			Morning Peak Hour		Evening Peak Hour	
Roadway Segment	**Traffic Volumes**	**LOS**	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**	**LOS**
I-40 – West of Hector Road	15,660[1]	B[4]	8.8	A	8.8	A
I-40 – East of Hector Road	16,850[1]	B[4]	8.8	A	8.8	A
Hector Road – North of I-40	10/10[2]	A/A[5]	---	---	8.5	---
Hector Road – South of I-40	10/15[5]	A/A[5]	---		---	---
National Trails Highway – West of Hector Road	10/10[2]	A/A[5]	8.5	A	8.5	A
National Trails Highway – East of Hector Road	10/15[2]	A/A[5]	8.5	A	8.5	A
BLM Access Road – North of I-40	N/A	N/A	---	---	---	---

Notes and Sources: 2007 Traffic Volumes (Caltrans, 2008a); [2]AM/PM Volumes (Higher Volumes between Northbound and Southbound Direction), Source: National Data Services, 2008a; 2007 Truck Volumes (Caltrans, 2008b); 4 ADT LOS; 5 Peak Hour LOS; 6 Peak Hour LOS is based on Table 5.11-3, San Bernardino CMP, 2003 Update. Information not listed was not available; ADT = Average Daily Traffic; LOS = Level of Service. Source: URS Corporation.

Traffic and Transportation Table 4
2011 Peak Hour Roadway Traffic Volumes
Design Capacities, and Levels of Service With Project

2011 Existing Conditions with Calico			Morning Peak Hour		Evening Peak Hour	
Roadway Segment	**Traffic Volumes**	**LOS**	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh**	**LOS**
I-40 – West of Hector Road	17,000[1]	B[4]	15.5	C	13.1	B
I-40 – East of Hector Road	17,250[1]	B[4]	16.5	C	11.0	B
Hector Road – North of I-40	705/775[2]	B/C[5]	---	---	---	---
Hector Road – South of I-40	10/15[2]	A/A[5]	---	---	---	---
National Trails Highway – West of Hector Road	10/10[2]	A/A[5]	8.5	A	8.5	A
National Trails Highway – East of Hector Road	10/15[2]	A/A[5]	8.5	A	8.5	A
BLM Access Road – North of I-40	81/12[2]	A/A[5]	---	---	---	---

Notes and Sources: 2007 Traffic Volumes (Caltrans, 2008a); [2]AM/PM Volumes (Higher Volumes between Northbound and Southbound Direction), Source: National Data Services, 2008a; 2007 Truck Volumes (Caltrans, 2008b); 4 ADT LOS; 5 Peak Hour LOS; 6 Peak Hour LOS is based on Table 5.11-3, San Bernardino CMP, 2003 Update. Information not listed was not available; ADT = Average Daily Traffic; LOS = Level of Service. Source: URS Corporation 2008.

Traffic and Transportation Table 5
2011 Peak Hour Intersection
Levels of Service Without Project

Intersection	AM Average Delay (sec/veh)	LOS	PM Average Delay (sec/veh)	LOS
I-40 – Westbound Ramp/Hector Road	8.8	A	8.8	A
I-40 – Eastbound Ramp Hector Road	8.8	A	8.8	A
Hector Road/National Trails Highway	---	---	8.5	---

Source: URS Corporation.

Traffic and Transportation Table 6
2011 Peak Hour Intersection
Levels of Service During Construction

Intersection	AM Average Delay (sec/veh)	LOS	PM Average Delay (sec/veh)	LOS
I-40 – Westbound Ramp/Hector Road	15.5	C	13.1	B
I-40 – Eastbound Ramp Hector Road	16.5	C	11.0	B
Hector Road/National Trails Highway	8.5	A	8.5	A

Source: URS Corporation.

Construction Truck Deliveries

During construction the passenger car equivalent (PCE) of approximately 41 trucks are expected to arrive at and leave from the construction site each morning and evening, resulting in a total of 274 trips during the 48-month construction period. Most deliveries will occur between 7 AM and 5 PM on weekdays.

Because these trucks will use the temporary intersection off I-40 to Hector Road, which is controlled by a stop sign, staff is recommending for inclusion in Condition of Certification **TRANS-2,** a traffic control plan**,** which includes a requirement for ensuring that the arrival and departure time of these trucks does not occur in peak traffic periods, thereby contributing to a decrease in the LOS on I-40 to unacceptable levels.

To transport this equipment, the applicant must obtain special permits from Caltrans to move oversized or overweight materials. In addition, the applicant must ensure proper routes are followed; proper time is scheduled for the delivery; and proper escorts, including advanced warning and trailing vehicles as well as law enforcement control are available, if necessary.

Consequently, staff is recommending Condition of Certification **TRANS-3** to ensure the project owner will comply with vehicle size and weight limitations imposed by Caltrans and other relevant jurisdictions; Condition of Certification **TRANS-4** to ensure the applicant complies with Caltrans' and other relevant jurisdictions' limitations on encroachments into public rights of way; and **TRANS-5** to ensure that the project owner will restore to their original condition or to near-original condition all public roads, easements, and rights-of-way that have been damaged due to project-related construction activities.

Emergency Services Vehicle Access

The applicant is proposing to build a temporary and permanent access road to the project site. Those access roads must be an all-weather road, constructed of appropriate materials and be able to be accessed from I-40. Therefore, staff is recommending Condition of Certification **TRANS-1** to ensure the construction of an all-weather access roads, designed for fire-truck access, constructed of appropriate materials, including culverts and paving, and safe for use in crossing washes at the site.

Staff notes that the temporary access road to the project site requires workers to travel over BNSF Railway tracks to get to the project site. Because of the schedule of BNSF Railway's trains and the number of workers and delivery trucks needing to access the site, staff also notes that access for emergency vehicles could be delayed.

Acceptable emergency response times are generally within the six-minute to ten-minute range. If an emergency vehicle is attempting to gain access to the project site while workers are also trying to enter or while a BNSF Railway train is traveling on the tracks, the response time could be increased by as much as fifteen minutes or more.

Staff is recommending in Condition of Certification **TRANS-2** methods to help ensure emergency response times are adequate and result in a less than significant impact. To ensure that emergency services vehicle access is available to workers and visitors as quickly as possible after start of construction, staff recommends that the applicant begin construction on the bridge to cross BNSF Railway's tracks as soon as possible.

Transportation and Storage of Hazardous Materials

Approximately ten types of hazardous materials, including hydrogen gas, will be used and stored at the site during construction. See **Hazardous Materials Handling** in this document. Those materials will be delivered to the site and disposed of by trucks via I-40 at regularly scheduled intervals.

During the construction phase of this project, hazardous materials delivered to the site will have to cross the BNSF Railway's tracks to gain access to the site. Staff is including in Condition of Certification **TRANS-2** requirements designed to ensure that the delivery and disposal of hazardous materials to and from the site will not result in a significant impact. In addition, to ensure that the transporting of hazardous materials will comply with all applicable federal and state regulations pertaining to the transportation of these materials, staff is recommending Condition of Certification **TRANS-6**. See **Traffic and Transportation Table 7** for information about these regulations.

To ensure that the transportation of hazardous materials is accomplished in the safest manner possible, staff recommends that the applicant begin construction on the bridge to cross BNSF Railway's tracks as soon as possible.

Operation Impacts and Mitigation

Operation of the CSP will result in a small amount of vehicular traffic. Operational workforce is estimated to be 164 workers. The arrival and departure time of those 164 workers will be staggered in three, eight-hour shifts. Those three, eight-hour shifts ensure workers are present on a 24-hour, seven-day-a-week basis.

Assuming the worst-case scenario with worker traffic, peak weekday traffic will consist of 53 vehicles per day, assuming each worker drove alone in his or her own vehicle. Those 53 vehicle trips will not contribute to a significant increase in the LOS on the surrounding roads. Hence, no mitigation is required.

Assuming the worse-case scenario with truck traffic, an average of 12 round-trip truck trips daily would arrive throughout the day to the project site. This increase in traffic, based on worst-case scenarios, would be minor and not contribute to increases in LOS on surrounding roads. Staff notes that during operation of the CSP, a bridge will have been constructed over BNSF Railway's tracks. Hence, no mitigation is required.

The surrounding roadways and intersections are projected to operate well below LOS capacity when CSP is operational in 2016. Projections have taken into account continued local and regional growth.

Truck travel as well as other non-employee site visits will be very small and will typically occur during non-peak periods. Consequently, cumulative operational impacts will not be significant and not require mitigation.

Emergency Services Vehicle Access

The applicant is proposing to build a permanent access road to the project site. To meet state fire marshall regulations, that road must be an all-weather road constructed of appropriate materials and be able to be accessed from I-40. Therefore, staff is recommending in Condition of Certifications **TRANS-1** that the access road be an all-weather road designed to allow for fire-truck access and be constructed of appropriate materials, including culverts and paving, so that it will be safe for use in crossing washes at the site.

Staff also notes that the permanent access road will be constructed to provide access to the site by a bridge to be constructed over BNSF Railway's tracks. Staff is recommending Condition of Certification **TRANS-1** to ensure that the bridge is constructed according to applicable code requirements and that the applicant has been granted access to BNSF Railway's right-of-way.

Parking

According to the applicant, on-site parking for workers would be provided on the grounds of a 10-acre satellite services complex located in the eastern portion of the Phase II section of the project site. When operational, the project would employ up to 164 workers, who would work in three 8-hour shifts.

To ensure adequate parking for workers, staff is proposing Condition of Certification **TRANS-2**, a traffic control plan that requires the project owner to ensure adequate parking for workers either in designated areas off the project site or on the project site itself.

Water and Rail Obstructions

The proposed CSP is not located adjacent to a navigable body of water; therefore, the CSP is not expected to alter water-related transportation. However, BNSF operates a double-track railroad line through the project site. See the **Worker Safety and Fire Prevention** section of this document for information on safety pertaining to the operation of the railroad line through the project.

Transportation of Hazardous Materials

Approximately ten types of hazardous materials will be used at the site during operations. See **Hazardous Materials Handling** in this document. Those materials will be delivered to the site and disposed of by trucks via Interstate 40 at regularly scheduled intervals.

Consequently, staff is recommending Condition of Certification **TRANS-6** to ensure that the transporting of hazardous materials will comply with all applicable federal and state regulations pertaining to the transportation of these materials. See **Traffic and Transportation Table 3** for information about these regulations.

Hazardous materials include gases, chemicals, and other toxic materials. Federal and state regulations specify precautions to be taken when using the highways to transport hazardous materials.

Those regulations are designed to help ensure that hazardous materials—including those that are flammable, combustible, explosive, toxic, noxious, corrosive, oxidizers, or radioactive—are not released into the environment when being transported and delivered. If spilled or released on the highway, hazardous materials can cause short-term or long-term evacuations of an area depending on the nature of the spill and weather conditions.

Impact of Glint and Glare

The proposed Calico Solar Project would utilize SunCatchers— a 40-foot tall, 25-kilowatt-electrical (kWe) solar dish developed by Stirling Energy Systems. The SunCatcher system consists of a unique radial solar concentrator dish structure that supports an array of curved glass mirror facets. Those mirrors are designed to automatically track the sun and collect and focus or concentrate its solar energy onto a patented power conversion unit (PCU).

The SunCatcher mirrors have the potential to move off-axis during cloud cover, and staff is concerned that the energy of the reappearing sun redirected from the mirrors nearest the rail line may pose a hazard in the form temporary flash blindness to motorists on Hector Road, I-40, and National Trails Highway (Route 66); and crews on trains traversing the project site on BNSF tracks

Consequently, staff has determined that the impacts of the SunCatchers could present, if not mitigated, a significant hazard to motorists and train crews. As a result, staff has proposed Condition of Certification **TRANS-7**, which is designed to reduce to less than significant the operational impacts of the SunCatchers to motorists and passengers on Hector Road, Interstate 40, and National Trails Highway (Route 66) as well as to BNSF Railway and AMTRAK train crews and passengers.

This condition of certification requires the project owner to modify the normal and offset tracking position to specific specifications and ensure specific morning-stow and night-stow procedures are followed. The applicant is also required to ensure that the minimum distance from any SunCatcher reflector assembly to the BNSF ROW or any public roadway be at least a minimum of 233 feet to reduce the possibility of temporary flash blindness.

In addition Condition of Certification **TRANS-7** requires the applicant to develop an emergency glare response program that requires, among other things, a monitoring plan; plan for reporting malfunctions and complaints; immediate repositioning of malfunctioning units; and a process of evaluating intrusive light conditions through video surveillance.

Finally, BNSF Railway has communicated to staff its concern about the effect of glint and glare on the railroad engineers' ability to clearly and accurately see signal lights. Staff has previously included in Condition of Certification **TRANS-7** measures designed to reduce to less than significant the operational impact of the SunCatchers' on BNSF Railway and AMTRAK crews and passengers.

However, because of the significance of the signal lights to the operational safety of the crews and trains, staff has analyzed BNSF's concerns. Staff has determined that any escaping or itinerant glint and glare that may affect the railroad engineer's ability to clearly and accurately see signals lights is mitigable through shielding, LED lights, or other means designed to increase the contrast and intensity of the signal light.

Consequently, staff is proposing for inclusion in Condition of Certification **TRANS-7** a requirement for the applicant to work with BNSF Railway to determine the appropriate size and design of shields to be affixed to signal lights as well as measures to increase the contrast of the signal light, including orienting the appropriately sized shield around the signal light; ensuring the darkest background possible on the signal light; or increase the brightness of the signal light emitter over historic light levels using current LED signal technology.

C.11.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the central portion of the proposed 850 MW project. It was developed because it could be constructed without the necessity of a new 500 kV transmission line, and would avoid several other environmental impacts. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

C.11.5.1 SETTING AND EXISTING CONDITIONS

The general setting and existing conditions would remain as described in C.11.4.1 although the land requirements would be proportionately reduced to reflect the smaller project size. Locations of laydown areas may also vary.

C.11.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The implementation of this alternative would reduce the number of workers needed for the construction and operation of this project. However, that reduction would not have a significant impact for the following reasons: It does not change the project's setting and the change in the number of workers is not significant. That is, traffic would still need to be mitigated because of the intersection at which workers would need to exit to the project. That intersection is signed and without mitigation, LOS would decrease to unacceptable levels.

C.11.5.3 CEQA LEVEL OF SIGNIFICANCE

Similar to the proposed project, staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant impacts would occur as a result of waste management associated with the Reduced Acreage Alternative.

The implementation of this alternative would not significantly affect the number of workers needed for the construction and operation of this project because it does not change the setting of the project or the necessity of the workers to travel on I-40. Workers required for this project is relatively small and even each worker traveling alone in one vehicle would not exceed acceptable levels of service on I-40. However, staff has proposed mitigation to encourage car-pooling or other methods of reducing traffic impacts.

C.11.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

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.11.7 NO PROJECT/NO ACTION ALTERNATIVE

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

C.11.7.1 NO PROJECT / NO ACTION ALTERNATIVE #1

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

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

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

The impacts of traffic and transportation of developing renewable projects being developed on other sites in San Bernardino County, the Mojave Desert, or adjacent states would be not significant because of the various mitigation measures available for transporting workers to those sites. These mitigation measures include:

1. Busing workers to the sites from central locations
2. Staying in local hotels and motels near the site and being bused to the site
3. Staggering work hours over a 24-hour period
4. Providing park-and-ride locations

C.11.7.2 NO PROJECT / NO ACTION ALTERNATIVE #2

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

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

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. As a result, impacts on traffic and transportation would essentially be the same and the same mitigation would be proposed to ensure a significant impact on the roadways would not occur.

That mitigation would include park-and-ride locations; staying in motels and being bused to work; and staggering work hours.

C.11.7.3 NO PROJECT / NO ACTION ALTERNATIVE #3

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

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

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result the negative impacts on the local transportation system would be nonexistent due to the construction and operation of a solar project. Roads would continue to operate at a relatively high level of service.

C.11.8 PROJECT-RELATED FUTURE ACTIONS - TRANSPORTATION AND TRAFFIC

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

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

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

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

at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.11.8.1 ENVIRONMENTAL SETTING

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

The proposed transmission line route would generally follow a southwest line from north of the Town of Newberry Springs, crossing I-40 east of Daggett, crossing State Highway 247 and terminating south of Hesperia at the SCE Lugo Substation. The major access routes for project workers would likely be I-40, I-15, and State Highway 247, as well as secondary routes such State Route 18 (SR 18).

The section of I-40 within the project area would be from Barstow southeast to Needles. This segment of I-40 is a fully improved freeway through Barstow at the junction with I-15. I-15 extends northeasterly from the Victorville area through Barstow and Las Vegas. It is fully improved to freeway status in the Victorville area with grade-separated interchanges at Bear Valley Road, Palmdale Road, Hook Boulevard, Mojave Drive, "D" Street, and Stockton Wells Road. State Highway 274 is classified as a minor arterial and is a two-lane highway connecting Barstow and Lucerne Valley near SR 18. SR 18 is a two-way, two-lane roadway.

The roadway operating characteristics for these routes have been defined in several recent transportation planning documents, including the Victor Valley Area Transportation Study (SANBAG 2008). LOS defines roadway operating conditions as follows:

- **LOS A**: Free flow, with no restrictions on maneuvering or operating speeds. Minimal or no delay.
- **LOS B**: Stable flow, with some restrictions on maneuvering or operating speeds. Nominal delays
- **LOS C**: Stable flow, with more restrictions on speed and maneuverability. Some delays.
- **LOS D**: Approaching unstable flow. Restricted speed and maneuverability. Delays encountered at intersections.
- **LOS E**: Unstable flow, with some stoppages. Constitutes maximum capacity by definition. Extensive delays at some locations.
- **LOS F**: Forced flow, with many stoppages. Low operating speeds, extensive queuing and very extensive delays.

C.11.8.2 ENVIRONMENTAL IMPACTS

The construction activity requiring the largest workforce would likely be the installation of the conductors and optical ground wire (OPGW). In addition, at some stages of the project, especially during the full build-out construction, multiple locations would be under construction simultaneously.

Consequently, several independent construction teams may be working throughout the project area. As a result, the overall peak number of workers may be greater. The area's roadways would also be used for transportation of equipment and access to the temporary staging areas and the transmission and telecommunication corridors. Finally, the movement of heavy machinery or the possible need to use rail lines, such as the BNSF railroad tracks that bisect the project area, to deliver equipment or materials to the project site could also affect the surrounding transportation system.

In addition, large vehicles delivering materials and oversized vehicles used in the construction process may affect traffic flow on one or more of the roadways, resulting in a safety hazard. These potential impacts can be avoided through mitigation, which is discussed below. In addition, there is potential for unexpected damage to roads by vehicles and equipment (overhead line trucks, crew trucks, concrete trucks, etc.) that would be entering and leaving roads within the project area.

Permits and Impact Fees. Some of the potential permits and impact fees that may be applicable to the project construction and transport of equipment or materials include:

- Apply at least 2 working days prior to oversize load on city roadways Caltrans Oversize Load Permit

C.11.8.3 MITIGATION

Mitigation for preventing or mitigating or both damage to the highways include developing and implementing a traffic control plan to include provisions for (1) on-site parking for workers; (2) deliveries of heavy equipment and building materials; (3) emergency access; (4) signing, lighting, and traffic control device placement; temporary travel lane closures and potential need for flaggers. The plan also requires coordination with San Bernardino County to mitigate any potential adverse traffic impacts from other proposed construction projects that may occur during the construction phase of this project.

In addition mitigation includes limitations on vehicle size and weight; prevention of encroachment into public rights of way; and restoration of all public roads, easements, and rights-of-way. See Condition of Certification **TRANS-3** through **TRANS-4**.

C.11.8.4 CONCLUSION

The intersection of a new access road with an existing public road would be constructed in accordance with the requirements of the agency having authority over the existing public road. Any activity that would need to occur outside of the existing transmission line ROW would require landowner notification and permission for access. Movement of heavy machinery on local roads would occur intermittently, but infrequently over the construction period. Since the majority of the upgrade activities for both options would take place in undeveloped areas on BLM land, impacts to traffic level of service for most roadways in the project vicinity would be less than significant.

Based on the temporary nature of the construction activities and the minor staffing and equipment expected to be required compared to the traffic volumes on I-40, and I-15 and coupled with implementation of mitigation measures similar to Conditions of Certification concerning peak hour traffic would likely ensure that any potential impacts to traffic and transportation would be less than significant.

C.11.9 CUMULATIVE IMPACT ANALYSIS

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

There is the potential for substantial future development in the San Bernardino Valley area and throughout the southern California desert region. Analysis of cumulative impacts is based on data provided in the following maps and tables (see **CUMULATIVE SCENARIO**):

- Cumulative Impacts Figure 1, Regional Renewable Applications;
- Cumulative Impacts Figure 2, Renewable Applications in the Barstow & Needles District Areas;
- Cumulative Impacts Figure 3, Newberry Springs/Ludow Area - Existing and Future/Foreseeable Projects;
- Cumulative Impacts Table 1, Renewable Energy Projects in the California Desert District
- Cumulative Impacts Table 2, Existing Projects in the Newberry Springs/Ludow Area; and
- Cumulative Impacts Table 3, Future Foreseeable Projects in the Newberry Springs/Ludlow Area.

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

Geographic Extent

Cumulative impacts can occur within San Bernardino County if implementation of the Calico Solar Project could combine with those of other local or regional projects. Cumulative impacts could also occur as a result of development of some of the many proposed solar and wind development projects that have been or are expected to be under consideration by the BLM and the Energy Commission in the near future. Many of these projects are located within the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona.

The geographic extent for the analysis of the cumulative impacts associated with the Calico Solar Project includes San Bernardino County. This geographic scope is appropriate because the roads to be most affected by the project are roads that are located in San Bernardino County, particularly I-40.

Potential Environmental Impacts

Local Impacts

Eleven projects either exist or are projected to be constructed during the same period as the Calico Solar Project. See Cumulative Impacts Figure 3 and the Cumulative Impacts section of this document.

These projects include the following:

1. Abengoa Solar Project, 250 MW solar thermal, Proposed. Application for Certification being reviewed by California Energy Commission.
2. SES Solar Three, 914 MW solar thermal, Proposed.
3. SES Solar Six, 1,631 MW solar thermal, Proposed.
4. Southern California Edison Pisgah Substation Expansion and Pisgah-Lugo Upgrade, Proposed.
5. CACTUS, originally a solar plant, now converted into an observatory, Existing.
6. Two small mines within 14 miles of project, Existing.

According to *California Environmental Quality Act (CEQA) Guidelines*, a project may result in significant adverse cumulative impacts when its effects are “cumulatively considerable.”

Cumulatively considerable means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, or the effects of probable future projects (Title 14, California Code of Regulations, section 15130).

Cumulative traffic and transportation impacts could occur when more than one project has an overlapping construction schedule resulting in a demand on highways that, if met, would result in an unacceptable level of service (LOS). An unacceptable level of service would result in traffic delays, significantly reduced traffic flows, and backup of traffic at signed intersections.

Operational cumulative traffic and transportation impacts could occur when the operation of multiple projects significantly impacts the highways, resulting in unacceptable levels of service (LOS) on highways.

Cumulative impacts of the Calico Solar Project were analyzed in the context of other known projects in the area. The analysis was based on the construction schedule indicated in the Executive Summary of the *Application for Certification* prepared by the applicant and submitted to the California Energy Commission on December 2, 2008. In that Executive Summary the applicant indicated that construction would begin in Fall 2010; be completed in Fall 2012; and the plant would be in full-scale operation in Winter 2012. The year 2012 traffic estimate is based on a 2% per year general growth rate.

In the general vicinity of the Calico Solar Project, the following projects were proposed, approved, or already exist:

1. Abengoa Solar Project, 250 MW solar thermal, Proposed. Application for Certification being reviewed by California Energy Commission.
2. SES Solar Three, 914 MW solar thermal, Proposed.
3. SES Solar Six, 1,631 MW solar thermal, Proposed.
4. Southern California Edison Pisgah Substation Expansion and Pisgah-Lugo Upgrade, Proposed.
5. CACTUS, originally a solar plant, now converted into an observatory, Existing.
6. Two small mines within 14 miles of project, Existing.

Staff analyzed the traffic-related impacts of those existing or proposed projects when combined with the traffic-related activities of the Calico Solar Project.[1] See **Cumulative Impacts Figure 3.**

Staff concluded that the existing or proposed projects, although relatively close to the Calico Solar Project on I-40, will not significantly impact traffic due to number of workers; construction schedules; in-place park-and-ride programs; and existing capacity

During regular operations facilities listed in this section generate a negligible amount of traffic. Consequently, the cumulative impacts of these projects are less than significant.

Regional Impacts

If all were to be built, projects located along I-40 and included in **Cumulative Impacts Figure 1**, **2**, and **3** and **Cumulative Tables 1B, 2,** and **3**, may have the potential to result in increased congestion on that highway. These projects include solar and wind projects in the California Desert District and Renewable energy projects. However, not all projects will be built. In addition, because of varying construction schedules; park and ride programs in place; and the locations of the various projects, the cumulative impact to the highway system will not be significant. In addition, not all projects will be built.

[1] Other projects were proposed but not considered, including Broadwell BrightSource, three wind projects, and the Twentynine Palms Expansion because of existing concerns with the projects; location; or length of EIS review period.

Cumulative Impacts Conclusion

In this analysis, staff considered the cumulative impacts of all future/foreseeable and existing projects as indicated in **Cumulative Impacts Figure 3** and determined that they would not contribute to a significant cumulative impact for the following reasons:

1. The number of workers needed for existing projects is minimal.
2. The mitigation measures the Calico Solar Project will result in acceptable levels of level of service (LOS) on roads and highways.
3. Even all existing and proposed projects used the same roadways, which is not the case, the locations of the various projects; different roadways, start times, and direction of travel used by workers; and conditions of certification imposed on the projects, including Calico Solar Project, to keep traffic at acceptable LOS level, will help to ensure that affected roadways operated at acceptable LOS.

C.11.10 COMPLIANCE WITH LORS

The proposed Calico Solar Project is intending to comply with all federal, state, and local LORS. Development and operation of the Calico Solar Project, as planned, would not conflict with the LORS as described in this section. **Traffic and Transportation Table 6** summarizes Calico Solar Project's conformance with all applicable LORS.

Traffic and Transportation Table 7
Calico Solar Compliance with Adopted Traffic and Transportation LORS

Applicable Law	Description
Federal	
Code of Federal Regulations (CFR), Title 14, Aeronautics and Space; Part 77, Objects Affecting Navigable Airspace (14 CFR 77)	This regulation includes standards for determining physical obstructions to navigable airspace; information about requirements for notices, hearings, and requirements for aeronautical studies to determine the effect of physical obstructions to the safe and efficient use of airspace. *Not applicable.*
Code of Federal Regulations (CFR), Title 49, Subtitle B, Sections 171-177; Sections 350-399; Appendices A-G Other Regulations Relating to Transportation	49 CFR Subtitle B includes procedures and regulations pertaining to interstate and intrastate transport (including hazardous materials program procedures) and as well as safety measures for motor carriers and motor vehicles operating on public highways. *Consistent:* With implementation of Condition of Certification **TRANS-2**, **TRANS-3**; **TRANS-4**; **TRANS-5**; and **TRANS-6**, project will comply. Enforcement is conducted by state and local law enforcement agencies and through state agency licensing and ministerial permits (for example, California Department of Motor Vehicles licensing; California Department of Transportation permits; and local agencies such as San Bernardino County Department of Transportation or Public Works.

Code of Federal Regulations (CFR); Title 49, Part 209 to Part 244*;* *Federal Railroad Safety Act of 1970 (FRSA)*	Act granted the Federal Railroad Administration rulemaking authority over all areas of railroad safety. Violations of federal safety laws are regulations are reported by FRA inspectors or by states in which violation was noted. Consistent: With implementation of **TRANS-2**, project will conform.
State	
California Vehicle Code (CVC), Division 2, Chapter 2.5, Div. 6; Chap. 7, Div. 13; Chap. 5, Div. 14.1; Chap. 1 and 2, Div. 14.8, Div. 15	These code sections pertain to licensing, size, weight, and load of vehicles operated on highways; safe operation of vehicles; and transporting hazardous materials. *Consistent:* With implementation of Condition of Certification **TRANS-3**, project will comply. Enforcement is conducted by state and local law enforcement agencies and through state agency licensing and ministerial permits (for example, California Department of Motor Vehicles licensing; California Department of Transportation permits; and local agencies such as San Bernardino County Department of Transportation or Public Works.
California Streets and Highway Code, Section 117; Section 660-695; Section 700-711; Section 1450; 1460 et seq.; and 1480 et. Seq.	Pertain to regulating rights-of-way encroachments and granting permits for encroachment on state highways and freeways and on county roads. *Consistent:* With implementation of **TRANS-4** and **TRANS-5**, project with comply. Enforcement is conducted by state and local law enforcement agencies and through state agency licensing and ministerial permits (for example, California Department of Motor Vehicles licensing; California Department of Transportation permits; and local agencies such as San Bernardino County Department of Transportation or Public Works.
California Health and Safety Code; Section 25160 et seq.	Pertain to operators of vehicles transporting hazardous materials. *Consistent:* With implementation of Condition of Certification **TRANS-6,** project will comply. Enforcement is conducted by state and local law enforcement agencies and through state agency licensing and ministerial permits (for example, California Department of Motor Vehicles licensing; California Department of Transportation permits; and local agencies such as San Bernardino County Department of Transportation or Public Works.
California Fire Code, Section 902.2.1 et.seq.	Pertains to requirements for constructing an access road for fire department and other emergency vehicle access. *Consistent:* With implementation of Condition of Certification **TRANS-1 and TRANS-2,** project will comply with this section of the California Fire Code. Enforcement is provided by local and state law enforcement and fire protection agencies.

California Public Utilities Code, Section 1201-1220	Pertains to constructing and operating rail road crossings. *Consistent:* With implementation of Condition of Certification **TRANS-2**, project will comply. Enforcement is provided by California Public Utilities Commission.
Local	
San Bernardino County Comprehensive Transportation Plan	Identifies transportation improvements and strategies to enhance system performance and achieve emission reductions to meet air quality requirements and serves as a basis for action programs to be implemented through the Congestion Management Program. *Consistent:* With implementation of Condition of Certification **TRANS-2** through Condition of Certification **TRANS-6**, project will comply. Enforcement provided through state and local agencies.
San Bernardino County Congestion Management Program, 2007	Requires all counties to develop a Congestion Management Plan designed to develop and implement comprehensive strategies needed to develop appropriate responses to transportation needs. Mandated by *Government Code Section* 65088, the CMP defines a network of state highways and arterials, level of service standards, and related procedures, and provides technical justification for the approach. *Consistent:* With implementation of Condition of Certification **TRANS-2**, project will comply. Enforcement provided through state and local agencies.
San Bernardino General Plan, Circulation and Infrastructure Element, Desert Region	Pertains to public policies and strategies for the transportation system in San Bernardino County, including those pertaining to transportation routes, terminals, and facilities; construction of extensions of existing streets; and levels of services (LOS). *Consistent:* With implementation of Condition of Certification **TRANS-2** project will comply.
San Bernardino Traffic Code, Section 52.0125	Pertains to requirements for oversize and overweight vehicles. *Consistent:* With implementation of Condition of Certification **TRANS-3**, project will comply. Enforcement provided by state and local agencies.

C.11.11 NOTEWORTHY PUBLIC BENEFITS

While the development of the proposed project is intended to address the requirements of federal and state mandates to develop renewable energy, it would not yield any noteworthy public benefits related to traffic and transportation.

C.11.12 FACILITY CLOSURE

Staff has considered facility closure and decommissioning impacts to Traffic and Transportation under individual headings in Assessment of Impacts and Discussion of Mitigation above. Impacts would be mitigated by implementing the required conditions of certification.

C.11.13 RESPONSE TO PUBLIC AND AGENCY COMMENTS

C.11.13.1 APPLICANT'S COMMENTS

Comment: The Applicant agrees with Staff's intention of providing alternative transportation; however, there is no demonstrated nexus between the cumulative traffic impacts of the Calico Solar Project and the Abengoa Mojave Project. The employee travel patterns would not overlap as the Calico Solar workforce is expected to originate almost entirely in Barstow and Calico Solar is located in the opposite direction as the Abengoa Mojave Project when traveling from Barstow.

The Applicant requests that condition of certification **TRANS-11** be deleted.

Response: Staff considered the applicant's comment; reviewed the documents filed with the Energy Commission since the first staff assessment was prepared; and modified its Condition of Certification **TRANS-2** to incorporate the applicant's concerns. The applicant is provided flexibility in determining its options for controlling traffic to account for cumulative impacts, if necessary, in **TRANS-2**.

C.11.13.2 PUBLIC COMMENTS

Comment: On July 29, 2010, staff received a copy of a letter from BNSF Railway to Christopher Meyer, California Energy Commission project manager for the Calico Solar Project, and Jim Stobaugh, Bureau of Land Management project manager for the project. The subject of the letter is "BNSF Comments Regarding Prehearing Conference and for Consideration at Evidentiary Hearing."

Response: Staff notes that Section 6 of the letter pertains to the glint and glare portion of the traffic and transportation section of the staff assessment. In particular, BNSF requested a specific condition of certification requiring a site-specific glint and glare study be conducted prior to the first SunCatcher disc being mounted on a pedestal.

Staff has been working with representatives from BNSF Railway since July 16, 2010, to resolve BNSF Railway's concerns with glint and glare. As is its usual procedure, staff commissioned a glint and glare study, which is attached to this document. The study included mitigation measures to ensure that significant impacts to BSNF Railway operations did not occur. Staff has incorporated those mitigation measures in this analysis.

In addition, staff reviewed the glint and glare study and mitigation measures with BNSF Railway representatives. The review included telephone conversations with Energy Commission glint and glare consultants to ensure BNSF Railway's concerns were addressed.

BNSF Railway's representatives also expressed a concern about glint and glare and its effects on the railroad engineer's ability to correctly perceive the color of the signal. Through several telephone conversations, staff and the commission's glint and glare consultants discussed with BNSF Railway representatives their specific concerns about the signal lights. Staff determined that measures exist, if needed, to ensure that BNSF Railway engineers will be able to correctly perceive the color of the signal. Those procedures involve hooding and increasing the intensity of the lights.

We have incorporated into this document a condition of certification that requires the applicant to work with BNSF Railway to fund and conduct a study to determine the specific measures needed, if any, to ensure that the correct signal color is visible to BNSF Railway engineers. This study and modifications to the signal, if required, are to be completed before operation of the Calico Solar Project.

C.11.14 PROPOSED CONDITIONS OF CERTIFICATION

TRANS-1 –Construction of All-Weather Roads and Bridge. If an easement is granted and the applicant begins construction, the applicant shall construct an all-weather road according to (1) California State Fire Marshall specifications as outlined in *California Fire Code* Section 902.2.1 et seq. These roads shall be constructed with appropriate materials, including culverts and paving, so that they will be safe for use in crossing washes at the site.

In addition, the applicant shall coordinate its activities with the BNSF Railway. Those activities include working with the Public Utilities Commission to ensure compliance with provisions of the *California Public Utilities Code* Sections 1201-1220.

During construction of both the temporary and permanent road, temporary crossing of BNSF tracks, and permanent crossing of BNSF tracks, the applicant shall prepare and coordinate with BNSF Railway; California Public Utilities Commission; and Federal Railroad Administration a safety plan for ensuring that all state and federal safety requirements for railroad crossings are followed.

That plan shall be reviewed and coordinated with BNSF Railway, appropriate regulatory agencies, and the CPM to ensure compliance with all state and federal requirements and approved by those agencies s well as the CPM.

Verification: At least 30-days prior to the start of mobilization, right-of-way easements shall be obtained and presented to the CPM. In addition to the BSNF easement, the project owner shall provide the CPM a copy of all documents pertaining to approvals from the Federal Railroad Administration (FRA); and the California Public Utilities Commission (CPUC). A courtesy copy shall be provided to the California Department of Transportation (Caltrans), District 8 Office. Within 30 days after the completion of each road and railroad crossing improvements, the project owner shall provide the CPM with a copy of written approvals from BNSF, FRA, and CPUC as to the adequacy and safety of the roads and bridge.

TRANS-2 – Traffic Control Plan. Prior to the start of construction for the Calico Solar Project, the project owner shall prepare and implement a traffic control plan (TPC) for the project's construction and operation traffic. The plan shall address the movement of workers, vehicles, and materials, including arrival and departure schedules and designated workforce and delivery routes.

For the project's construction period, the plan is to be designed to take into account any impediments that may or could occur because of the need to cross BNSF Railway tracks. In developing this plan the applicant is required to consider off-site parking and staging in designated areas and the use of buses to transport workers to and from the construction site.

Once the bridge is constructed, the applicant shall prepare a parking and staging plan to require all project-related parking to occur on-site or in designated off-site parking areas and that staging occurs on-site in a specifically-defined area.

The project owner shall consult with the BNSF Railway; County of San Bernardino; and the California Department of Transportation (Caltrans) District 8 office in the preparation and implementation of the plan and shall submit the proposed traffic control plan to the BNSF Railway; County of San Bernardino; and Department of Transportation (Caltrans) District 8 office in sufficient time for review and comment. The plan, along with any written comments from the BNSF Railway, County of San Bernardino; and Department of Transportation (Caltrans) District 8 office, shall then be submitted to the Energy Commission Compliance Program Manager (CPM) for review and approval prior to the proposed start of construction and implementation of the plan.

The traffic control plan shall include:

- A work schedule and end-of-shift departure plan designed to ensure that stacking does not occur on intersections necessary to enter and exit the project site. The project owner shall consider using one or more of the following measures designed to prevent stacking: (1) staggered work shifts; (2) off-peak work schedules; and (3) restricting travel to and departures from the project site to ten or fewer vehicles every three minutes during peak travel hours on Interstate 40.
- Provisions for at least two flaggers stationed at the BNSF Railway crossing during each day of construction until the proposed bridge is constructed and operating. Flaggers shall be present at the BNSF Railway crossing to ensure the safe crossing of workers, visitors, and delivery persons arriving and leaving the project site.
- Provisions for an incentive program such as an employer-sponsored Commuter Check Program to encourage construction workers to carpool or use van or bus service or both.
- Provisions for delivering and staging of heavy equipment and building material deliveries as well as for the movement of hazardous materials to the site

- Limitation on truck deliveries to the project sites to only off-peak hours to ensure adequate exit and entry at appropriate intersections and railroad tracks.
- On I-40, provisions for direction and redirection of construction traffic with flag persons as necessary to ensure traffic safety and minimize interruptions to nonconstruction-related traffic flow.
- Placement of signage, lighting, and traffic control devices at the project construction site and laydown areas
- Signage along eastbound and westbound appropriate roads and at the entrance of the Hector Road I-40 northbound and southbound off-ramps to notifying drivers of construction traffic throughout the duration of the construction period.
- A heavy-haul plan designed to address the transport and delivery of heavy and oversized loads requiring permits from Department of Transportation (Caltrans) or other state and federal agencies.
- Parking for workforce and construction vehicles, including consideration of off-site parking prior to opening of bridge across BNSF Railway tracks, to prevent stacking on I-40 roads and intersections and facilitate timely and safer crossing across tracks for workers, visitors, and delivery persons as well as for emergency access.

Verification: At least 30-days prior to the start of construction, including any grading or site remediation on the power plant site or its associated easements, the project owner shall submit the proposed traffic control plan to BNSF Railway; San Bernardino County; and the Department of Transportation (Caltrans) District 8 office for review and comment and to the CPM for review and approval. The project owner shall also provide the CPM with a copy of the transmittal letter to BNSF Railway; San Bernardino County; and the Department of Transportation (Caltrans) District 8 office requesting review and comment.

At least 60 calendar days prior to the start of construction, the project owner shall provide copies of any comment letters received from BNSF Railway; San Bernardino County; and the Department of Transportation (Caltrans) District 8 office along with any changes to the proposed traffic control plan for CPM review and approval.

TRANS-3 – Limitations on Vehicle Size and Weight. Due to the dynamic nature of the construction environment, at least 30 days prior to the start of construction, the project owner shall consult with the BNSF Railway; San Bernardino County; and the Caltrans District 8 office to coordinate procedures for obtaining required and necessary easement and permits on an as-needed basis.

After consultation with BNSF Railway, San Bernarndino County, and the Caltrans District I office, the project owner shall prepare a coordination plan designed to comply with limitations imposed by California Department of

Transportation (Caltrans) District 8 office and other relevant jurisdictions including San Bernardino County, on vehicle sizes and weights. In addition, the project owner or its contractor shall obtain necessary transportation permits from Caltrans and all relevant jurisdictions for use of roadways.

Verification: At least 30-days prior to construction, a copy of the coordination plan shall be provided to the CPM for review and comment. In addition, the applicant shall provide copies of easements and permits obtained from BNSF Railway; San Bernardino County; and the Caltrans District 8 office to the CPM.

In the monthly compliance reports (MCRs), the project owner shall submit copies of any easements or permits or both received during that reporting period. In addition, the project owner shall retain copies of these permits and supporting documentation in its compliance file for at least six months after the start of commercial operation. The project owner shall retain copies of BNSF Railway easements for the life of the project.

TRANS-4 – Encroachment into Public Rights of Way. The project owner and its contractors shall comply with Caltrans and other relevant jurisdictions limitations for encroachment into public rights-of-way and shall obtain necessary encroachment permits from Caltrans and all relevant jurisdictions.

Verification: In the monthly compliance reports (MCRs), the project owner shall submit copies of permits received during the reporting period. In addition, the project owner shall retain copies of these permits and supporting documentation in its compliance file for at least six months after the start of commercial operation.

TRANS-5 – Restoration of All Public Roads, Easements, and Rights-of-Way. The project owner shall restore all public roads, easements, and rights-of-way that have been damaged due to project-related construction activities to original or near-original condition in a timely manner, as directed by the CPM. Repairs and restoration of access roads may be required at any time during the construction phase of the project to ensure safe ingress and egress.

Verification: At least 30-days prior to the start of mobilization, the project owner shall photograph or videotape all affected public roads, easements, and right-of-way segments and/or intersections and shall provide the CPM, the affected local jurisdictions, and Caltrans (if applicable) with a copy of these images. The project owner shall rebuild, repair and maintain all public roads, easements, rights-of-way in a usable condition throughout the construction phase of the project.

In addition, the project owner shall consult with San Bernardino County and California Department of Transportation (Caltrans) District 8 and notify them of the proposed schedule for project construction. The purpose of this notification is to request that San Bernardino County and Caltrans consider postponement of public right-of-way repair or improvement activities in areas affected by project construction until construction is completed and to coordinate with the project owner regarding any concurrent construction-related activities that are planned or in progress and cannot be postponed. The purpose of this requirement is to help ensure cooperation from San Bernardino County and Caltrans so that the applicant's construction work is accommodated and the project can be completed in a timely and safe manner.

TRANS-6– Permits/Licenses to Transport Hazardous Materials. The project owner shall ensure that permits and/or licenses are secured from the California Highway Patrol and Caltrans for the transport of hazardous materials.

Verification: The project owner shall include in its monthly compliance reports (MCRs), copies of all permits and licenses acquired by the project owner or contractors or both concerning the transport of hazardous substances.

TRANS-7 – Prevention of Glare from SunCatchers to BNSF Train Crews and Motorists on Hector Road; Route 66; and Interstate 40

This condition of certification is divided into two sections. Section One concerns the testing of signals to ensure that they are easily visible to train engineers. Section Two concerns general location, operating, and reporting procedures pertaining to the SunCatcher mirrors.

I. Signal Light Modifications

Immediately after the installation of the first SunCatcher mirrors near the BNSF Railway right-of-way but before operation of the mirrors, the applicant will work with BNSF Railway to ensure that the operation of the SunCatcher mirrors will not interfere with the railroad engineers' ability to accurately see and respond to appropriate signal lights.

The applicant will work with BNSF Railway to determine the appropriate size and design of shields to be affixed to signal lights as well as measures to increase the contrast of the signal light, including orienting the appropriately sized shield around the signal light and increasing the brightness of the signal light emitter over historic light levels using current LED signal technology.

In addition, the applicant will work with BNSF Railway to determine emergency reporting procedures to immediately identify, report, and repair any malfunctioning or missing shield.

Verification: Signal Light Modifications. At least 120 days before the first SunCatchers are operated, the applicant shall consult with BNSF to prepare a plan to design, develop, and manufacture the appropriate shields to ensure that railroad engineers can accurately identify and respond properly to signal lights. As part of the development process, the applicant shall coordinate the development of the plan as well as the manufacture and installation of these shields with BNSF Railway, California Public Utilities Commission, and the

CPM. The completed plan shall be submitted to the CPM for review and approval at least 30 days prior to the start of operations.

At least 60 days before the first SunCatchers are operated, the applicant shall consult with BNSF Railway to test the shielded signal lights to ensure that the railroad engineers can accurately identify and respond to the appropriate signal. The CPM shall also be notified when testing shall occur.

Once BNSF Railway, California Public Utilities Commission has accepted the modified shield and verified that it allows the railroad engineers to accurately identify and respond to the proper signal, the applicant, along with BNSF Railway, shall coordinate methods and reporting procedures to ensure their safe and effective use.

The applicant shall develop, with BNSF Railway's input and approval, a monitoring plan that shall provide for the immediate reporting of any defective shield as well as its immediate replacement. This plan shall include methods for coordinating and implementing these reporting procedures with all necessary federal, state, and local agencies as well as BNSF Railway. This monitoring plan shall be submitted to the CPM for review and approval.

In addition, the project owner shall provide the CPM a monthly report that includes the date, time, location, response, and response time of any malfunction, public complaint, or video detection covered by the emergency glare response program; any determinations made by the project owner as to cause of the problem; and methods taken to resolve the problem. A copy of these reports shall be kept by the project owner for at least five years.

II. General Location, Operating, and Reporting Procedures

The project owner shall accomplish the following:

1. Modify the offset tracking procedure to use a 25-degree offset instead of the proposed 10-degree offset.
2. Ensure the morning stow position-to-offset position transitions occur at least 30 minutes before sunrise and end in the 25 % offset tracking position
3. Ensure that the "Night Stow" should occur 30 minutes after sunset to avoid any intrusive light effects
4. Ensure that the minimum distance from any SunCatcher reflector assembly to the BNSF right-of-way (ROW) or any public roadway shall be a minimum of 223 feet to reduce the possibility of temporary flash blindness. In addition, during the normal tracking and offset tracking positions, the project operator shall adhere to the following procedures and specifications:
5. Develop and implement an emergency glare response program that includes all of the following:

a. Monitoring plan that requires (1) the use of video surveillance trucks to identify and document intrusive light conditions, covering all hours of operation on a weekly basis for five years; and (2) monitoring of the status of individual SunCatchers during all hours of operation to immediately identify any malfunctioning units with the potential to create glare within the BNSF Railway right-of-way; or on I-40, Route 66, or Hector Road

b. Procedures that allow motorists and train operators, including AMTRAK and BNSF, to report to the project owner, as well as to Caltrans, California Highway Patrol (CHP), and the County of San Bernardino. in the case of complaints from motorists, any problems with glint or glare resulting from the operation or malfunction of SunCatchers. The procedures developed by the applicant for public reporting of glare problems shall be developed in consultation with BNSF Railway, California Department of Transportation (Caltrans) District 8 office, California Highway Patrol (CHP), and San Bernardino County. These procedures shall include a toll-free number for reporting problems as well as a process for written notification to the project owner and to California Department of Transportation (Caltrans, District 8) and San Bernardino County, in the case of complaints from motorists; or to AMTRAK or BNSF Railway, or both, in the case of complaints from train operators or passengers.

c. Procedures for the immediate (1) repositioning of any malfunctioning units to avoid potential glare within the BNSF Railway right-of-way or on I-40, Route 66, or Hector Road; investigation and resolution of complaints received from train operators or motorists or both.

d. Process for evaluating intrusive light conditions identified by the video surveillance and determining, in consultation with the CPM, what operational or other changes may be warranted to reduce or eliminate the identified intrusion;

e. Procedures for documenting instances when malfunctioning units with the potential to create glare are identified, or when train operators or motorists complain of glare, and the actions taken in response to those instances or complaints

f. Period reports to the Project CPM detailing instances of SunCatcher malfunction, public complaints about glare, or video-detected problems that are covered by the emergency glare response program.

Verification: General Location, Operating, and Reporting. At least 90 days before the first SunCatchers are tested or operated, the project owner shall submit documentation to the CPM necessary to verify that the operational measures and setback requirements included in this condition of

certification will be implemented and achieved.
At least 60 days before the SunCatchers are tested or operated, the project owner shall .submit to the CPM, for the CPM's review and approval, a copy of the project owner's draft emergency glare response program, including methods for coordinating and implementing the program with all state, county, and local agencies as well as BNFS Railway and AMTRAK.

Beginning no more than 30 days after the first SunCatchers are tested or operated and continuing for the duration of project operations, the project owner shall develop a procedure for any motorist, passenger, worker, train personnel, or visitor to report a malfunctioning unit and make those procedures known and available to those groups. The project owner shall provide the CPM a monthly report that includes the date, time, location, response, and response time of any malfunction, public complaint, or video detection covered by the emergency glare response program; any determinations made by the project owner as to cause of the problem; and methods taken to resolve the problem. A copy of these reports shall be kept by the project owner for at least five years.

C.11.15 CONCLUSIONS

1. SunCatcher Mirrors have the potential to significantly affect train crews as well as motorists on 1-10; Route 66; and Hector Road. Consequently, staff has proposed conditions of certification designed to reduce those impacts to less than significant.
2. Crossing BNSF Railway's tracks has the potential to significantly affect access for emergency vehicles, workers, visitors, and delivery persons. Staff has proposed conditions of certification designed to reduce those impacts to less than significant.
3. With implementation of proposed conditions of certification, the Calico Solar Project as proposed would cause no significant direct or cumulative traffic and transportation impacts, and therefore, no environmental justice issues, and would comply with all applicable LORS related to traffic and transportation.
4. Presently open BLM routes that traverse the project area would be closed if any of the action alternatives of amendments to the CDCA Plan as required are approved, limiting transportation through the area.
5. Staff is proposing Condition of Certification **TRANS-1**, which requires the applicant to obtain from BNSF Railway the easements necessary to construct all-weather roads to access the project site and a bridge designed to transverse BNSF tracks.
6. Staff is proposing Condition of Certification **TRANS-2**, which requires that the applicant to develop a traffic control plan to be developed and implemented prior to earth-moving activities. This plan is to be coordinated with BNSF Railway, San Bernardino County; and California Department of Transportation, District 8 Office.
7. Staff is proposing Condition of Certification **TRANS-3** to ensure the applicant complies with all size and weight limitations proposed by San Bernardino County.
8. Staff is proposing Condition of Certification **TRANS-4** to ensure applicant complies with Caltrans requirements for encroachment on rights-of-way.

9. Staff is proposing Condition of Certification **TRANS-5** to ensure that the applicant restores to its original or better condition all public roads that may be damaged during the construction of the project.
10. Staff is proposing Condition of Certification **TRANS-6** to ensure applicant complies with all relevant state, county, and local regulations on the transportation, handling, and disposal of hazardous materials.
11. Staff is proposing Condition of Certification **TRANS-7** to ensure that glare from SunCatcher mirrors located near Hector Road, Interstate 40; Route 66; and BNSF Railway right-of-way is reduced to less than significant levels and that the SunCatcher mirrors do not interfere with the railroad engineers' ability to correctly see and respond to signal lights.

C.11.16 REFERENCES

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Jackson 2010c – Intervenor/P. Jackson (tn 55876). Patrick Jackson Status Report #5, dated March 13, 2010. Submitted to CEC/Docket Unit on March 15, 2010.

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APPENDIX A

DAYTIME INTRUSIVE BRIGHTNESS ANALYSIS FOR STIRLING ENGINE SOLAR ENERGY SYSTEMS

James Jewell, LC, IES; Alan Lindsley, AIA, IESNA, LEED GA; & Clifford Ho, Sandia National Laboratories[1]

INTRODUCTION

California is being asked to approve and accept a significant number of solar energy electricity generating plants. The capture and redirection of insolation has the potential for important impacts on transportation systems and facility workers. These impacts may be actinic or visual. The different styles of facilities can be broken into four types: linear troughs, Stirling engine, photovoltaic flat panels and focused power tower systems. The Calico Solar Project utilizes approximately 34,000 SunCatcher units (Stirling engine technology) to generate thermal-rotary power.

PROJECT DESCRIPTION

The Calico Solar Project is located in an undeveloped area of San Bernardino County, California approximately 37 miles east of Barstow, California and north of Interstate 40 (I-40) between approximately 1,925 to 3,050 feet above mean sea level. The project is located primarily on Bureau of Land Management (BLM). The area where the Project would be constructed is primarily open, undeveloped land within the Mojave Desert. The Cady Mountain Wilderness Study Area (WSA) is located north of the Calico site. The Pisgah Crater, within the BLM-designated Pisgah area of Critical Environmental Concern (ACEC), is located south and east of the Project (south of I-40 by several miles). Several underground and above ground utilities traverse the area, primarily along the east side of the project area.

Adjacent land uses include the Pisgah Substation located along the southeastern border of the project site, as well as a small number of rural residences. The nearest residence is located approximately 2 miles to the east of the project site. Five to seven miles to the west of the site there are some scattered residences with obstructed and partial views of the project site. Although few people live in the local area, the majority of viewers are anticipated to be travelers commuting to and from larger urban centers or to local industrial facilities.

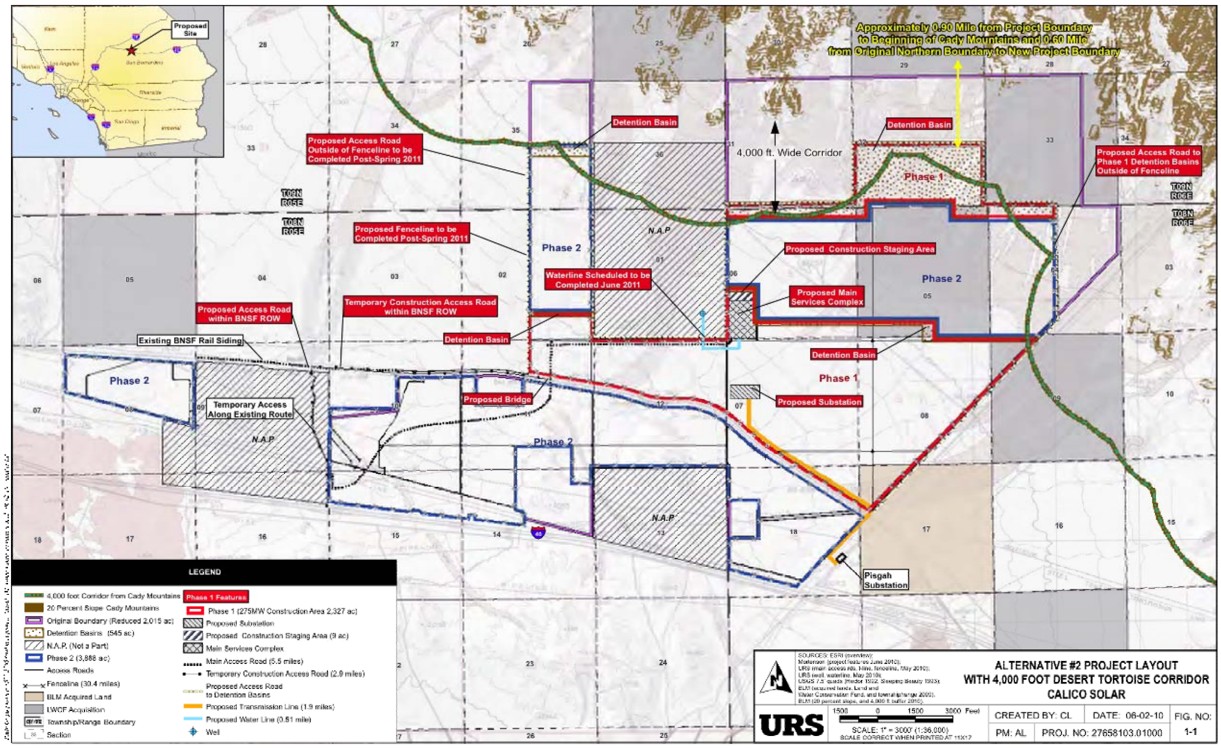
A Burlington Northern Santa Fe Railway (BNSF) runs between Phase I (to the north) and Phase II (to the south) of the proposed installation (see Exhibit 1). The railroad right-of-way (ROW) is adjacent to the southern boundary (fence line) of Phase I for approximately 2.8 miles. For Phase 2, the railroad ROW is adjacent to the northern

[1] Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

boundary (fence line) of the Project area for approximately 3.5 miles.

I-40 runs to the south of Phase II from east to west. For approximately 2.1 miles, the southern boundary (fence line) of Phase II ranges between approximately 120 to 260 feet north of Interstate 40.

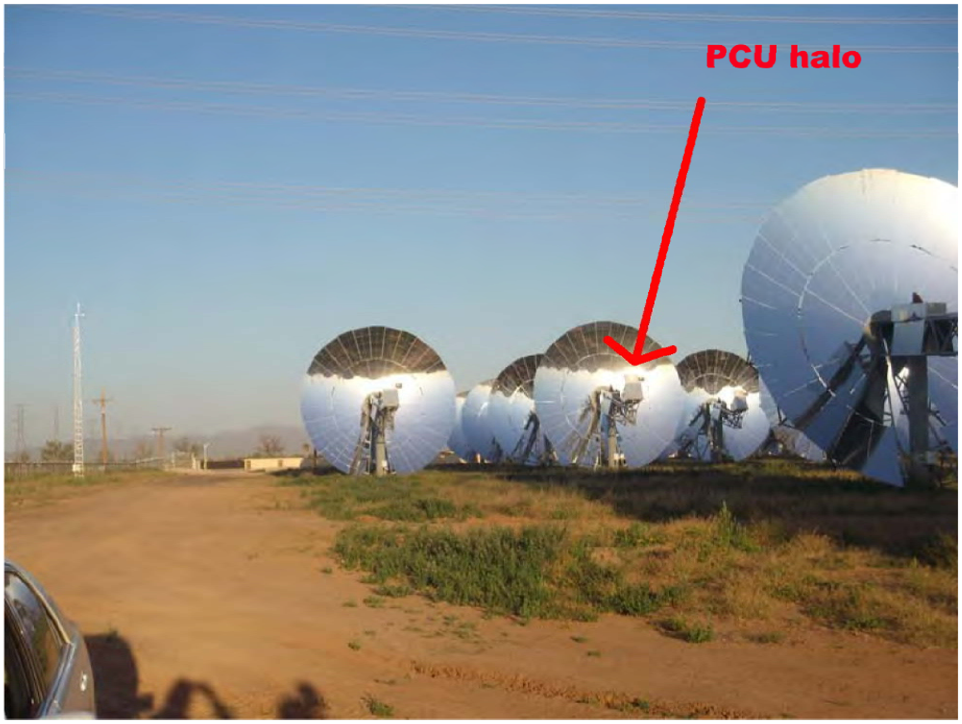
Exhibit 1 – Project Location



STIRLING ENGINE CHARACTERISTICS

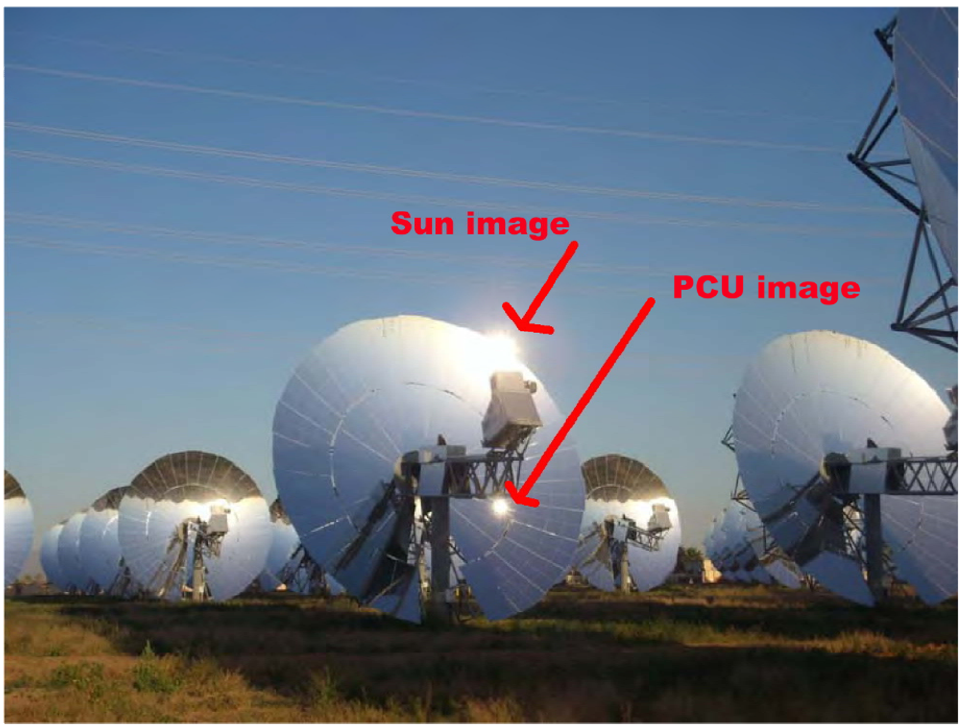
Each SunCatcher device consists of a power conversion unit (PCU) and a mirrored-surface dish assembly operating as a solar concentrator that automatically tracks the sun. The dish assembly (±40 feet high) collects and focuses solar energy onto the PCU to generate electricity. Each PCU consists of a solar receiver heat exchanger and a closed-cycle, high-efficiency Solar Stirling Engine specifically designed to convert solar power to rotary power via a thermal conversion process. The collection system will combine the output from multiple groups of SunCatchers and connect each 1.5 MW group to a generator step-up unit (GSU) transformer. Power is then transferred to the independent grid.

The SunCatcher is a parabolic dish that tilts in elevation and rotates in azimuth to track the sun. The SunCatcher mirrors focus the reflected sunlight on a single point 22 feet from the dish surface. The PCU is located at that focal point and absorbs the reflected solar energy to power the Stirling engine. As a result of the intensity of this solar energy, the face of the PCU can be observed from some viewpoints as a very bright object (see Exhibit 2).



Photograph #5
Date: 04/06/10

Comments:
Maricopa Solar Site



Photograph #6
Date: 04/06/10

Comments:
Maricopa Solar Site

Exhibit 2 – Solar Reflection Examples

There are two basic operating conditions for the SunCatcher system: tracking and off-axis positions:

Tracking Position – This is the normal operating position of a SunCatcher, which occurs approximately 30 minutes after sunrise and continues throughout the day until sunset. In this position, the center of the parabolic mirror is directly in line with the PCU and the sun (see Exhibit 2, Photograph #5). An observable halo of light is visible around the PCU. Up to 5% of the visible light reflected by the SunCatcher may spill outside of the receiver aperture (95% of the reflected sunlight enters the aperture). However, much of this spillage would be intercepted by the rest of the PCU, which extends several feet around the aperture opening. Only a small percentage (of the 5% spillage) gets past the PCU. Of that amount, only a small fraction is actually pointed in the direction of the observer. The rest is spilled in many directions that cannot be seen by the observer. As a result, the halo of light around the PCU is not expected to have a significant impact on any observers beyond 223 ft.

<u>Off-axis Positions</u> – Off-axis includes all positions where the back of the mirror is not aligned with the PCU and the sun (see Exhibit 2, Photograph #6). In off-axis positions, the focal point of energy is shifted away from the PCU. The following is a description of these conditions.

1. Night-Stow to Operation Transition – A SunCatcher moves from night stow position to a tracking position at sun-up and back into night-stow position after sundown. In the morning, the SunCatcher rotates approximately 270 degrees counter-clockwise from a north-facing azimuth to a 10 degree offset track position. The rotation may take up to 5 minutes. It stays in this offset tracking position until the light level is sufficient to generate power (up to 30 minutes). From offset tracking position to tracking position takes approximately 10 seconds.
2. Wind Stow – During high winds a SunCatcher will cease operations and move into a position with the PCU pointed skyward. It takes up to five minutes for SunCatchers to transition into the wind stow position, depending on initial position.
3. Offset Tracking (Cloud Cover) – When the sun is blocked by a cloud, the SunCatcher will move into a 10 degree offset tracking position (PCU pointed above the sun). The 10 degree offset track is required to protect equipment and bring the PCU back on-line gradually after the cloud has passed. The SunCatcher may stay in an offset track position for up to 30 minutes waiting for the PCU to come on-line. Once the PCU is on-line, it takes approximately 10 seconds to transition from offset tracking to tracking position.
4. Malfunction – A malfunction or fault is a rare occurrence. In most cases, the SunCatcher detects the fault, immediately moves into a wind stow position, and remains offline until maintenance is performed. In very rare cases, a SunCatcher may malfunction and hold a static position. A SunCatcher unable to move into wind stow position is either manually moved or repaired within one hour.

ANALYSIS & CONCLUSIONS

CRITERIA FOR EVALUATION

Total solar energy is the complete spectrum of sunlight including ultra violet energy

(UV), the visible spectrum, and infrared energy (IR). It is this total solar irradiation that has the potential to create a human safety impact by causing erythemal or ocular damage. Total solar energy is evaluated in units of power such as kilowatts per square meter (kW/m²).

Glare is defined as difficulty seeing in the presence of bright light such as reflected sunlight. Glare is caused by a substantial ratio of luminance (brightness) between a field of view and an intrusive light source. Glint is defined as a momentary flash of intrusive light or brightness. Please refer to Appendix I of this report for a glossary of lighting terms.

There are currently no regulations specific to light reflected from solar plants. However, potential safety effects of solar radiation have been analyzed within the context of principles and procedures developed for beam safety in the Solar 1 experimental plant at Daggett, California, as conducted by the Sandia National Laboratories (Sandia Report SAND83-8035 by T. D. Brumleve). The Sandia Report identified maximum permissible exposure (MPE) limits for reflected sunlight to minimize the potential for permanent eye damage (i.e., retinal burn).

Temporary flash blindness is caused by excessive light exposure that saturates the retinal pigments, causing a visual image of the glint or glare to remain temporarily after the intrusive light exposure. Impacting variables may include, but not be limited to: individual filtering ability of the preretinal ocular media, background illuminance adaptation, age, eye disease and corrective corneal surgery (radial keratotomy or RK). Veiling reflections are caused by a reflection that, when perceived by the human eye, deceases visual acuity to either side of the reflection and progressively gets better as one moves the eye away from the intrusive light source.

Sandia National Laboratories has developed models of glare from concentrating solar collectors. They examine the impact of retinal irradiance vs. the subtended angle based upon the distance of the observer from the source. Ho et al. (2010) state, "If the retinal irradiance is sufficiently large for a given subtended source angle, permanent eye damage from retinal burn may occur. Note that as the subtended source angle increases, the safe retinal irradiance threshold decreases because of the increased size of the retinal image area, and, hence, increased energy applied to the retina." See Exhibit 3 as an example of the potential impacts of retinal irradiance as a function of subtended source angle for 0.15 second exposure (typical blink reflex). Additional metrics are also provided that describe the potential for temporary after-image, which can occur at retinal irradiances (or subtended angles) that are much lower than that which causes retinal burn.

In this assessment, the potential ocular impacts of glint and glare can be categorized as follows:

- **Permanent Eye Damage or Retinal Burn**: For the SunCatchers evaluated in this study, there is minimal risk of permanent eye damage to individuals unless they are within several meters of the focal length (between ~4 - 10 m) of the SunCatchers.

- **Temporary Flash Blindness (After-Image)**: Within 223 feet of the SunCatchers, there is a strong potential for temporary after-image effects (see following calculation).

- **Veiling Reflections and/or Distracting Glare**: Beyond the distance that may cause temporary flash blindness, intrusive light may cause nuisance distractions or veil other objects (e.g., signal indicators for train operators) in the visual field.

Exhibit 3 – Example of Retinal Irradiance Calculation (Ho et al. (2010))

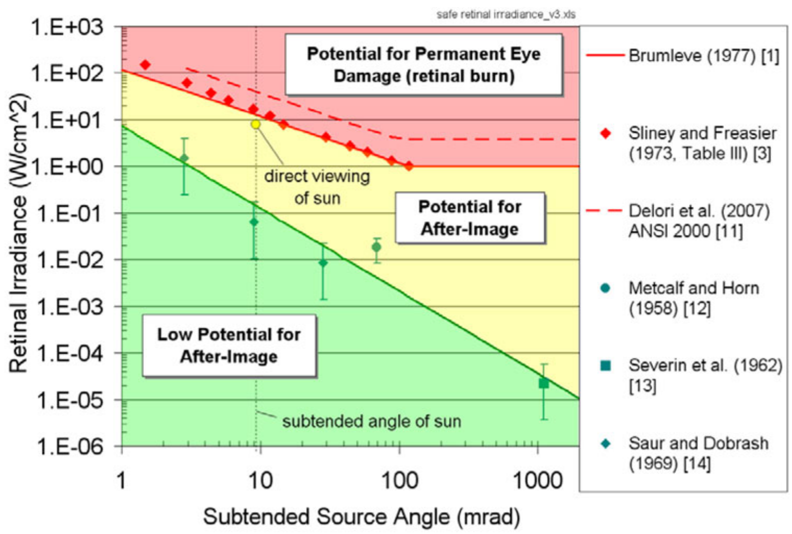


Figure 1. Potential impacts of retinal irradiance as a function of subtended source angle for 0.15 s exposure (typical blink response time). Data for irreversible eye damage is from [1], [10], and [11]. Data for temporary flash blindness (after-image) is from [12], [13], and [14].

The equations provided in Ho et al. (2010) can be used to determine the maximum distance from the SunCatcher at which temporary flash blindness is likely to occur. The equations use the diameter (11.5 m) and focal length (6.7 m) of the parabolic dish collector, which are taken from Figure 7 of the Calico Solar Project Staff Assessment and Draft Environmental Impact Statement Visual Resources section (CEC 2010). In addition, the mirror facets are assumed to have a reflectivity of 0.94 with an RMS slope error of 1 mrad. The sun shape is assumed to be 9.4 mrad. The retinal irradiance is first determined using the equations in Ho et al. (2010) assuming a direct normal insolation of 1000 W/m^2 and ocular parameters recommended in the paper (pupil diameter = 2 mm, transmission coefficient = 0.5, eye focal length = 17 mm).

Based on the calculated retinal irradiance value, which does not change with distance since the retinal image size decreases at the same rate as the corneal irradiance with increasing distance (assuming no atmospheric attenuation), the maximum distance between the collector and an observer that has a strong potential for causing temporary flash blindness can be determined. For the parameters listed above, this distance is found to be 68 m (223 feet). Beyond this distance, temporary flash blindness is less likely to occur.

GLARE SAFETY CONCERNS/SIGNIFICANCE THRESHOLDS

Once operating, the proposed project will require special consideration to any worker, interstate highways, secondary roads, or railroad ROW adjacent to the Project where the mirrors may present exposure to intrusive brightness. A number of SunCatcher operating conditions can occur:

- Tracking Position (normal)
- Off-axis Positions
    - Night Stow
    - Wind Stow
    - Offset Tracking (cloud cover)
    - Malfunction

Of these conditions, the offset tracking (cloud cover) position have the greatest potential to generate glare impacts to adjacent receptors. During proposed Project operation, when switching from offset tracking to on-axis tracking positions, the SunCatchers have the greatest potential for glare. Based on the Criteria for Evaluation and Technical Reports Completed/Evaluated (as discussed above), for purposes of this analysis it is determined that significant glare impacts (temporary flash blindness) would occur to any receptor within 223 feet of any SunCatcher unit. This threshold is utilized during both Phase I and full buildout (Phase II) operations.

TRAIN OPERATIONS

An existing double-track railroad line currently operates through the Project site. The railroad is owned by BNSF Railway. During both Phase I and Phase II operations of the Calico Solar project, the potential for significant glare impacts to the BNSF Railway operators would occur as SunCatcher units may be located within 223 feet of the BNSF ROW. To reduce the potential for temporary flash blindness impacts, recommended measure #1 (as described below) is suggested to ensure that no SunCatcher unit be located within 223 feet of the existing BNSF ROW.

During normal and offset tracking positions, as observers move past the SunCatchers a “flashing” will occur as the reflective image transfers from one unit to the next. This exposure will continue for approximately three miles along the ROW on both the north (2.8 miles) and south (3.5 miles) sides of the ROW. The introduction of these types of solar facilities will add visual distractions and daytime intrusive light to the visual terrain where none have existed previously.

The rapid movement of trains passing through the solar field and the human instinct to avoid such brightnesses in the field of vision should reduce these impacts. First surface reflection from train windows as well as the index of refraction of the windows will diminish the impact of high brightnesses and contrasts.

To reduce the extent of these extending veiling reflections and/or distracting glare impacts, recommended measure #2 (as described below) is suggested and includes a number of technical specifications and operating procedures to reduce the veiling reflections and/or distracting glare associated with Project operation.

ROADWAYS

The potential impact of the redirected sunlight on observers such as motorists on adjacent roadways is a matter of great concern. The following describes general characteristics of roadways adjacent to the proposed Project with the potential to be impacted by glare.

- **Hector Road**. This local roadway is a north-south local road that currently serves as the primary access to the Project site. It starts at Historic Route 66 just south of the I-40 interchange and continues north entering the Project site. The existing ADT near the vicinity of the Project site is 31 vehicles per day.
- **Interstate 40 (I-40)**. This freeway runs east-west and is located approximately 120 to 260 feet south of the Project site. The segment of I-40 near the Project site has four through lanes (two through lanes in each direction) with 6 feet of shoulder on both sides and a wide center median. The speed limit along this segment is posted at 70 miles per hour (mph), with existing average daily traffic (ADT) of 15,600 vehicles per day.
- **National Trails Highway (Historic Route 66)**. This roadway is an east-west two-lane highway located approximately 300 feet south of the Project site and running parallel to I-40. The existing ADT near the vicinity of the project site is 28 vehicles per day.

As indicated above, both Phase I and Phase II of the proposed project would have the potential to result in temporary flash blindness to motorists traveling on Hector Road because the applicant has proposed locating SunCatcher units along the roadway. To reduce the potential for temporary flash blindness impacts on Hector Road, recommended measure #1 (as described below) is suggested to ensure that no SunCatcher unit be located within 223 feet of an existing public roadway ROW.

Phase Two of the installation will result in extending veiling reflections and/or distracting glare to the I-40 highway corridor and Historic Route 66 in a manner similar to those impacts expected to occur along the BNSF ROW. The exposure to motorists will be approximately 2.1 miles long and visible to the north. As the observer moves past the SunCatchers, a “flashing” will occur as the reflective image transfers from one unit to the next. To reduce the extent of these extending veiling reflections and/or distracting glare impacts, recommended measure #2 (as described below) is suggested and includes a number of technical specifications and operating procedures to reduce the veiling reflections and/or distracting glare associated with Project operation to help ensure that passengers and drivers along those roadways in the vicinity of the project will be less likely to experience temporary flash blindness.

CONSTRUCTION AND OPERATION WORKERS

At any distance less than 223 feet from the SunCatcher units, construction and operational workers will experience hazardous levels of irradiance. This means the potential for ocular hazards are more likely to occur. In addition, at distances closer to the SunCatcher (within ~10 – 15 m), hazardous impacts to the skin may occur. Both construction and operational workers risk the exposure of active SunCatcher units within these distances during both Phase I and Phase II operations. To reduce the extent of skin and ocular impacts, recommended measure #3 (as described below) is suggested and includes requiring all workers who enter the field of SunCatchers wear proper protective eyewear and clothing.

PEDESTRIAN SAFETY

Public pedestrian circulation networks are mainly associated with existing roads that have sidewalks. In the absence of curbs, gutters, or sidewalks, pedestrian circulation and local foot traffic generally use the ROW easements along the edges of paved streets. The traffic and circulation review found no pedestrian activity within the immediate vicinity of the Project site. Additionally, perimeter security fencing and access gates will be provided for the Project site further deterring pedestrian activity near the Project and eliminate pedestrian activity within the field of SunCatchers.

AVIATION SAFETY

The following lists airports identified near the Project site, and includes their approximate distances in relation to it:

- Barstow-Dagget Municipal Airport (DAG) – approximately 19 miles west of the Project Site,
- Twentynine Palms EAF Airport (NXP) – approximately 32 miles southeast of the Project Site, and
- Bicycle Lake Army Airfield (BYS) – approximately 34 miles northwest of the Project Site.

Based on the distances of these airports, it is assumed that aircraft approaching or departing from these facilities would be at an elevation exceeding potential glare associated with proposed Project operation.

RECOMMENDED MEASURES

Best practices for reducing the potential impacts of intrusive light is to prevent the intrusive light from occurring (#1), then apply physical set backs to protect the populance when intrusive light does occur (#2 & #3)

#1. During the normal tracking and offset tracking positions, the project operator shall adhere to the following procedures and specifications:

a. Modify the offset tracking procedure to use a 25-degree offset instead of the proposed 10-degree offset.
b. Ensure the morning stow position-to-offset position transitions occur at least 30 minutes before sunrise and end in the 25 percent offset tracking position
c. The "Night Stow" should occur 30 minutes after sunset to avoid any intrusive light effects; and
d. Develop and implement an emergency glare response program that includes all of the following:

    - a monitoring plan that 1) makes use of video surveillance trucks to identify and document intrusive light conditions, covering all hours of operation on a weekly basis for five years; and 2) also monitors the status of individual SunCatchers during all hours of operation to immediately identify any malfunctioning units with the potential to create glare within the BNSF Railway right-of-way or on I-40, Route 66 or Hector Road;
    - procedures that allow motorists and train operators to report to the project owner, as well as to Caltrans, CHP and the County of San Bernardino in the case of complaints from motorists, any problems with glint or glare resulting from the operation or malfunction of SunCatchers. The procedures developed by the applicant for public reporting of glare problems shall be developed in consultation with BNSF Railway, California Department of Transportation (Caltrans) District 8 office, California Highway Patrol (CHP), and the County of San Bernardino. These procedures shall include a toll-free number for reporting problems as well as a process for written notification to the project owner and to Caltrans, CHP, and the County of San Bernardino, in the case of complaints from motorists, or to BNSF Railway, in the case of complaints from train operators;
    - procedures for the immediate repositioning of any malfunctioning units to avoid potential glare within the BNSF Railway right-of-way or on I-40, Route 66 or Hector Road, and to immediately investigate and resolve complaints received from train operators or motorists;
    - a process for evaluating intrusive light conditions identified by the video surveillance and determining, in consultation with the CPM, what operational or other changes may be warranted to reduce or eliminate the identified intrusion;
    - a procedure for documenting instances when malfunctioning units with the potential to create glare are identified, or when train operators or motorists complain of glare, and the actions taken in response to those instances or complaints; and
    - periodic reports to the Project CPM detailing instances of SunCatcher malfunction, public complaints about glare, or video-detected problems that are covered by the emergency glare response program.

#2. The project owner shall ensure that the minimum distance from any SunCatcher reflector assembly to the BNSF ROW or any public roadway ROW shall be a minimum of 223 feet to reduce the possibility of temporary flash blindness.

#3. The SunCatchers shall be rotated away from the sun to cool before any maintenance work is performed. Additionally, if the potential for severe intrusive light is a possibility, workers who enter the field of SunCatchers shall be protected against the reflected solar energy.

RECOMMENDED VERIFICATION

At least 60 days before the first SunCatchers are tested or operated, the project owner shall give the CPM, for the CPM's review and approval, a copy of the project owner's draft emergency glare response program.

Beginning no more than 30 days after the first SunCatchers are tested or operated and continuing for the duration of project operations, the project owner shall provide the CPM a monthly report that includes the date, time, location, response, and response time of any malfunction, public complaint, or video detection covered by the emergency glare response program, and any determinations made by the project owner as to cause of the problem. A copy of these reports shall be kept by the project owner for at least five years.

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Definitions Related to Daytime Intrusive Light

Actinic Effect- photochemical reactions through having exposure to a significant short wavelength or ultraviolet light component.

Candela- the SI unit of luminous intensity; equal to one lumen per steradian.

Diffuse Reflection- if a reflecting surface is rough, it spreads the outgoing ray in all directions according to the cosine law.

Disability Glare- the effect of intrusive light in the eye whereby visibility and visual performance are reduced.

Discomfort Glare- glare that produces discomfort but does not interfere with visual performance.

Erythema- reddening of the skin as a result of an irritation caused by exposure to high levels of solar flux; in the case of daylight flux, ultra violet light (UV) is the most dangerous.

Glare- the sensation produced by a point luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted, which causes annoyance, discomfort, or loss of visual performance and visibility.

Insolation- the solar electromagnetic radiation measured at a given location on Earth with a surface element perpendicular to the Sun's rays.

Intrusive (obtrusive) Light- Light that produces sky glow, light trespass, glare or other undesirable environmental impacts.

Lumen- SI unit for luminous flux.

Luminance- perceived brightness created by luminous flux reflecting off objects in the visual environment (candela per square meter or cd/m^2).

Luminous Flux- the measure of the perceived power of light. It differs from radiant flux, the measure of the total power of light emitted, in that luminous flux is adjusted to reflect the varying sensitivity of the human eye to different wavelengths of light.

Nuisance or Distracting Glare- intrusive light impacting the observers eye (s) in a manner creating a visual distraction in the field of view.

Point Source- a source of radiation whose dimensions are sufficiently small, compared with the distance between the source and the irradiated surface, that these dimensions can be neglected in calculations and measurements, e.g.. the Sun.

Specular Reflection- if a reflecting surface is smooth or mirror-like, the light from a single incoming direction (a ray) is reflected into a single outgoing direction.

Spread Reflection or Mixed Reflection- if a reflecting surface is not smooth, it spreads parallel rays into a cone of reflected rays with large irregularities.

Veiling Reflection- a specular reflection that when perceived by the human eye deceases visual acuity to either side of the specular reflection and progressively gets better as one moves the eye away from the intrusive light source.

F. LIST OF PREPARERS

CALICO SOLAR PROJECT
08-AFC-13
LIST OF PREPARERS

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Traffic and Transportation .... Marie McLean, James Jewell; and Alan Lindsley

Project Assistant .... Sabrina Savala

G. WITNESS QUALIFICATIONS AND DECLARATIONS

CHRISTOPHER MEYER

Senior Associate,
Energy and Infrastructure/Cultural Resources

ACADEMIC BACKGROUND

B.A., Biological Anthropology/Archaeology
California State University, Hayward, 1993

PROFESSIONAL EXPERIENCE

Mr. Meyer's has over thirteen years with Aspen in support of CEQA/NEPA projects including EIR/EIS, IS/MND, and EA. His background combines strong experience in environmental inspection, compliance management, and project management on large-scale construction projects with a solid background in archaeological field investigations. With over 18 years experience as an archaeologist, Mr. Meyer is familiar with the cultural settings of California and Oregon and the regulatory requirements for cultural resource management under CEQA/NEPA. He has worked closely with construction contractors, agency representatives, and Native American tribal governments to ensure projects are built on time, within budget, and in compliance with all environmental requirements. In addition to field experience, he has worked as a project manager, produced reports, document, and permit applications, and has reviewed mitigation measures for federal, State, and local government agencies as well as corporations.

Aspen Environmental Group — 1997 to present

California Energy Commission (CEC), Technical Assistance in Application for Certification Review, Siting Project Manager. In response to California's power shortage, Aspen is assisting the CEC in evaluating the environmental and engineering aspects of new power plant applications throughout the State. As part of this effort, Mr. Meyer serves as a Project Manager and supervises technical staff members, preparing the CEC's CEQA-equivalent Preliminary Staff Assessments and Final Staff Assessments in response to applications for the construction of new power plants across the State. Responsibilities include: review of applications for new power plants; identifying potential issues with proposed power plants; preparation of conditions of certification for proposed power plants; review and editing of CEC technical staff's analysis, scheduling and coordinating public workshops; tracking status of permitting process; coordinating with affected agencies to resolve potential concerns; detailed reporting; conflict resolution; and preparing briefings for the CEC Siting Committee.

California Energy Commission (CEC), Technical Assistance in Application for Certification Review, Compliance Project Manager. In response to California's power shortage, Aspen is assisting the CEC in evaluating the environmental and engineering aspects of new power plant applications throughout the State. As part of this effort, Mr. Meyer served as a Compliance Project Manager and supervised technical staff members, preparing the CEC's Conditions of Certification for construction of power plants across the State as well as managing on-going operational issues with power plants currently under license with the CEC. Responsibilities included: preparation of amendments to conditions of certification for existing power plants; review of applications for new power plants; drafting of Memoranda of Understanding with Chief Building Officials; coordinating with affected agencies to resolve concerns with potential impacts to cultural resources or threatened or endangered species; maintaining contractor construction milestones, detailed reporting; development of mitigation measures; conflict resolution; and inspection for compliance with the Conditions of Certification.

MARIE McLEAN

QUALIFICATIONS SUMMARY

Twenty years experience in the field of environmental research, analysis, and planning, with specific emphasis on the economics of water, energy, and land use and its social, visual, and cultural ramifications. Specific projects involved (1) assessing economic costs and benefits of water delivery contracts and energy sales; (2) conducting and presenting visual analyses of historic and other local, state, and federal resources; (3) preparing local, state, and federal resource assessment forms; (4) determining and communicating benefits and costs of proposed development projects (housing, energy, and water) on the social and economic life of communities in which they are located; and (5) as member of local design review, historic preservation, and housing boards, recommended programs and policies and monitored their implementation.

RECENT PROFESSIONAL EXPERIENCE

California Energy Commission, Planner II, Environmental Office-Facilities Siting, January 2008—present.

Conduct technical analyses for complex facility siting cases and planning studies in the area of socioeconomics and visual resources.

Electricity Oversight Board; June 1, 2007—December 31, 2008.

Developed, conducted, and presented economic studies on energy markets and transmission projects; California Independent System Operator (CAISO) market redesign and technology upgrade program; and investigated, analyzed, and reported the effects of existing and proposed energy programs on supply, demand, and rates.

California Department of Water Resources, State Water Project Analysis Office, June 2001—July 31, 2007.

Developed and implemented complex analyses of the social, economic, and financial ramifications of contracted and proposed water deliveries and transfers and changes to valuation methods for selling energy in deregulated markets. Researched, identified, and reported on market activities in energy and water and their economic effects on ratepayers.

EDUCATION

Bachelor of Arts, Economics, California State University, Sacramento, 1983

SDG&E Miguel-Mission 230 kV #2 Project Construction Monitoring and Supplemental Environmental Review Program, Lead Environmental Monitor. Under contract to the California Public Utilities Commission (CPUC), Mr. Meyer served as Lead Environmental Monitor and supervised one environmental monitor in the field, monitoring the implementation of the CPUC environmental impact report's conditions of approval for construction of the overhead 230 kV electric transmission line and substations upgrades. The project included installing a new 230 kV circuit on existing towers along the 35-mile right-of-way, as well as relocating 69 kV and 138 kV circuits on approximately 80 steel pole structures. In addition, the Miguel Substation and Mission Substation was modified to accommodate the new 230 kV transmission circuit. Responsibilities included: supervision, guidance and development of environmental monitors in field monitoring as well as the compliance review of pre-construction plans and mitigation compliance documentation, review of variance requests and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; and coordination with SDG&E, construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

SCE Viejo Systems Project Construction Monitoring and Supplemental Environmental Review Program, Lead Environmental Monitor. Under contract to the California Public Utilities Commission (CPUC), Mr. Meyer served as Lead Environmental Monitor and supervises one environmental monitor in the field, monitoring the implementation of the CPUC negative declaration's conditions of approval for construction of the overhead 66 kV and 220 kV electric transmission lines and substation upgrades and construction. This Southern California Edison (SCE) project involves the installation of a 220/66/12 kV substation and 3.1-mile 66 kV transmission line in southern Orange County, California. The transmission line will traverse residential and recreational areas in the City of Mission Viejo and the substation is located in a business park adjacent to a wilderness area in the City of Lake Forest. Responsibilities include: supervision, guidance and development of environmental monitors in field monitoring as well as the compliance review of pre-construction plans and mitigation compliance documentation, review of variance requests and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; and coordination with SDG&E, construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

PG&E Tri-Valley 2002 Capacity Increase Project Construction Monitoring and Supplemental Environmental Review Program, Lead Environmental Monitor. Under contract to the California Public Utilities Commission (CPUC), Mr. Meyer serves as Lead Environmental Monitor and supervises two environmental monitors in the field, monitoring the implementation of the CPUC environmental impact report's conditions of approval for construction of this combination overhead and underground 230 kV electric transmission lines and substations. Construction involves underground installation of the double-circuit 230 kV transmission line conduit and construction of a substation and several transition stations as three separate phases. Responsibilities include: supervision, guidance and development of environmental monitors in field monitoring as well as the compliance review of pre-construction plans and mitigation compliance documentation, variance requests and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; and coordination with PG&E, construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

PG&E Jefferson-Martin 230 kV Transmission Line Project, Lead Environmental Monitor. Under contract to CPUC, Mr. Meyer served as Lead Environmental Monitor and supervised two environmental monitors in the field, monitoring the implementation of the CPUC compliance, and reporting program for the PG&E Jefferson-Martin Project. This project involved the installation of a 27-mile 230 kV transmission line through scenic San Mateo County in the Highway 280 corridor, urban Colma and Daly City, and across San Bruno Mountain. Responsibilities included: supervision, guidance and development of environmental monitors in field monitoring as well as the compliance review of pre-construction plans and mitigation compliance documentation, variance requests and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; and coordination with PG&E, construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

California Energy Commission Emergency Siting Team, Power Plant Development, Compliance Project Manager. Under contract to the California Energy Commission (CEC), Mr. Meyer served as a Compliance Project Manager and supervised technical staff members, preparing the CEC's Conditions of Certification for construction of emergency power plants across the State. Responsibilities included: review of applications for new emergency power plants; drafting of Memoranda of Understanding with Chief Building Officials; coordinating with affected agencies to resolve concerns with potential impacts to cultural resources or threatened or endangered species; maintaining contractor construction milestones, detailed reporting; development of mitigation measures; conflict resolution; and inspection for compliance with the Conditions of Certification.

California Energy Commission Coastal Power Plant Study, Archaeologist. This research study undertaken by the California Energy Commission (CEC) examined the engineering and environmental issues associated with 24 coastal power plants. The purpose of the study was to identify, describe, and analyze issues with the potential to substantially delay or complicate the certification process for future applications to the Energy Commission for expansion or modernization of existing coastal power plants. For this study, Mr. Meyer was responsible for performing site surveys and reviewing documentation for cultural resources for all 24 Coastal Power Plants.

CEC Hydroelectric Power Plant Inventory Study, Natural Resources Analyst. Mr. Meyer assisted in the collection of power and environmental data on over 200 hydroelectric power plants located in California. Physical power data included electrical output, system upgrades, water storage capacity and peaking availability. Environmental information included developing a data base addressing sensitive species issues, fish screens and ladders, monitoring parameters and a map of known hydroelectric facilities and barriers to anadromous fish passage.

Devers-Palo Verde 500 kV Transmission Line Project EIS/EIR, southern California/western Arizona. For this EIR/EIS prepared by US Bureau of Land Management and CPUC, Mr. Meyer assisted in the review and development of construction mitigation measures for SCE's proposed 250-mile long transmission line project from the Palo Verde Nuclear power plant in Arizona to the northern Palm Springs area in California. Major issues of concern include EMF and visual impacts on property values, impacts on the area's vast recreational resources and tribal lands, and the development and evaluation of several route alternatives, including the Devers-Valley No. 2 Route Alternative, which eventually was approved by the CPUC.

Antelope-Pardee 500 kV Transmission Line Project EIS/EIR, Los Angeles County, CA. For this EIR/EIS prepared by USFS, Angeles National Forest and CPUC, Mr. Meyer assisted in the review and development of construction mitigation measures for SCE's proposed 25-mile long transmission line project from the Antelope Substation in the City of Lancaster, through the ANF, and terminating at SCE's Pardee Substation in Santa Clarita. Major issues of concern included impacts to biological, recreational, and cultural resources within Forest lands, EMF and visual impacts on property values, impacts on residences in the urbanized southern regions of the route, and the development and evaluation of several route alternatives.

Tehachapi Renewable Transmission Project (TRTP) EIR/EIS, Kern, Los Angeles, and San Bernardino Counties, CA. For this EIR/EIS prepared by USFS, Angeles National Forest and CPUC, Mr. Meyer assisted in the review and development of construction mitigation measures for

SCE's proposal to construct, use, and maintain a series of new and upgraded high-voltage electric transmission lines and substations to deliver electricity generated from new wind energy projects in eastern Kern County. Approximately 46 miles of the project would be located in a 200- to 400-foot right-of-way on National Forest System land (managed by the Angeles National Forest) and approximately three miles would require expanded right-of-way within the Angeles National Forest. The proposed transmission system upgrades of TRTP are separated into eight distinct segments: Segments 4 through 11. Segments 1 (Antelope-Pardee) and Segments 2 and 3 (Antelope Transmission Project) were evaluated in separated CEQA and NEPA documents as described above.

PG&E Northeast San Jose Transmission Reinforcement Project Construction Monitoring and Supplemental Environmental Review Program, Lead Environmental Monitor. Under contract to the California Public Utilities Commission (CPUC), Mr. Meyer served as Lead Environmental Monitor and supervised two environmental monitors in the field, monitoring the implementation of the CPUC environmental impact report's conditions of approval for construction of this combination overhead and underground 230 kV electric transmission lines and substations in the Cities of San Jose, Milpitas, and Fremont. Construction of the dual 230kV circuit involved underground construction, single-pole tower installation, and construction of the Los Esteros Substation. Given the proximity of the project to the Bay, sensitive biological resources were present, including the burrowing owl and wetland mitigation sites. Responsibilities included: supervision, guidance and development of environmental monitors in field monitoring as well as the compliance review of pre-construction plans and mitigation compliance documentation, variance requests and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; and coordination with PG&E, construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

Pacific Pipeline Project EIR/EIS for the U.S. Forest Service, Angeles National Forest, and the California Public Utilities Commission, Environmental Monitor. Served as an Environmental Monitor and supervised mitigation monitoring for all sensitive resources for a construction segment along a 132-mile crude oil pipeline within southern California. Coordinated construction activities with the applicant's inspection team, archaeological specialists and Native American monitors through areas with sensitive cultural, biological, and visual resources. Monitored for hazardous materials management, storm water pollution prevention, and biological and cultural resources. Maintained daily written documentation of compliance activities.

ESSEX ENVIRONMENTAL — 1995 TO 1997

Sierra Pacific Power Co., Alturas 345 kV Electric Transmission Project, Associate. Assisted in the development of the environmental management program implementation plan for a 164-mile electric transmission line. Wrote the Storm Water Pollution Protection Plan (SWPPP) for the California and Nevada segments.

DECLARATION OF
Kathleen Forrest

I, Kathleen Forest, declare as follows:

1. I am presently employed by the California Energy Commission in the Environmental Office of the Siting, Transmission and Environmental Protection Division as a Cultural Resources Specialist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Cultural Resources**, for the Calico Solar Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 8/9/10 Signed: Original signed by Kathleen Forrest

At: Sacramento, California

DECLARATION OF
JAMES EARL JEWELL

I, James Earl Jewell, declare as follows:

1. I am currently under contract with the Aspen Environmental Group to provide environmental technical assistance to the California Energy Commission. I am serving as an Illuminating Engineer to provide Peak Workload Support for the Siting, Transmission, and Environmental Protection Division.

2. A copy of my professional qualifications and experience is attached hereto and incorporated herein.

3. I assisted in the preparation of the final staff testimony on Glint and Glare for the Calico Solar Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable sources and documents, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is accurate and valid with respect to the issues addressed therein.

5. I am familiar personally with the facts and conclusions applicable to matters of intrusive light and glare and relative brightnesses, and if called as a witness, could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated:______8/9/10_______ Signed:_________Original signed__________

At: __San Francisco, California_____

DECLARATION OF
Marie McLean

I**,** Marie McLean, declare as follows:

1. I am presently employed by the California Energy Commission in the Environmental Office of the Siting, Transmission, and Environmental Protection Division as an Environmental Planner ll.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on Traffic and Transportation for the Final Staff Assessment for the Calico Solar Project (08-AFC-13) based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: ____________________ Signed: ____________________

At: Sacramento, California

DECLARATION OF
Michael D. McGuirt

I, **Michael D. McGuirt**, declare as follows:

1. I am presently employed by The California Energy Commission in the **Siting, Transmission, and Environmental Protection Division** as a **Planner II**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the portion of the staff testimony on archaeological resources for the **Cultural Resources and Native American Values** section of the supplemental staff assessment for the Calico Solar project, based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared subject portion of the testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the subject portion of the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: August 9, 2010 Signed:__________________________

At: ______________________

DARCANGELO, JENNIFER, JOHN SHARP, MICHAEL D. MCGUIRT, AND ANDREA GALVIN

2005 ***How to Consult with the California SHPO***. Workshop presented on 23 April 2005 at the 39th Annual Meeting of the Society for California Archaeology, Sacramento, California (6 hours).

JONES & STOKES

1999a ***Cultural Resource Inventory Report for Williams Communications, Inc. Fiber Optic Cable System Installation Project, Wendover, Nevada to the California State Line***. Volume 1: Draft Report. July. (JSA 98-358.) Sacramento, California. Prepared for Williams Communications, Inc., Tulsa, Oklahoma.

1999b ***Cultural Resources Report for the Williams Communications, Inc. Interstate 80 Fiber Optic Cable System Installation Project***. Volume I. September. (JSA 98-358.) Submitted to Williams Communications, Inc., Tulsa, Oklahoma. On file with the State Historic Preservation Office, Carson City, Nevada.

1999c ***Archaeological Site Avoidance and Monitoring Plans for Williams Communications' Fiber Optic Cable Installation In the Union Pacific Railroad Right-of-Way, Doña Ana County to Hidalgo County, New Mexico***. October. (JSA98-379.) Sacramento, California. Prepared for Williams Communications, Inc., Tulsa, Oklahoma.

2001 ***Final Phase II Cultural Resource Evaluation for the Kramer Mining District, Edwards AFB, Kern and San Bernardino Counties, California***. Volume I. November. Sacramento, California. On file with the Base Historic Preservation Officer, Edwards AFB, California.

LEBO, SUSAN A. AND MICHAEL D. MCGUIRT

1997 ***Geoarchaeology at 800 Nuuanu: Archaeological Inventory Survey of Site 50-80-14-5496 (TMK1-7-02:02), Honolulu, Hawai`i***. Department of Anthropology, Bishop Museum, Honolulu. (100 pp.) Submitted to Bank of Hawaii, Honolulu. On file with the State Historic Preservation Division, Honolulu.

1998a ***Assessments of Stone Architecture: a Case Study from North Hālawa Valley, O`ahu***. Paper presented at the 11th Annual Hawaiian Archaeology Conference of the Society for Hawaiian Archaeology, Kailua-Kona, Hawai`i.

1998b ***Pili Grass, Wood Frame, Brick, and Concrete: Archaeology at 800 Nuuanu***. Department of Anthropology, Bishop Museum, Honolulu. (142 pp.) Submitted to Bank of Hawaii, Honolulu. On file with the State Historic Preservation Division, Honolulu.

LENNSTROM, HEIDI A., P. CHRISTIAAN KLIEGER, MICHAEL D. MCGUIRT, AND SUSAN A. LEBO

1997 ***Archaeological Reconnaissance of Pouhala Marsh, `Ewa District, O`ahu***. Department of Anthropology, Bishop Museum, Honolulu. (14 pp.) Submitted to Ducks

ENERGY PLANNER II, California Energy Commission, Sacramento, California
November 2007 to December 2009, June 2010 to present

Develop environmental impact analyses of the potential effects that the construction and operation of proposed thermal power plants may have on significant cultural resources. Apply applicable Federal, State, and local statutes and regulations, as they relate to the consideration of cultural resources. Design and execute cultural resource impact analyses that are appropriate to the specific regulatory context for each proposed project. Gather and evaluate information on projects and on cultural resources in project areas. Develop and maintain agency and public relationships to acquire the most useful data and to elicit input in the development of California Energy Commission conditions of certification. Succinctly convey, orally in different public forums and in different written technical formats, the results of cultural resource impact analyses and proposed conditions of certifications meant to mitigate adverse impacts to significant cultural resources. Periodic reviews of licensees' actions to ensure compliance with extant conditions of certification. Oversight of consultants' who are preparing cultural resource impact analyses.

ASSOCIATE STATE ARCHAEOLOGIST, Office of Historic Preservation, California Department of Parks and Recreation (California State Parks), Sacramento, California
May 2001 to November 2007

Regulator, in the California Office of Historic Preservation (OHP), of the Advisory Council on Historic Preservation's (Advisory Council) process implementing Section 106 of the National Historic Preservation Act (NHPA). Conducted among the most complex Section 106 reviews, and participated in, and often guided, the consultations of which those reviews were a part. Formally advised other OHP units and the California State Historical Resources Commission on the appropriate disposition and treatment of archaeological resources in the context of other State and Federal historic preservation programs that OHP either administers or in which OHP participates. Worked out of class for two consecutive, six-month terms as a Senior State Archeologist, from December 2004 through December 2005, supervising the Project Review Unit for the State Historic Preservation Officer (SHPO). As the Acting Chief of Project Review, managed and trained a staff of eight professionals and one clerical assistant to conduct, on behalf of the SHPO, the review of all Federal agency actions in the State of California under 36 CFR Part 800, the Advisory Council's Section 106 regulation.

ENVIRONMENTAL SPECIALIST III, Jones & Stokes, Sacramento, California
February 1999 to May 2001

Designed, conducted, and managed short- and long-term archaeological projects in California, Nevada, and New Mexico to comply with Sections 106 and 110 of the NHPA. Prepared proposals. Assisted with client contract negotiations. Conducted archaeological record searches and archival research. Directed Phase I pedestrian inventory surveys and test excavations for Phase II evaluations. Analyzed material culture assemblages. Prepared technical reports and regulatory compliance documents including National Register property and district evaluations, and monitoring and discovery plans. Represented clients in consultations with federal and state agencies, and coordinated and managed clients' compliance with federal cultural resource regulations and the cultural resource regulations of California, Nevada, and New Mexico.

ASSISTANT ANTHROPOLOGIST, Bernice Pauahi Bishop Museum, Honolulu, Hawai`i
August 1996 to June 1998

Assisted with archaeological project design, preparation of proposals, and client contract negotiations, directed Phase I pedestrian inventory surveys, test excavations for Phase I subsurface inventory surveys, test excavations for property evaluations, and data recovery excavations, and assisted with preparation of technical reports on short-term cultural resource management contracts. Analyzed field records, prepared site reports and synthetic report chapters, and analyzed and prepared reports on lithic assemblages for Phases I–III of a long-term federal highway project (Interstate Route H–3). Conducted research in Hawaiian archaeology, and delivered public and professional presentations of that research. Advised on the integration of geoarchaeological methods and techniques into cultural resource management field efforts, and on geoarchaeological interpretations of extant field records, and designed and conducted geoarchaeological components of fieldwork for short–term cultural resource management contracts.

RECENT PROFESSIONAL DEVELOPMENT

CULTURAL RESOURCE AND ENVIRONMENTAL LAW

Successful CEQA Compliance: An Intensive Two-Day Seminar
Sacramento, California, University of California, Davis, Continuing and Professional Education, Terry Rivasplata and Maggie Townsley
June 2009

ACHP - FHWA Advanced Seminar: Reaching Successful Outcomes in Section 106 Review
Vancouver, Washington, Advisory Council on Historic Preservation, Don Klima and Carol Legard; Federal Highway Administration, Mary Ann Naber
October 2007

NEPA Compliance and Cultural Resources
Portland, Oregon, National Preservation Institute, Joe Trnka
October 2007

Section 106: How to Negotiate and Write Agreements
Sacramento, California, National Preservation Institute, Claudia Nissley
November 2004

Consultation with Indian Tribes on Cultural Resource Issues
Sacramento, California, National Preservation Institute, Thomas F. King and Reba Fuller
September 2003

Section 106: How to Negotiate and Write Agreements
The Presidio, San Francisco, California, National Preservation Institute, Thomas F. King
May 2002

Introduction to CEQA

Sacramento, California, University of California, Davis, Continuing and Professional Education, Ken Bogdan and Terry Rivasplata
July 2000

TECHNICAL ARCHAEOLOGY

Introduction to Historic Site Survey, Preliminary Evaluation, and Artifact ID
West Sacramento, California, California Department of Transportation, Julia Huddleson, Anmarie Medin, Judy Tordoff, and Kimberly Wooten; California Department of Parks and Recreation, Glenn Farris, Larry Felton, and Pete Schulz
September 2006

Principles of Geoarchaeology for Transportation Projects (Course No. 100246)
Sacramento, California, California Department of Transportation, Graham Dalldorf, Glenn Gmoser, Jack Meyer, Stephen Norwick, Adrian Praetzellis, and William Silva
October 2006

INFORMATION TECHNOLOGY AND CULTURAL RESOURCE MANAGEMENT

GIS: Practical Applications for Cultural Resource Projects
Sacramento, California, National Preservation Institute, Deidre McCarthy
September 2006

RECENT PAPERS AND REPORTS

BASTIAN, BEVERLY E. AND MICHAEL D. MCGUIRT

2009 **Cultural Resources**. In *Final Staff Assessment, Canyon Power Plant, Application for Certification (07-AFC-9), Orange County* (CEC-700-2009-008-FSA, September 2009), edited by Siting, Transmission and Environmental Protection Division, California Energy Commission, pp. 4.3-1–4.3-51. Siting, Transmission and Environmental Protection Division, California Energy Commission, Sacramento. On file with the California Energy Commission, Sacramento.

BLOSSER, AMANDA, MICHAEL D. MCGUIRT, AND BEVERLY E. BASTIAN

2008 **Cultural Resources**. In *Staff Assessment, Orange Grove Project, Application for Certification (08-AFC-4), San Diego County* (CEC-700-2008-009, November 2008), edited by Siting, Transmission and Environmental Protection Division, California Energy Commission, pp. 4.3-1–4.3-43. Siting, Transmission and Environmental Protection Division, California Energy Commission, Sacramento. On file with the California Energy Commission, Sacramento.

DARCANGELO, JENNIFER, JOHN SHARP, MICHAEL D. MCGUIRT, ANDREA GALVIN, AND CLARENCE CAESAR

2004 ***Section 106 for Experienced Practitioners: Consulting with the California SHPO*** *(GEV4111)*. Course taught on 8 September 2004 in Oakland to California Department of Transportation cultural resources personnel and private sector cultural resource consultants (8 hours).

MICHAEL D. MCGUIRT, MA, RPA

SUMMARY OF PROFESSIONAL EXPERIENCE

Fifteen years of professional academic and cultural resources management experience in western North America, Hawai'i, Central America, and Eastern Europe. Former regulator and present planner with expert knowledge of Section 106 of the National Historic Preservation Act of 1966 (NHPA). Thorough knowledge of the California Environmental Quality Act of 1970, Section 110 of the NHPA, and the US Army Corps of Engineers' Appendix C. Working knowledge of the National Environmental Policy Act of 1969, Native American Graves Protection and Repatriation Act of 1990, and the Archaeological Resources Protection Act of 1979. Expert in developing and coordinating historic preservation solutions that comply with complex Federal, state, and local regulatory environments for large-scale energy, transportation, and telecommunications projects. Expert technical skills in geoarchaeology, mapping and spatial analysis, archaeological survey and excavation, and material culture analyses.

EDUCATION

MASTER OF ARTS, Anthropology, University of Texas at Austin
May 1996

BACHELOR OF ARTS, Anthropology and Archaeological Studies, University of Texas at Austin
December 1990

PROFESSIONAL AFFILIATIONS

Register of Professional Archaeologists
Society for American Archaeology
Society for California Archaeology
National Trust for Historic Preservation
California Preservation Foundation

HONORARY AFFILIATIONS

Honor Society of Phi Kappa Phi

RECENT PROFESSIONAL EMPLOYMENT

ENERGY PLANNER III, California Energy Commission, Sacramento, California
December 2009 to May 2010

> Supervised an Energy Commission staff of five professional cultural resources analysts and a varying number of equivalent consultants in the development of CEQA and NEPA analyses of the potential effects that the construction and operation of proposed thermal power plants may have on significant cultural resources, developed and supervised the implementation of agency-wide programs to facilitate agency compliance with Federal historic preservation regulations, and supervised the periodic staff reviews of licensees' actions to ensure compliance with conditions of certification for extant licenses.

Unlimited, Inc., Rancho Cordova, California. On file with the State Historic Preservation Division, Honolulu.

MCGUIRT, MICHAEL D.

1996 ***The Geoarchaeology and Palynology of an Early Formative Pithouse Village in West-Central New Mexico***. Unpublished M.A. thesis, Department of Anthropology, University of Texas at Austin.

1998 **50-80-10-2010, 50-80-10-2016, 50-80-10-2088, and 50-80-10-2134**. In *Activities and Settlement in an Upper Valley: Data Recovery and Monitoring Archaeology in North Hālawa Valley, O`ahu*, vols. 2a and 2b, edited by Department of Anthropology, Bishop Museum, pp. 1–3, 1–44, 1–5, and 1–46. Department of Anthropology, Bishop Museum, Honolulu. Submitted to State of Hawaii, Department of Transportation, Honolulu. On file with the State Historic Preservation Division, Honolulu.

2002 **Committee Reports, OHP Liaison**. *SCA Newsletter* 36(3):4–5.

2004 **Committee Reports, OHP Liaison**. *SCA Newsletter* 38(2):7, 38(3):6–8.

2006 **Preservation Archaeology**. In *California Statewide Historic Preservation Plan: 2006–2010*, edited by Marie Nelson, pp. 8–15. California Department of Parks and Recreation's Office of Historic Preservation, Sacramento. Submitted to the National Park Service, Washington, D.C. On file at the California Office of Historic Preservation, Sacramento.

2007 **Dealing with Multi-element Cultural Resources under Section 106**. In *Historic Properties Are More Than Meets the Eye: Dealing with Historical Archaeological Resources under the Regulatory Context of Section 106 and CEQA*. Session presented on 25 April 2008 at the *33rd Annual California Preservation Conference* of the California Preservation Foundation in Napa, California, moderated by Michelle Messinger and Michael D. McGuirt (1 1/2 hours).

2010 **Cultural Resources and Native American Values**. In *Imperial Valley Solar Project (Formerly SES Solar Two), Supplemental Staff Assessment, Part II* (CEC-700-2010-013 SUP, August 2010), edited by Siting, Transmission and Environmental Protection Division, California Energy Commission, pp. C.3-1–C.3-409 plus appendix B (118 pp.). Siting, Transmission and Environmental Protection Division, California Energy Commission, Sacramento. On file with the California Energy Commission, Sacramento.

MCGUIRT, MICHAEL D., AMANDA BLOSSER, AND BEVERLY E. BASTIAN

2009 **Cultural Resources**. In *Final Staff Assessment, Beacon Solar Energy Project, Application for Certification (08-AFC-2), Kern County* (CEC-700-2009-005-FSA, August 2009), edited by Siting, Transmission and Environmental Protection Division, California Energy Commission, pp. 4.3-1–4.3-131. Siting, Transmission and Environmental Protection Division, California Energy Commission, Sacramento. On file with the California Energy Commission, Sacramento.

McGuirt, Michael D. and Leslie H. Hartzell

1997 **50-80-10-2139 and 50-80-10-2459**. In *Imu, Adzes, and Upland Agriculture: Inventory Survey Archaeology in North Hālawa Valley, O`ahu*, vols. 2c and 2d, edited by Department of Anthropology, Bishop Museum, pp. 1–17 and 1–5. Department of Anthropology, Bishop Museum, Honolulu. Submitted to State of Hawaii, Department of Transportation, Honolulu. On file with the State Historic Preservation Division, Honolulu.

1998 **Chapter 1: Introduction**. In *Activities and Settlement in an Upper Valley: Data Recovery and Monitoring Archaeology in North Hālawa Valley, O`ahu*, vol. 1, edited by Department of Anthropology, Bishop Museum, pp. 1–14. Department of Anthropology, Bishop Museum, Honolulu. Submitted to State of Hawaii, Department of Transportation, Honolulu. On file with the State Historic Preservation Division, Honolulu.

McGuirt, Michael D. and Shannon P. MacPherron

1998 **50-80-10-2137**. In *Activities and Settlement in an Upper Valley: Data Recovery and Monitoring Archaeology in North Hālawa Valley, O`ahu*, vol. 2b, edited by Department of Anthropology, Bishop Museum, pp. 1–86. Department of Anthropology, Bishop Museum, Honolulu. Submitted to State of Hawaii, Department of Transportation, Honolulu. On file with the State Historic Preservation Division, Honolulu.

McGuirt, Michael and Sarah C. Murray

2008 **Cultural Resources**. In *Preliminary Staff Assessment, Ivanpah Solar Electric Generating System, Application for Certification (07-AFC-5), San Bernardino County* (CEC-700-2008-013-PSA, December 2008), edited by Siting, Transmission and Environmental Protection Division, California Energy Commission, pp. 5.3-1–5.3-73. Siting, Transmission and Environmental Protection Division, California Energy Commission, Sacramento. On file with the California Energy Commission, Sacramento.

McGuirt, Michael D. and Deborah I. Olszewski

1997 **50-80-10-2256**. In *Imu, Adzes, and Upland Agriculture: Inventory Survey Archaeology in North Hālawa Valley, O`ahu*, vol. 2d, edited by Department of Anthropology, Bishop Museum, pp. 1–9. Department of Anthropology, Bishop Museum, Honolulu. Submitted to State of Hawaii, Department of Transportation, Honolulu. On file with the State Historic Preservation Division, Honolulu.

Mikesell, Stephen, Michael McGuirt, and Trish Fernandez

2008 **Introduction to the White Papers in State Historical Resources Commission Archaeology Committee White Papers**. *SCA Newsletter* 41(1):18–21.

Sharp, John, Michael D. McGuirt, Jennifer Darcangelo, and Andrea Galvin

2004 ***How to Consult with the California SHPO***. Workshop presented on 18 March 2004 at the 38th Annual Meeting of the Society for California Archaeology, Riverside, California (4 hours).

DECLARATION OF
Sarah Allred

I, Sarah Allred, declare as follows:

1. I am presently employed by the California Energy Commission in the Environmental Office of the Siting, Transmission and Environmental Protection Division as a Cultural Resources Specialist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Cultural Resources**, for the Calico Solar Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated:______________ Signed:__________________________

At: Sacramento, California

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION

For the CALICO SOLAR (Formerly SES Solar One)

Docket No. 08-AFC-13

PROOF OF SERVICE
(Revised 8/9/10)

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& Project Manager
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Adams Broadwell Joseph
& Cardozo
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Basin and Range Watch
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Kevin Emmerich
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atomictoadranch@netzero.net

*indicates change

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San Francisco, CA 94105
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Kristy Chew, Adviser to
Commissioner Byron
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Staff Counsel
cholmes@energy.state.ca.us

Steve Adams
Co-Staff Counsel
sadams@energy.state.ca.us

Christopher Meyer
Project Manager
cmeyer@energy.state.ca.us

Jennifer Jennings
Public Adviser
e-mail service preferred
publicadviser@energy.state.ca.us

*indicates change

DECLARATION OF SERVICE

I, Sabrina Savala, declare that on August 9, 2010, I served and filed copies of the attached Supplemental Staff Assessment Part II, dated July, 2010. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: [www.energy.ca.gov/sitingcases/solarone].

The documents have been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

FOR SERVICE TO ALL OTHER PARTIES:

x____ sent electronically to all email addresses on the Proof of Service list;

_____ by personal delivery;

x____ by delivering on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses NOT marked "email preferred."

AND

FOR FILING WITH THE ENERGY COMMISSION:

_____ sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (*preferred method*);

OR

_____ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 08-AFC-13
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

Original Signed by: ______________________
Sabrina Savala