SECTION 6.0

Alternatives

6.1 Introduction

The California Environmental Quality Act (CEQA) requires consideration of "a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." (14 Code of Federal Regulations [CCR] 15126.6(a)). Thus, the focus of an alternatives analysis should be on alternatives that "could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects." (14 CCR 15126.6(c)). The CEQA Guidelines further provide that "[a]mong the factors that may be used to eliminate alternatives from detailed consideration in an Environmental Impact Report (EIR) are: (i) failure to meet most of the basic project objectives, (ii) infeasibility, or (iii) inability to avoid significant environmental impacts." (14 CCR 15126.6(c)).

A range of reasonable alternatives that could feasibly attain most of the basic objectives of the Hidden Hills Solar Electric Generating System (HHSEGS) project are identified and evaluated in this section including the "No Project" alternative (that is, not developing a new solar power generation facility), alternative site locations for constructing and operating HHSEGS, alternative thermal configurations to the solar arrangement proposed for HHSEGS, and alternative power generation technologies.

6.1.1 Project Objectives

The Applicant's project objectives are also described in Section 1.0, Executive Summary. Some of the basic project objectives include the following:

- To safely and economically construct and operate a nominal 500-megawatt (MW), solar generating facility in California capable of selling competitively priced renewable energy, consistent with the procurement obligations of California's publicly owned and privately owned utilities.
- To use BrightSource's proprietary technology in another utility-scale project, further proving the technical and economic viability of the technology.
- To locate the solar generating facility in an area of high solarity.
- To reduce stormwater impacts by selecting a site with minimal slope, predominately 5 percent slope or less.
- To site the project in a timely manner by minimizing potentially significant impacts and complying with applicable laws, ordinances, regulations and standards (LORS).
- To secure site control within a reasonable timeframe, with a reasonable effort, and at a reasonable cost.

- To locate the solar generating facility on land that has been identified by local governments as suitable for renewable energy development.
- To assist California in repositioning its generation asset portfolio to use more renewable energy in conformance with state policies, including the policy objectives set forth in SB 1078 (California Renewable Portfolio Standard [RPS] Program), Assembly Bill (AB) 32 (California Global Warming Solutions Act of 2006), and SB X 1-2 recently signed by Governor Brown to codify the 33 percent RPS by 2020.
- To comply with provisions of the power sales agreement to develop a nominal 500 MW solar generating facility that can interconnect to the CAISO Balancing Authority with the potential of achieving a commercial on-line date as soon as possible, targeted for the first/second quarter of 2015.
- To provide renewable power capable of providing grid support by offering power generation that is flexible, and delivered to the grid operator through communications with a scheduling coordinator.
- To generate renewable electricity that will be qualified as meeting the RPS requirements of the California Energy Commission (CEC), California Public Utility Commission (CPUC), and the Western Renewable Energy Generation Information System (WREGIS) program for tradable renewable energy credits.

6.1.2 Alternative Site Selection Criteria

The following criteria were developed to evaluate the alternative sites' suitability for solar power tower development:

- **Site Suitability (Solarity, Size and Grade)—**Site needs to be located in an area with long hours of sunlight (low cloudiness). It needs to be approximately 5 square miles of contiguous land and, to reduce erosion potential, be relatively flat with a predominant grade of 5 percent or less.
- **Site Control—**Land has to be available for sale or use (e.g., lease, purchase or right-of-way [ROW] grant). If private land, the land owner must be willing to negotiate a long-term option agreement so that site control does not require a large capital investment until the license is obtained. If public land, the parcels must be free of competing ROW applications and the jurisdictional agency must maintain a compatible development timeframe.
- **Proximity to Infrastructure—**Site needs to be located in reasonable proximity to high voltage transmission lines or corridors with the ability to interconnect to a CAISO system, and to a gas transmission system, and to an adequate water supply.
- **Environmental Sensitivity—**Site should have few or no environmentally sensitive areas and should allow for development with less than significant impacts on cultural and environmental resources.
- **Jurisdictional Issues—**Proposed use should be consistent with the existing jurisdictional policies. It should provide opportunity for compliance with all LORS.

- **Economic Viability—**Project needs to be economically viable and competitive with other renewable technologies including wind, geothermal, and solar. The site should be located on property currently available at a reasonable cost, have reasonable proximity to infrastructure and have good solarity. Sites with excellent solarity may be able to carry higher mitigation costs or infrastructure costs.

The alternative site locations, shown in Figure 6.1-1 (figures located at the end of this section), were evaluated using the above criteria.

6.2 Site Alternatives Considered

This section describes the HHSEGS site and eight alternative locations that were considered for a 500 MW net solar project. These locations were initially chosen for analysis as alternative project sites because of their high solarity, large flat terrain, and potential for minimal biological, cultural, and visual impacts. These sites were then analyzed for their ability to satisfy most of the basic project objectives, using the screening criteria, as discussed above.

To begin, each site was selected based, in part, on its ability to allow for the construction and operation of a 500 MW solar generating facility using BrightSource's proprietary technology in utility-scale application. Each site was also selected because it is in an area of high solarity.

All of the alternative sites considered are located within Renewable Energy Land Use Designation Overlay Zones as designated in the Inyo County Solar and Wind Renewable Energy General Plan Amendment (REGPA): Centennial Flat, Panamint Valley, Chicago Valley, Tecopa, Sandy Valley, Death Valley Junction, and Trona. Accordingly, each of these sites would meet the project objective to locate the solar generating facility on land that has been identified by local governments as suitable for renewable energy development. The County's selection of these zones was based on certain factors, including proximity to electrical transmission lines and substations and having terrain suitable for renewable energy development. Taking into account input from citizens, and state and federal agencies, the County then modified the zones to address concerns regarding sensitive resources and biological constraints. The County also expanded certain zones to include disturbed lands (mining areas) and lands identified in the U.S. Bureau of Land Management's (BLM) Solar Programmatic Impact Statement (PEIS). Charleston View, also designated as a Renewable Energy Land Use Overlay, is the area of Inyo County where both HHSEGS and alternative site Calvada South are located.

The No Project alternative is also discussed.

Of the eight alternative sites considered, six locations were not carried forward for further analysis, and two locations were carried forward for full examination, as was the No Project alternative. Table 6.2-1 lists the alternatives considered.

TABLE 6.2-1
Site Alternatives Considered

Locations not Carried Forward for Further Analysis	Locations Carried Forward for Further Analysis
Centennial Flat	Calvada South
Panamint Valley	Trona
Chicago Valley	No Project Alternative
Tecopa	
Sandy Valley	
Death Valley Junction	

6.2.1 Alternative Site Locations Considered But Not Carried Forward

The following six locations were considered but not carried forward for further analysis:

- Centennial Flat
- Panamint Valley
- Chicago Valley
- Tecopa
- Sandy Valley
- Death Valley Junction

All six alternative locations meet the project objective to locate the solar generating facility on land that has been identified by local governments as suitable for renewable energy development. Each has been designated as a renewable energy overlay zone by the Inyo County General Plan. However, these six alternative sites were not carried forward for detailed analysis because they would not avoid or substantially reduce environmental impacts as compared to the HHSEGS location and/or because they fail to satisfy most of the project's basic objectives for reasons summarized in the following subsections.

6.2.1.1 Alternative Sites That Are Not Feasible

A summary of the site selection criteria and reasons for elimination from further consideration are presented below and summarized in Table 6.2-2.

6.2.1.1.1 Site Suitability (Solarity, Size and Grade)

One of the objectives is for the site to have approximately 5 square miles (3,264 acres) of relatively flat slope (predominately less than a 5 percent grade) with high solarity. All of these locations have adequate solarity. Chicago Valley, Panamint Valley, and Death Valley Junction each have adequate size and grade specifications. However, it is uncertain as to whether contiguous land of adequate size could be obtained in the Sandy Valley and Tecopa areas. Centennial Flat does not have sufficient contiguous land with predominate slope of 5 percent or less.

6.2.1.1.2 Ability to Obtain Site Control

Of the sites not selected for further review, only the Chicago Valley contains enough contiguous private land to confidently meet the project objective of securing site control within a reasonable timeframe and with a reasonable effort. However, it is unknown

TABLE 6.2-2
Comparison of Site Screening Criteria for Eliminated Sites

Location	Site Suitability	Ability to Obtain Site Control	Infrastructure			Environmental Sensitivity	Jurisdiction	Economic Viability
			Electrical	Gas	Water			
Centennial Flat	Good solarity; adequate size; **Proximity to China Lake Naval Base**	Medium Desirability	Approx. 20 – 25 mi. from nearest existing high voltage transmission line – **Non-CAISO**	**Approx. 85 mi. from nearest high capacity gas line**	Uncertain	**High Sensitivity: Mohave ground squirrel**	**Low Desirability: Potential conflict with military operations**	**Low**
Panamint Valley	Good solarity; adequate size; **Proximity to China Lake Naval Base**	Medium Desirability	Approx. 55 mi. from existing high voltage transmission line	Approx. 25 mi. from nearest high capacity gas line. Size uncertain	Uncertain	**High Sensitivity: Visual—near Death Valley NP;** Low quality tortoise habitat	**Low Desirability: Potential conflict with military operations**	Medium
Chicago Valley	Good solarity; adequate size	High Desirability	**Approx. 90 mi. from existing high voltage transmission line**	**Approx. 60 mi. to KRGT gas line**	Medium Desirability	**High Sensitivity: High quality desert tortoise habitat**	Medium Desirability: LORS compliance likely	**Low**
Tecopa	Good solarity; **Size too small; poor slope**	**Low Desirability**	**Approx. 85 mi. from existing high voltage transmission line**	**Approx. 60 mi. to KRGT gas line**	Medium Desirability; Groundwater high in minerals	Low Sensitivity: Low quality desert tortoise habitat	Medium Desirability: LORS compliance likely	**Low**
Sandy Valley	Good solarity; **Size too small**	**Low Desirability**	Approx. 50 mi. from existing high voltage transmission line	Approx. 25 mi. to KRGT gas line	Medium Desirability	Medium Sensitivity: Suitable desert tortoise habitat but land previously disturbed for agriculture	Medium Desirability: LORS compliance likely	Medium
Death Valley Junction	Good solarity; adequate size	Medium Desirability	**Approx. 100 mi. from existing high voltage transmission line**	**Approx. 70 mi. to KRGT gas line**	**Poor Desirability: Restricted by REGPA**	**High Sensitivity, Visual—near Death Valley NP;** Medium quality tortoise habitat	Medium Desirability: LORS compliance likely	**Low**

Notes: Primary factors for elimination are shown in **bold**

whether there is sufficient contiguous land available for sale in the Chicago Valley. There are no applications pending with Inyo County for renewable energy projects on private land in the Chicago Valley.

The other areas each contain parcels of private land, but these parcels are not of sufficient size to accommodate the project. For example, the entire Tecopa overlay contains only 408 acres of private land.

Sandy Valley may have a sufficient amount of private land to accommodate the HHSEGS project, but many of the private parcels located in Sandy Valley are currently being used for agricultural purposes. Even assuming that the agricultural lands might be available for sale, land consolidation and landowner cooperation is expected to be too time consuming and costly to obtain site control within a reasonable time period and certainly not in time for planned commercial operations, targeted for the first/second quarter of 2015.

6.2.1.1.3 Lack of Available Infrastructure

To be suitable for further consideration, sites need to be close to electrical transmission lines located in the California Independent System Operator (CAISO) control area that have additional capacity or can be upgraded quickly at a reasonable cost. In addition, they need access to natural gas lines and a water source.

Transmission – Generation Tie Line and CAISO Interconnection

The project needs to be able to be interconnected to CAISO transmission lines to meet the requirements of the power purchase agreement. Each location has been evaluated based on its proximity to CAISO high voltage transmission lines. However, this screening-level analysis does not consider whether there is sufficient capacity to add a 500 MW (net) project to any of these transmission lines.

A generation tie-line is necessary to interconnect with the transmission grid to deliver electricity to market. A major transmission corridor runs through the Owens Valley along the western edge of Inyo County. The two lines within this corridor are the Pacific DC Intertie and the Los Angeles Department of Water and Power (LADWP) Owens Gorge-Rinaldi line. However, these transmission lines are outside of the CAISO control area and are therefore not compatible with the project objective of CAISO interconnection. Southern California Edison Company (SCE) also operates several substations and subtransmission lines within this corridor. Centennial Flat is the only location capable of interconnecting to a CAISO-controlled line. It could interconnect at either the Control or Cottonwood substations; both are approximately 20 to 25 miles away. Although the gen-tie line associated with a project at Centennial Flat would be shorter than that of the proposed project, other constraints discussed herein eliminate Centennial Flat from consideration as a feasible project location.

The Panamint Valley location could also connect to a high voltage transmission line within this corridor. However, portions of a transmission line from Panamint Valley would transect the Naval Air Weapons Station China Lake, which would be infeasible and not result in a significant reduction of impacts as compared to the proposed project.

The Chicago Valley site is about 90 miles from a high voltage transmission interconnection point. The Tecopa area is only slightly closer, requiring about 85 miles of new transmission to be constructed. Sandy Valley would require about 50 miles of new transmission; whereas,

Death Valley Junction would require twice that distance, or 100 miles of new transmission to reach a CAISO interconnection point.

Natural Gas

Proximity to natural gas is a requirement because the proposed project requires natural gas to fuel auxiliary, startup, and nighttime preservation boilers. Sites located in Centennial Flat, Chicago Valley, Tecopa, and Death Valley Junction are all 60 miles or more from an existing high-capacity natural gas pipeline. Some of these sites are farther from a supply of natural gas than the proposed project site, and would therefore be less economically viable and would likely create more environmental impacts. The existing Kern River Gas Transmission (KRGT) pipeline is located approximately 25 miles from the Sandy Valley location. An existing gas line is also located approximately 25 miles from the Panamint Valley location; however, at no more than 12 inches in diameter, it is uncertain if this line has sufficient capacity to meet the project requirements.

Water Supply

Proximity to an adequate supply of quality water is also necessary. Individual wells supply water to the Chicago Valley, Tecopa and Sandy Valley areas. However, groundwater in Tecopa is high in mineral content necessitating the use of bottled drinking water. Death Valley Junction is served by a private water supply. The Inyo County REGPA requires that low water use technologies be employed for any development within the Death Valley Junction area. Although dry cooling, used by the project, is a low water-use technology, the project will still have some water demands and the heightened water restrictions within Death Valley Junction decrease the economic feasibility of this location. Water supply in Panamint Valley and Centennial Flat is uncertain.

6.2.1.1.4 Environmental Sensitivity

All locations, except Centennial Flat, are within the range of the desert tortoise. The presence of desert tortoise at these locations has been assessed based on the U.S. Geological Survey (USGS) habitat suitability model (Figure 6.2-1). Sandy Valley and Chicago Valley have the highest desert tortoise habitat suitability. However, in the Sandy Valley area much of the land has already been disturbed by agricultural use. Death Valley Junction has medium habitat suitability. Panamint Valley and Tecopa have low habitat suitability.

Although Centennial Flat does not contain any suitable desert tortoise habitat, the environmental sensitivity was determined to be high because it is within the range of the Mohave ground squirrel. A CNDDB record search for Centennial Flat has verified that Mohave ground squirrels have been observed in the area.

Death Valley Junction and Panamint Valley were determined to have high visual sensitivity due to their close proximity to Death Valley National Park. Visual impacts from the project could affect designated “scenic vistas” associated with the Park.

6.2.1.1.5 Jurisdictional Issues

As noted above, the proposed use should be consistent with the existing jurisdictional policies. It should also provide opportunity for compliance with all LORS. The alternatives generally provide the opportunity for compliance with applicable LORS. However, some areas are within military flight paths where tall structures are discouraged or, in certain areas, prohibited. Panamint Valley and Centennial Flat are both adjacent to the Naval Air

Weapons Station China Lake. Military aircraft regularly fly over these locations. Hence, the presence of tall solar power towers is not likely to be allowed.

6.2.1.1.6 Economic Viability

The economic viability of a project takes into account distance to existing infrastructure (natural gas and electric transmission lines), land cost (including grading costs), water cost, likely mitigation requirements, and solarity. A site with excellent solarity might be able to afford higher land cost or longer lines for interconnection, but there is little leeway because solar projects compete with wind, geothermal, and other renewable technologies in utility solicitations. The overall economic viability was considered poor for Tecopa, Death Valley Junction, Chicago Valley, and Centennial Flat due to questions about availability and the cost associated with necessary infrastructure improvements. The economic viability for Panamint Valley and Sandy Valley was considered medium because the required linear corridors were long, but not as long as the other locations.

6.2.1.2 Alternative Sites Would Not Avoid or Substantially Reduce Environmental Impacts

All six locations are in desert areas, and would require about 5 square miles of land area and linear corridors of varying lengths. While Centennial Flat would have less environmental sensitivity than the HHSEGS site with respect to desert tortoise, it is in the range of state threatened Mohave ground squirrel. Sandy Valley is also expected to be less environmentally sensitive because much of the land has been previously disturbed for agricultural purposes. However, these locations were not viable for other reasons as discussed above. The Centennial Flat and Panamint Valley locations have the additional obstacle of being close to the Naval Air Weapons Station China Lake. Death Valley Junction and Panamint Valley could have visual impacts on Death Valley National Park. The remaining locations (Chicago Valley, Tecopa, and Sandy Valley) are expected to have environmental sensitivity similar to, or greater than, the HHSEGS site and therefore do not avoid or substantially reduce the environmental impacts of the Hidden Hill site.

6.2.1.3 Alternative Sites Would Fail to Satisfy Some of the Project Objectives

The first screening criterion (Site Suitability) is related to five of the project objectives: to construct a 500-MW net solar site, use BrightSource's proprietary technology, locate it in an area of high solarity, have predominate ground slopes of 5 percent or less, and locate the site in areas identified by local government as being a suitable for renewable energy development. Although all of the locations are in areas of high solarity, sites within Tecopa and Sandy Valley are too small to meet the primary objective of developing a 500 MW project that uses BrightSource's technology. Use of its solar power tower technology requires large contiguous parcels of land. Tecopa also fails to meet the necessary slope requirements.

The second screening criterion (Site Control) addresses the project objective of securing and developing the project site in a timely manner by minimizing potentially significant impacts and complying with applicable LORS. Chicago Valley is the only location that is comprised of sufficient contiguous private land to allow for a timely and efficient development schedule.

Another project objective is to develop a project with the potential of achieving a commercial on-line date of 2015. Four project locations—Panamint Valley, Tecopa, Chicago

Valley, and Death Valley Junction—have constrained transmission capacity and system upgrades that would make it more difficult, if not impossible, for those areas to be available by 2015.

6.2.2 Alternatives Carried Forward for Further Analysis

All of the sites carried forward for further analysis are designated as areas appropriate for renewable energy development by the Inyo County REGPA: the HHSEGS site, Calvada South, and Trona.

6.2.2.1 HHSEGS Project Site

HHSEGS is located in southern California's Mojave Desert, along the California-Nevada border, 18 miles south of Pahrump, Nevada in Inyo County, California. The proposed site was selected for further consideration because it consists of vacant private land that has been partially developed as a residential subdivision. It has less than a 5 percent slope. Sufficient groundwater is available. The site has special-status plants, but contains low density populations of desert tortoise and low-quality tortoise habitat. Transmission infrastructure will need to be constructed. The distance depends on the results of the system studies. A new gas line, approximately 35.3 miles long will also be needed.

The transmission line alternatives and the gas line supporting the HHSEGS project are in Nevada and will be located primarily on federal land managed by BLM. Two distinct transmission options for the proposed project are being considered because of a unique situation concerning Valley Electric Association (VEA). Under the first option, the project would interconnect via a 230-kV transmission line to a new VEA-owned substation (Tap Substation) at the intersection of Tecopa Road and Nevada State Route (SR) 160 (the Tecopa/SR 160 Option). The other option is a 500-kV transmission line that interconnects to the electric grid at the Eldorado Substation (the Eldorado Option), in Boulder City Nevada. Both options will be considered in the NEPA analysis performed by BLM. Similarly, a new natural gas pipeline will be required and will be included in the NEPA analysis. Alternatives to these linear segments are not addressed here, but will be analyzed as part of that NEPA analysis.

6.2.2.2 Calvada South

The Calvada South site lies approximately 2 miles southeast of the HHSEGS site, south of Tecopa Road along the California-Nevada border. It has similar characteristics to the HHSEGS site in that interconnection timing would be comparable and the land has a predominate slope of 5 percent or less. However, the Calvada South site has the following disadvantages as compared to the HHSEGS site:

- It has more suitable desert tortoise habitat than the HHSEGS site based on the density of the tortoise population, vegetation, degree of disturbance, and this site's proximity to adjacent undisturbed wilderness areas to the north and south.
- It is adjacent to the Pahrump Valley Wilderness Area. The primary access into this wilderness passes close by the southwest corner of this alternative site.

6.2.2.3 Trona

Trona is located in southern Inyo County approximately 20 miles northeast of Ridgecrest and approximately 15 miles east of the Naval Air Weapons Station China Lake. Trona Wildrose Road runs north-south through the site connecting the community of Trona to the Panamint Valley. Searles Dry Lake is located approximately 5 miles south of the Trona site. Existing substations and sub-transmission lines are located approximately 12 miles south of the Trona site in the Searles Valley. However, these lines do not have enough existing transmission capacity to carry the amount of electricity that would be generated by the project. Therefore, a 40-mile transmission line would be necessary to connect to the Inyokern Substation. A Pacific Gas and Electric Company natural gas pipeline is also located 12 miles south; however, with a diameter of no greater than 12 inches, it is uncertain whether the line has sufficient capacity to meet the needs of the project. Naturally occurring water in the Searles Valley is high in salinity, but potable water is piped from the Indian Wells Valley 22 miles east. The northern portion of Trona is zoned General Industrial and Extractive. The southern portion is zoned Rural Residential.

6.2.2.4 No Project Alternative

HHSEGS will produce renewable electricity for California, thus supporting California's goals for use of renewable energy as set forth in SB 1078, SBX 1-2, and AB 32. The project will have beneficial environmental impacts compared to traditional natural-gas-fired power plants. If the No Project alternative were selected, the Applicant would not receive authorization to construct and operate a new solar power generation facility. As a result, the proposed solar facility would not be constructed.

The project site has General Plan and zoning designations that would allow for residential development. This is the No Project alternative, given that residential development could proceed on this site if the project is not approved by the CEC. Development maps have been filed and a series of streets with crushed gravel beds already have been cut into the project site. The residential street grid is prominent and easily distinguishable on satellite views of the project site. In the absence of a solar project, given this consistency with Inyo County's General Plan and zoning ordinance, it is possible that residential development would occur on the project site.

The current zoning designation of OS-40 stipulates a minimum parcel size of 40 acres, which would allow for up to 80 residences on the project site. These 80 residences associated with the No Project alternative would result in environmental impacts.

For example, under the No Project alternative, water resources would be impacted. Historically, groundwater pumping quantities for domestic uses was estimated by Nevada Division of Water Resources (NVDWR) assuming a demand of 1 ac-ft/yr/dwelling. Assuming 1 ac-ft/yr/dwelling, under a maximum build-out scenario, the annual water usage would be 80 acre-feet. In 2009, NVDWR modified the assumed demand rate reducing it to 0.5 ac-ft/year. Assuming the more conservative 0.5 ac-ft/yr/dwelling, under a maximum build-out scenario the annual water usage would be 40 acre-feet. There is a good argument that higher estimate of 1 ac-ft/yr/dwelling may be a lower than what may occur, given that these 80 residences would each be on 40-acre lots. Large lot sizes could result in more water use. As one example of greater water use associated with larger lot sizes, there is a former orchard site located on large lot on the project site just off Tecopa Road. Other

similar uses might be expected on 40-acre lots, including other agricultural uses and water use for farm and domesticated animals. Given the overall low project water usage (140 ac-ft/yr) and the potential for large water usage on 40 acre lots, the HHSEGS and the No Project alternatives appear to be comparable in terms of impacts on water resources.

Other impacts associated with the No Project residential development could occur. With respect to air quality, the project's emissions are below the levels that require best available control technology (BACT) or offsets under Great Basin Unified Air Pollution Control District regulations. Although BACT is not required, emissions from the boilers and engines will be well controlled, and modeling shows that the project will not result in any significant air quality impacts. While it is difficult to compare the two uses, it is clear that residential development would not be subject to the same rigorous air quality analyses. Public health analyses, based primarily on air quality information would also be affected. Though it is very unlikely that the effects associated with the residential development would be significant, there would be air quality impacts under the No Project alternative, nevertheless.

In terms of biological resources, residential development of the project site, like development of the project, would result in the loss of desert land and its associated habitat. Moreover, the greater number of people associated with 80 individual residences would also increase the potential for other impacts associated with human uses of the project site and the surrounding buffer lands (off-road vehicles, hunting, recreation, increased vehicle trips and other activities on and around the project site associated with residential development). It seems clear that the "edge effects" of residential development (i.e., the impacts likely to occur off the project site) would be greater with increased residential development.

Hazardous materials handling for 80 residential units would introduce a different set of materials, associated with transportation (gasoline and diesel), household hazardous wastes (e.g., herbicides, pesticides, mercury vapor bulbs), and sanitary sewer needs (leach fields or a community water treatment facility). Geologic hazards for a residential development would have similar issues as with the proposed project and would require appropriate engineering. Noise from activities associated with 80 residential units could be expected to contribute to an overall increase in ambient and background noise sources. There is a similar potential for impacts to cultural and paleontogical resources associated with residential development and the project.

In terms of socioeconomics, both the project and residential development would involve workers accessing the site, though the power plant construction period would likely be both more intense and of shorter duration (compared to a slower paced, individual residential construction process for 80 homes). It is generally considered that residential development creates greater demands on County fiscal resources than are funded by their property taxes. Therefore, the No Project alternative could result in a slight negative impact to Inyo County fiscal resources, which may not be offset by payment of taxes and fees. The increase of 80 residential units would also likely create increased demand on local schools and emergency support (sheriff and fire) services.

The soils impacts would be similar, and arguably higher with respect to stormwater runoff with residential development given greater amount of impervious surface associated with

residential dwellings and related infrastructure (roads, sidewalks, and paved pathways). While construction of the project may result in greater, temporary traffic impacts, during operations the eighty 40-acre residential units would likely generate more daily trips than the 120 full-time employees, who would arrive in two shifts, with the majority of the workers arriving off-peak during the evening hours for mirror washing.

Regarding visual resources, the No Project alternative of residential development would result in 80 new residences dispersed on the project site. While this would represent a change in the visual charter of the Charleston View/Calvada Springs area, this impact would likely be less than significant, given the small number of viewers, distances between residences, and the likely brief glimpses of the new residences from any key observation point. As for waste management, development of the site with residential units would create additional demand for solid waste services from the County and the surrounding area. Additional public services for residents such as waste management would be necessary.

In addition to the onsite impacts, the No Project alternative would also adversely affect several important public policy goals of the state related to meeting the state's objectives related to RPS, greenhouse gas (GHG) reduction, and electric system reliability. If the No Project alternative were adopted, the energy that would have been produced by the proposed facility would need to be generated by another source and possibly imported into southern California. Common available sources include older power generation facilities that operate less efficiently and release larger quantities of air pollutants and greenhouse gases than the proposed facility, and new thermal power plants.

Potential environmental impacts from the No Project alternative would result in greater natural gas consumption and air pollution because new or modernized natural-gas-fired power plants would need to be brought into operation, or electricity would need to be generated from older, less efficient plants that have high air emissions. Because solar energy is produced during periods of peak demand, much of the replacement power would be generated by less efficient, more polluting, peaking plants.

If the No Project alternative were adopted, conservation alone could not provide the benefits of the project. Currently, the State of California and all major utilities offer conservation programs and incentives for customers to conserve energy. In fact, in 2005 California was the second most energy efficient state in the union[1] and, based on 2003 data, energy consumption per capita in California was the lowest of all the states.[2] More Energy Star appliances (clothes washers, refrigerators, dishwashers, and air conditioners) are sold in California than any other state. In 2005, 17 percent of new housing met or exceeded the state's Title 24 energy efficiency building code requirements by at least 15 percent. As a result of energy conservation standards, Californians saved 4 billion kilowatt-hours in 2005.[3] Although there is always room to improve energy conservation, it will not replace the need for additional power plants given the fact that about one-third of all in-state generation is more than 40 years old and that peak electricity demand is growing

[1] http://www.fypower.org/about/faq.html

[2] http://www.energy.ca.gov/electricity/us_percapita_electricity_2003.html

[3] http://www.fypower.org/about/faq.html

at about 2.4 percent per year (or about 1,500 MW).[4] In addition, even in the unlikely event that all future load growth were met by conservation, new renewable energy plants would still be required to meet the state renewable energy goal.

Similarly, rooftop photovoltaic panels—connected at the distribution level—would not satisfy the basic project objectives of the Applicant and, significantly, would not provide the benefits associated with utility-scale renewable generation connected at the transmission system level. Distribution level technologies do not provide renewable power capable of providing grid support by offering power generation that is flexible and delivered to the grid operator through communications with a scheduling coordinator. Significantly, distribution-level alternatives qualify as counting towards the RPS requirements of the CEC, CPUC, and the WREGIS program for tradable renewable energy credits. Because they are not RPS-eligible, such distribution-level technologies fail to assist California in repositioning its generation asset portfolio to use more renewable energy in conformance with state policies, including the policy objectives set forth in Senate Bill (SB) 1078 (California RPS Program), AB 32 (California Global Warming Solutions Act of 2006), and SB X 1-2 recently signed by Governor Brown codifying the 33 percent RPS by 2020.

The No Project alternative is not feasible because it does not meet the Applicant's basic project objectives, including the development of new solar power generation facilities to assist California in meeting its goals of developing renewable power sources, reducing carbon emissions, and reducing dependence on imported power. The No Project alternative would also remove land suitable for the development of solar power generation facilities. As demand for additional renewable energy continues, renewable energy generation facilities will have to be constructed elsewhere.

6.2.3 Comparative Analysis of Sites Carried Forward for Further Analysis

In this section, the potential environmental impacts of the two alternative sites carried forward for further analysis are discussed in comparison to the proposed site. The No Project alternative is also analyzed. Potential environmental impacts from use of the proposed site are presented in more detail in the 16 environmental subsections of Section 5.0 of the Application for Certification (AFC). Table 6.2-3 summarizes the impacts of each alternative site in comparison to the proposed site.

TABLE 6.2-3
Impacts of Each Alternative Site Compared to the HHSEGS Site

Resource	HHSEGS	Calvada South	Trona
Air Quality	Less than significant	Similar	Similar
Biological Resources	Less than significant	Greater than HHSEGS. Greater density of desert tortoise and plants. Area to the immediate south is part of the Pahrump Valley Wilderness Area.	Greater than HHSEGS. Mohave Ground Squirrel Management Area and Inyo California Townee critical habitat

[4] http://www.cpuc.ca.gov/cfaqs/howhighiscaliforniaselectricitydemandandwheredoesthepowercomefrom.htm

TABLE 6.2-3
Impacts of Each Alternative Site Compared to the HHSEGS Site

Resource	HHSEGS	Calvada South	Trona
Cultural Resources	Less than significant	Similar to HHSEGS	Greater than HHSEGS. Due to potential for historic structures and proximity to dry lake
Geologic Hazards	Less than significant	Similar to HHSEGS	Similar to HHSEGS
Hazardous Material Handling	Less than significant	Similar to HHSEGS	Similar to HHSEGS
Land Use	Less than significant	Similar to HHSEGS	Similar to HHSEGS
Noise	Less than significant	Similar to HHSEGS	Less than HHSEGS
Paleontological Resources	Less than significant	Similar to HHSEGS	Greater, due to closer proximity to dry lake bed
Public Health	Less than significant	Similar to HHSEGS	Similar to HHSEGS
Socioeconomics	Provides a project benefit	Similar to HHSEGS	Similar benefits. Potentially more sales tax revenues to California.
Soils	Less than significant	Similar to HHSEGS	Similar to HHSEGS
Traffic and Transportation	Less than significant	Similar to HHSEGS	Less impacts than HHSEGS
Visual Resources	Less than significant	Similar to HHSEGS	Higher than HHSEGS
Waste Management	Less than significant	Similar to HHSEGS	Similar to HHSEGS
Water Resources	Less than significant	Similar to HHSEGS	Questionable due to greater salinity
Worker Health and Safety	Less than significant	Similar to HHSEGS	Similar to HHSEGS

6.2.3.1 Air Quality

From an air quality perspective, the plant's configuration and operation would be essentially the same at every location. The type and quantity of air emissions from the alternative sites would be very similar, if not identical. Similarly, the impacts on the human population and the environment would only differ slightly because of the remote location of the sites and the low level of combustion required to augment the project's solar capabilities. HHSEGS, Calvada South, and Trona sites have a residential community within a 5-mile distance. Local terrain is similar at all sites and not likely to change impacts. HHSEGS, Calvada South, and Trona are all within the Great Basin Unified Air Pollution Control District. Regardless of location, the project would need to demonstrate that effective emissions control technologies are employed to reduce air emissions, air quality impacts do

not cause or contribute to a violation to an ambient air quality standard, and that mitigation is provided, consistent with the applicable LORS. Potential impacts of the project on residents are discussed in Section 5.9, Public Health, and potential impacts on wildlife are discussed in Section 5.2, Biological Resources. It should be noted that annual air emissions from this 500-MW net plant are substantially lower than the annual emissions from a 500-MW (net) natural-gas-fired base load or peaking power plant.

Without this plant, it is likely that older plants that create substantially more air pollution than the proposed project would remain online or that electricity demand would be served from new gas-fired plants or other conventional resources in the west-side grid. Thus, overall, air pollutant and greenhouse gas emissions would be higher under the No Project alternative if the project is not built.

6.2.3.2 Biological Resources

The proposed and alternative sites are all within the Mojave Desert. HHSEGS and Calvada South are located within the BLM's Northern and Eastern Mojave (NEMO) Management Plan boundary, and the Trona site is located within the West Mojave Plan boundary. Both plans contain measures to manage the desert tortoise (*Gopherus agassizii*), a federal- and state-listed threatened species.

Due to their proximity to each other, HHSEGS and the Calvada South site are expected to contain similar physical conditions including topography, alluvial substrate, ephemeral drainages, creosote bush scrub plant community and wildlife. However, desert tortoise density surveys performed at HHSEGS and the Calvada South sites indicated a higher density of desert tortoise at Calvada South. A California Natural Diversity Database (CNDDB) search was performed at a 10-mile radius. These sites are located close enough to each other for the CNDDB search to show similar special-status species at both locations. However, the major differences between these two sites are the higher density of both desert tortoise and native vegetation at Calvada South. The HHSEGS site is also more disturbed than the Calvada South site because roads had been graded for the planned residential development.

Forked buckwheat (*Eriogonum bifurcatum*) has been previously documented within Calvada South. It is not listed as threatened or endangered by the state or federal government, but the California Native Plant Society (CNPS) lists forked buckwheat as a 1B.2 species, which is considered rare or endangered in California.

Trona contains some suitable tortoise habitat, according to the USGS model that rates the area as high quality habitat. However, there are no tortoise observations recorded in the CNDDB. The higher biological concern at Trona is related to its location within the Mohave Ground Squirrel Management Area. Trona is also in the vicinity of U.S. Fish and Wildlife Service-designated critical habitat for the Inyo California Towhee (*Pipilo crissalis eremophilus*). Both Mohave ground squirrel and Inyo California Towhee are recorded in the CNDDB for the area.

With the No Project alternative, the additional renewable power generation that would be required at other locations in pursuit of the policy objectives set forth in SB 1078 (California RPS Program) AB 32 (California Global Warming Solutions Act of 2006), and the recently

signed and SBX 1-2 and the resulting urgent need for renewable generation in California, would likely have biological impacts.

6.2.3.3 Cultural Resources

The proposed and alternative sites are located on alluvial fans where ground conditions are dominated by heavily disturbed braided ephemeral drainages caused by active erosion from flash flooding and other natural processes. These processes bury or obliterate evidence of archaeological sites.

The HHSEGS and Trona sites are located near dry lakes. Areas surrounding dry lakes have a higher likelihood to contain archeological artifacts. The Calvada South site is farther from a dry lake, minimizing the potential for cultural impacts.

The community of Trona is an old mining town dating back to 1862 when John Searles discovered borax and with his brother, in 1873, formed the San Bernardino Borax Mining Company (SVHS, 2011).

6.2.3.4 Geologic Hazards and Resources

The potential for seismic impacts is low, and would not be significantly different, for the HHSEGS site, Calvada South site, and Trona. The potential for seismic impacts at all locations can be addressed in plant design and compliance with applicable LORS.

6.2.3.5 Hazardous Materials Handling

The same quantity of hazardous materials would be stored and used at all locations. The risk of potential impacts is small at each location because the amount of hazardous materials required to be stored and used is much smaller than a thermal power plant of similar output and ammonia is not required for air emissions control, as at a natural-gas-fired plant. Also, because the sites are remote, the risk of impact to the public is extremely low.

6.2.3.6 Land Use

The proposed site and the Calvada South site are located in Inyo County on vacant private land that has been partially developed for a residential subdivision. Trona is also located in Inyo County, and contains both private land and land under the management of BLM. All three sites are located within areas that have been designated as Renewable Energy Land Use Overlay Zones by the Inyo County Renewable Energy General Plan Amendment. A summary of the land use designations is provided in Table 6.2-4.

TABLE 6.2-4
Land Use Status of Sites

Site Location	County Designation Zoning	BLM Designation
HHSEGS	Open Space 40 Acre Minimum Parcel Size (OS-40); Renewable Energy Overlay	N/A
Calvada South	Open Space 40 Acre Minimum Parcel Size (OS-40); Renewable Energy Overlay	N/A
Trona	General Industrial and Extractive (M-1); Rural Residential (RR); Renewable Energy Overlay	L

Multiple use is an objective of the Federal Land Policy and Management Act of 1976 and California Desert Conservation Area Risk Management Plan, which specifically envisions renewable energy development in areas with BLM designations of L and M. The Trona site has a multiple use designation of L. The proposed site and the two alternative sites are located in the Mojave Desert. Development at any of these sites will not remove Prime Farmlands or other important farmlands. The HHSEGS, Calvada South, and Trona sites are consistent with Inyo County REGPA.

6.2.3.7 Noise

The Trona site is located approximately 3.5 miles from Fellowship Christian Academy and the community of Pioneer Point. Valley Wells is a sparsely populated community that is located approximately 1 mile from the Trona site.

The HHSEGS site and the Calvada South site are both located near the commercial St. Therese Mission facility (approximately 0.5 and 1 mile, respectively). Both sites are also located less than 1 mile from existing residences. However, the project would not generate substantial operational noise (estimated at 54 dBA or less) at the nearest receptors. Given the solar nature of this project, activity at night will be limited to primarily maintenance-related activities such as mirror washing. Therefore, no potential impacts from noise are anticipated at any of the alternative locations.

6.2.3.8 Paleontological Resources

All of the alternative sites, except a portion of Calvada South, are located on alluvial fans. The Calvada South site is away from playas and dry lakes in the valley bottoms and away from the rocky outcrops of the mountainsides surrounding these intermountain valleys. Accordingly, this site avoids the lake silts and fossil springs surrounding the old Ice Age lakes in the valley bottoms, as well as the surrounding hillsides that can be composed of older fossiliferous rocks, which have the potential to include paleontological resources. Alluvium in most desert environments has low to no paleontological potential, and therefore, siting on alluvial fans assures that in most (but not all) cases, projects will have little to no potential to affect paleontological resources. Although located near a dry lake, fieldwork at the proposed HHSEGS site indicates low paleontological sensitivity. Trona is considered medium sensitivity due to its proximity to a dry lake. In general, however, significant impacts to paleontological resources are not anticipated at any of the sites.

6.2.3.9 Public Health

The proposed site and the Calvada South site are both located near the St. Therese Mission project (approximately 0.5 and 1 mile, respectively). However, the public health impacts are generally related to air quality, which is not expected to result in significant impacts. The sites appear equivalent with respect to potential impacts. The Trona site is not located within 1 mile of sensitive receptors such as schools, hospitals, churches, residential areas, or other facilities that would potentially be considered sensitive receptors for public health.

6.2.3.10 Socioeconomics

The HHSEGS site and the Calvada South site are located approximately 48 miles west of Las Vegas, Nevada. The Las Vegas and Pahrump, Nevada areas are expected to supply most of the construction and operation labor for the project.

Development of the project at the HHSEGS site and the Calvada South site would likely result in a substantial amount of materials and supplies coming from Nevada. Development of the project at Trona could result in slightly more sales taxes to California, and communities located in California, from the purchase of local materials and supplies.

Because they will not have any disproportionately high or adverse human health or environmental effects on minority and low-income populations, given their remote locations and the low potential impacts associated with solar thermal projects, there are no environmental justice issues anticipated at any of these sites.

6.2.3.11 Soils

Development of the proposed site and the two alternative sites would generally affect the same amount of land area because in all cases about 5 square miles would need to be disturbed.

6.2.3.12 Traffic and Transportation

The HHSEGS site and the Calvada South site are both easily accessible via Tecopa Road. The sites are approximately 48 miles west of Las Vegas. Regional access to these sites is provided from the west via Nevada State Route 160 (SR 160) and I-15. The primary traffic concern is the level of service at the intersection of SR 160 and Tecopa Road.

Trona is accessible from Trona Wildrose Road via California State Route 178. No traffic concerns are anticipated at the Trona site.

6.2.3.13 Visual Resources

Typically, the potential for visual resource impacts associated with a site varies depending on the relative visibility of the site from roads and residences, and the length and potential visibility of any new transmission lines that the power plant would require. Visual impacts are also a function of the surrounding facilities.

All three sites are located within areas that have been designated as Renewable Energy Land Use Overlay Zones by the Inyo County Renewable Energy General Plan Amendment. This provides a strong indicator that the County has made a policy decision that this area is one where energy development rather than landscape preservation is to be the priority.

The nearest public facility to the HHSEGS and the Calvada South site is the St. Therese Mission. This first phase of construction for this facility began in spring 2011.

The tops of the solar power towers at HHSEGS and the Calvada South site are outside the viewshed of the Death Valley National Park, but will be visible from SR 160 and the southern fringe of the town of Pahrump.

Trona sits in a small valley surrounded by a rock-walled canyon, the area may deemed to have low visual sensitivity due to the few number of residents and the fact that the town supports a large mineral mining operation. However, visual sensitivity was considered to be high because there are unusual geological features called the Trona Pinnacles, which consists of more than 500 tufa spires (up to 140 feet tall) of porous rock formed as a deposit from springs or streams. The Trona Pinnacle have been used as a backdrop for several sci-fi movies and television series (Kelly, 2006).

6.2.3.14 Waste Management

The same quantity of waste would be generated at the proposed site as at the alternative sites. Given available landfill capacities, the quantity of waste generated from any of the alternative sites would not be significant. The environmental impact of waste disposal would not differ significantly between the alternative sites.

6.2.3.15 Water Resources

Potable and industrial water for the plant at any site would consist solely of groundwater. All sites are outside of adjudicated basins. HHSEGS and the Calvada South site would have similar impacts with regard to water use. Water for the Trona site is more troublesome. The naturally occurring water supply near the Trona site is very high in salinity and minerals. Potable water is piped to the Trona community from Indian Wells Valley 22 miles to the east.

6.2.3.16 Worker Health and Safety

Potential impacts on worker health and safety are activity-specific rather than site-specific. Regardless of the location, the Applicant will prepare appropriate health and safety plans to protect workers and reduce the potential for injuries. Therefore, the worker health and safety impacts from all of the alternative sites are equivalent to the proposed site.

6.2.3.17 Transmission

The Calvada South site would require new transmission lines similar in length to those required for the proposed project. Trona would require about 40 miles of new transmission line to tie into an existing line to the southwest. It has not been determined whether the line has sufficient capacity.

In the eastern Mojave Desert in California, there are three transmission corridors. The northern transmission lines of SCE and LADWP run north of Interstate 15 (I-15). The middle corridor of SCE lines running from the Pisgah substation near Interstate 40 (I-40) to southern Nevada. The southern corridor runs north of I-40. However, the availability of existing network transmission capacity in these lines to accommodate additional generation is expected to be limited[5] without major upgrades.

6.2.3.18 Natural Gas

The proposed site would require about 35 miles of new gas line to connect to the KRGT pipeline. The Calvada South site would require a mile or two more than HHSEGS to connect to the KRGT pipeline. Depending on the capacity of the existing gas lines, the Trona area would require between 12 to 40 miles of new gas line.

[5] See CTPG Phase 3 Report (http://www.ctpg.us/public/images/stories/downloads/2010-09-10_final_phase3_study_report_final112910.pdf), Appendix B, and SCE Transmission Ranking Cost Report, dated January 20, 2010 (http://asset.sce.com/Documents/Shared/2011_SCERFPSCE_s_TransmissionRankingCostReport.pdf), Table 1-1.

6.3 Selection of the Proposed Site

Table 6.3-1 compares the potential environmental effects of the HHSEGS site with the other alternatives. As shown in the table, no alternative site would feasibly attain most of the basic objectives of the project, avoid any potentially significant effects of the project and also avoid significant effects of its own.

TABLE 6.3-1
Comparison of the HHSEGS Site and Alternative Site Locations Against Screening Criteria

Characteristic	HHSEGS Project Site	Calvada South	Trona
Size of parcel (parcel must be about 5 sq. miles or larger)	Greater than 5 square miles	Greater than 5 square miles	Unknown, but has potential
Parcel grade should be 5% or less.	≤5%	≤5%	≤5%
Jurisdictional Issues	Capable of satisfying applicable LORS	Capable of satisfying applicable LORS	Capable of satisfying applicable LORS
Potential presence of threatened and endangered species/habitat	Medium/high. Desert tortoise; rare plants	Medium/high. Desert tortoise; rare plants	High. Mohave Ground Squirrel; Inyo California Towhee, and tortoise habitat
Potential cultural/ archaeological sensitivity	Medium due to proximity to dry lake	Low due to greater distance from dry lake	Medium due to proximity to dry lake
Appropriate zoning/ Federal Plan Designation	Yes/Renewable Energy General Plan Overlay	Yes/Renewable Energy General Plan Overlay	Yes/Federal Land BLM Designation L; Renewable Energy General Plan Overlay
Proximity to sensitive noise receptors	Yes	Yes	Yes
Risk to humans from deposition of air pollutants	No	No	No
Removal of prime agricultural land	No	No	No
Traffic and transportation	Low concern	Low concern	Low concern
Potential visual sensitivity	Medium	Medium	High
Ability to use water consistent with State Water Resources Control Board policy	Only source is groundwater. Usage is very low.	Only source is groundwater. Usage is very low.	Groundwater is poor quality--high salinity and minerals. Potable water supplied via pipeline.
Potential paleontological sensitivity	Presumed medium; however, analysis indicates low sensitivity	Low due to proximity to dry lake	Medium due to proximity to Searles Dry Lake

TABLE 6.3-1
Comparison of the HHSEGS Site and Alternative Site Locations Against Screening Criteria

Characteristic	HHSEGS Project Site	Calvada South	Trona
Existing gas supply	A new ~35 mile natural gas line to interconnect Kern River Gas Transmission Line	A new ~36 mile natural gas line to interconnect Kern River Gas Transmission Line	~12 - 40 miles south/southwest, depending on capacity
Existing transmission	~39-67 miles to the northeast to proposed substation and existing transmission corridor; would have to cross SR 160	~45-65 miles to the northeast to proposed substation and existing transmission corridor; would have to cross SR 160	~40 mile to the southwest for robust transmission

The HHSEGS site and the alternative sites have similar environmental profiles, given that they all have similar environmental settings; however, HHSEGS avoids some of the potential issues that the other sites have.

The HHSEGS site and the Calvada South site are similar. The major disadvantage of the Calvada South site is that it has greater desert tortoise densities and the greater potential to impact sensitive plant species.

The No Project alternative would not meet the basic project objectives and would not provide the benefits of the project. Additionally, the No Project alternative would have other major environmental impacts due to both the residential development that could occur on the site and due to the lack of large scale solar projects will make it difficult, if not impossible, for California to meet its RPS, GHG, and electric system reliability goals while reducing fossil fuel based energy sources. Of the alternatives considered that are potentially capable of meeting the basic project objectives, the HHSEGS site, incorporating the mitigation measures proposed in this AFC, would be expected to result in the least short-term and long-term environmental effects, all of which are less than significant.

6.4 Linear Corridors

The CEC has exclusive permitting jurisdiction for the siting of thermal power plants of 50 MW or more and related facilities in California. The CEC also has responsibility for ensuring compliance with CEQA through the administration of the CEC's certified regulatory program. The project site is located within California. As such, the CEC has CEQA jurisdiction over the direct, indirect, and cumulative impacts for activities on the HHSEGS project site.

The CEC has no permitting or CEQA jurisdiction over activities or portions of projects occurring in Nevada. Public Resources Code section 21080 provides that CEQA does not apply to any project or portion thereof located in another state that will be subject to environmental impact review pursuant to NEPA or a comparable state law. (See also CEQA Guidelines section 15277).

Linear facilities required for the HHSEGS project include an electric transmission line and a natural gas supply line (see Figure 1.2-3). The proposed linear facilities will be analyzed in a NEPA document that will be prepared by BLM for the project linear facilities located in Nevada. A detailed description of the linear corridors and alternatives will be provided in the NEPA document.

6.5 Alternative Project Configurations

The proposed 500-MW net project configuration of HHSEGS is the result of considering a variety of design and operating limitations. The main factors affecting the configuration include available land area, height of the solar power tower, water supply, transmission capacity, and demand for renewable energy. Smaller-sized projects were also considered but were rejected as being uneconomical.

The proposed project configuration includes five auxiliary gas-fired boilers for each plant. While the elimination of these boilers was considered due to the reduction in air emissions and cost, they have been included to enhance the operation and economics of the project.

Each plant includes three auxiliary (supplemental) boilers that will be used for augmenting the solar operation when solar energy diminishes or during transient cloudy conditions. Auxiliary boilers may also be used to extend the daily power generation when the solar boiler is inactive. These boilers will be used primarily during the summer in the late afternoon and early evening when electrical energy usage peaks. However, their use will be restricted by the solar plant's renewable energy source designation and air emissions limitations discussed in Section 5.1, Air Quality.

Each solar plant also includes a start-up boiler that will be used during the morning start-up cycle to assist the plant in coming up to operating temperature more quickly. Each plant includes a night preservation boiler that will be used to provide steam to the gland systems of the steam turbine and boiler feedwater pump turbine to prevent air ingress overnight and during other shutdown periods when steam is not available from the solar boiler. This boiler will also provide pegging steam to the deaerator during these shutdowns. Both of these boilers are used to expedite the startup of the plant. This will allow the plant to ramp up early and fully use the solar flux.

In addition to the proposed 500 MW (net) HHSEGS, the Applicant considered the development of a smaller plant such as a 100 or 200 MW plant. Generally, a smaller plant would have proportionately smaller impacts. For example, a 100 MW or 200 MW plant would still have air emissions at the selected site, but they would be proportionately less than the 500 MW plant. However, a smaller plant would also forgo the benefits of the additional generation, resulting in more air emissions, including criteria pollutants and GHGs, from gas-fired plants that would have to run to serve load. A smaller plant would require less land area (about 600 acres for each 100 MWs) resulting in fewer biological impacts. However, the BrightSource proprietary solar power tower technology for the HHSEGS project design incorporates an important technology advancement, the 750-foot-tall solar power tower. One principle advantage of the HHSEGS solar power tower design is that it results in more efficient land use and greater power generation. The new, higher, 750-foot solar power tower allows the heliostat rows to be placed closer together, with the

mirrors at a steeper angle. This substantially reduces mirror shading and allows more heliostats to be placed per acre, with a net result that more megawatts can be generated per acre and a corresponding increase in efficiency.

The site does not appear to be culturally or paleontologically sensitive, yet a smaller site would have less risk of having cultural or paleontological impacts. The potential for soil erosion would be proportionately less at a smaller site as would traffic impacts because the work force would be smaller and of shorter duration. Waste products would be proportionately less with a smaller site as would water consumption. Worker safety may be slightly lower with a smaller plant because there would be fewer workers and the construction duration would be shorter.

Other impacts would remain roughly the same. Geological impacts are not correlated with the size of the site. Hazardous materials would be needed at small or large sites and while the quantities may be proportional, the risks would be about the same regardless of the size of the site. Land use compatibility impacts would be consistent regardless of the site. Public health impacts would be proportionately less at a smaller site, but they are not significant at the larger site. Visual impacts would be less with a smaller project, but any project, regardless of site, would change the visual character of the area and the difference would not be significant as a result of the size of the plant.

There are no socioeconomic impacts at the larger site and, so, there would not be any with the development of a smaller site; but the benefits (property tax revenues, employment, etc.) would be proportionally less.

Even if the impacts are proportionally higher, the impacts from the 500 MW (net) HHSEGS will be mitigated below the level of significance. The smaller project would not feasibly accomplish most of the basic objectives of the project and would not avoid or substantially lessen one or more of the significant effects. Furthermore, a smaller plant may result in an inefficient use of the land by failing to fully realize the solar potential of the area. California's goals for increased use of renewable power and reduction of carbon sources would not be as well served, including the policy objectives set forth in SB 1078 (California PRS Program); AB 32 (California Global Warming Solutions Act of 2006), and the recently signed and SBX 1-2.

6.6 Water Supply Alternatives

A search was conducted to identify possible alternative sources of water for HHSEGS. This search included inquiries of water and wastewater treatment and distribution facilities in the area. Onsite groundwater was selected based on a variety of factors including reliability of source, availability, practicality, regulatory acceptability, environmental impacts, total groundwater demand, and cost.

The only alternative water supply source that had potential for consideration for the project was use of treated wastewater from the town of Pahrump. However, Desert Utilities has stated that it cannot sell reclaimed water outside its jurisdiction (Dustin, 201) and the project is located in California, outside its jurisdiction.

6.7 Alternative Technologies

BrightSource was founded to commercialize a cost-effective solar energy technology. A project goal is to produce solar energy using BrightSource's proprietary Solar Power Tower (SPT) technology. In developing its proprietary technology, BrightSource evaluated other solar technologies including central power tower, solar trough, and photovoltaic. These alternative technologies are not as cost-effective as the SPT technology.

Other generation technologies considered for HHSEGS are grouped according to the fuel used:

- Solar
- Oil and natural gas
- Coal
- Nuclear
- Hydroelectric
- Biomass
- Wind

Alternative technologies were evaluated with respect to commercial availability, implementability, and cost-effectiveness.

6.7.1 Solar

The HHSEGS project will use concentrating solar thermal technology. Other designs considered for the HHSEGS included parabolic trough and photovoltaic solar technologies. These technologies are used in similar projects in California. Selection of concentrating solar thermal technology was made based primarily on the following criteria: minimization of water use, production of renewable energy, efficiency of operation and relatively low cost of power.

6.7.1.1 Central Tower with Integral Thermal Storage

One variation of the solar power tower is where the project has integral thermal storage. Those projects use concentrating solar thermal technology with integral thermal storage that includes a central receiver tower, a tracking heliostat field, separate hot and cold salt storage tanks, and a conventional steam turbine synchronous generator (Rankine cycle), which is used to generate electricity.

In these systems, sunlight is concentrated and directed from a large field of heliostats to a central receiver tower. A liquid salt heat transfer medium is pumped from the cold salt thermal storage tank through the tower to the receiver where it is heated to 1,050ºF. Hot salt is then collected in the hot salt tank, from which it is pumped through a steam generation system to create superheated steam. Cooled liquid salt exits the steam generation system at 550ºF and is returned to the cold salt storage tank for further solar heating.

This technology offers some additional stability and flexibility of generator operation inherent with liquid salt solar systems, similar to those associated with supplemental natural gas firing. Because this technology uses liquid salt, a medium that can be heated to a very high temperature (approximately 1,050°F), the steam cycle is efficient. Because the

liquid salt can be stored with very little heat loss, this system allows power to be generated on demand, day or night, and regardless of short-term weather fluctuations.

This technology is, however, only currently available at a much higher cost. Additional deterrents to this technology include an increase in plant footprint for the thermal storage tanks, the risks of having the fluid become solid due to a prolonged period of cloud cover or a power outage and the amount of gas-fired energy and its associated emissions initially required to melt the salt and bring it to minimum operating temperature. In addition there are other risks associated with the super-heated fluid. Fire can result from broken fluid transfer systems. The fluids tend to be hazardous materials, requiring greater care in handling and disposal, and hazardous materials spillages can result from leaking fluids. Moreover, the fluids themselves can become solid in the event of a power outage, reducing reliability.

6.7.1.2 Parabolic Trough

A parabolic trough system converts solar radiation into electricity indirectly by using sunlight to first heat a thermal fluid, typically synthetic oil, which is then used to generate steam that is used to power a turbine-generator to produce electricity. Parabolic trough CSP plants consist of horizontal, trough-shaped solar collectors arranged in parallel rows, normally aligned on a north-south horizontal axis. Each parabolic trough collector has a linear parabolic-shaped reflector that focuses the sun's direct beam radiation on a linear receiver tube, also referred to as a heat collection element, located at the focus of the parabola. The trough rotates east to west in order to track the sun throughout the day, heating the fluid circulating within the collector element. The hot thermal fluid is collected in a tank and then pumped through a steam generation system to power the turbine-generator. This system also requires that the solar field be devoid of vegetation and have less than a 1 percent slope.

Parabolic trough technology was not selected because of its lower efficiency and greater vegetative impacts from having to grade the solar field, and higher stormwater impacts from having to re-route stormwater around the site. There are also worker safety, fire protection, and environmental hazards associated with the thermal fluid.

6.7.1.3 Solar Photovoltaic

Solar photovoltaic (PV) power plants typically include modules of PV panels that absorb solar radiation and convert it into direct current (DC) electricity. This DC power is then converted into alternating current (AC) electricity for delivery to the electric grid system. In general, PV panels are currently installed in one of two ways. Fixed, stationary panels are a simple and very common PV application. Larger, more complex installations employ "tracking" devices that tilt the panels toward the sun for maximum efficiency. PV trackers use either single-axis (east-west) or dual-axis (east-west and north-south) axes in order to maximize the panels' absorption of sunlight during the day and throughout the year.

Solar PV technology is an electrical process using silicon-based semiconductors to convert sunlight (e.g., photons) directly into DC electricity flow. Multiple PV panels are wired together to increase the total system output. DC current flows through a device called an "inverter," which generates an alternating current that can be tied to the power distribution system for power delivery. PV technology does not involve thermal energy or the

production of steam to drive turbines. In addition, a PV system is relatively simple to operate and maintain, using modest amounts of water to keep the panels clean. In addition, due to strict dependence on solar irradiance to generate electron flow, PV systems produce highly intermittent electricity under routine conditions of haze and cloud cover. PV panel output can fluctuate by the minute with normal variations in the intensity of solar irradiance. To compensate for normal, minute-by-minute variability in output, PV installations require additional electrical equipment to avoid grid instability, including batteries.

PV technology was not selected because of its inherent technical limitations, chiefly, intermittency, which at the desired scale poses significant challenges to grid system stability.

6.7.2 Oil; Natural Gas; Coal; Conventional and Supercritical Boiler/Steam Turbine, or Simple Combustion Turbine

These technologies are commercially available and could be implemented. However, because of relatively low efficiency, they emit a greater quantity of air pollutants per kilowatt-hour generated than the solar thermal power technology proposed for the project. Use of these fuel sources does not meet the project objective of being a renewable power source; nor does it meet the objective of using SPT technology; therefore, they were eliminated from consideration.

6.7.3 Nuclear

California law prohibits new nuclear plants until the scientific and engineering feasibility of disposal of high-level radioactive waste has been demonstrated. To date, the CEC is unable to make the findings of disposal feasibility required by law for this alternative to be viable in California. The technology, therefore, is not implementable.

6.7.4 Hydroelectric

Most of the sites for hydroelectric facilities have already been developed in California and any remaining potential sites face lengthy environmental licensing periods. It is doubtful that this technology could be implemented within 3 to 5 years. Use of this fuel source meets the project objective of being a renewable power source; however, it does not meet the objective of using BrightSource's solar power tower technology. Therefore, it was eliminated from consideration.

6.7.5 Geothermal

Geothermal development is not viable in the Mojave Desert because suitable thermal vents and strata are not present. Therefore, it was eliminated from consideration.

6.7.6 Biomass

Major biomass fuels include forestry and mill wastes, agricultural field crop and food processing waste, and construction and urban wood wastes. Because sufficient biomass fuel is not available in the Mojave Desert, this technology was eliminated from consideration.

6.7.7 Wind Generation

In California, the average wind generation capacity factor has been 25 to 30 percent. Use of this fuel source meets the project objective of being a renewable power source; however, it does not meet the objective of satisfying the load requirements because it is intermittent nature. In addition, the HHSEGS site is not suitable for development of wind generation because wind technology requires certain parameters be met, and the site does not meet the requirement to have wind speeds of at least 5 meters per second. Therefore, wind generation was eliminated from consideration.

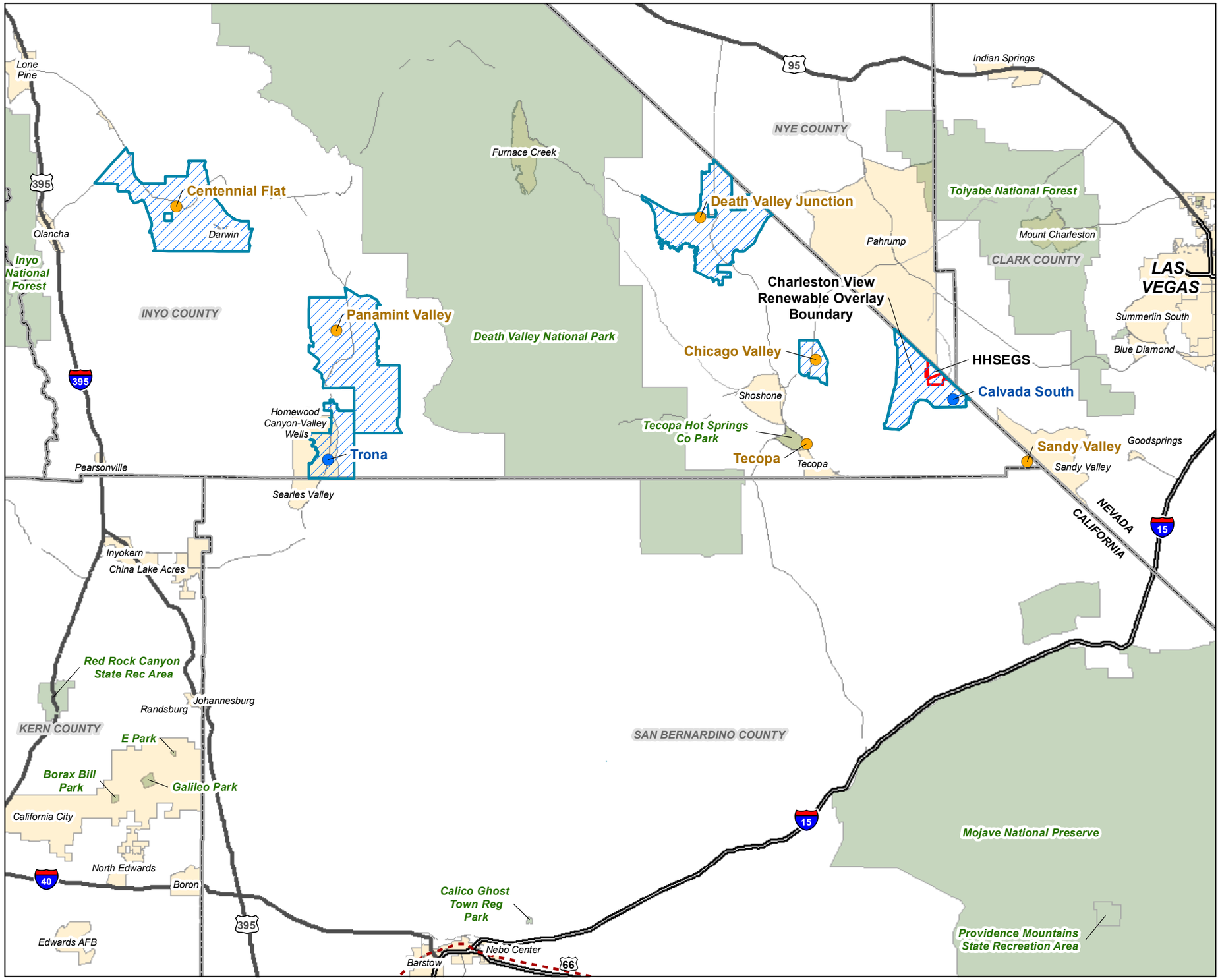
6.8 References

California Energy Commission. 1995. 1*994 Biennial Electricity Report* (ER94), P300-95-002. November.

Dustin, Carol/Office Manager, Desert Utilities, Inc. 2011. Personal communication with Fatuma Yusuf/CH2M HILL. June 9.

Kelly, David. 2006. Stark Beauty, Solitude, Squalor and Sulfur -- Trona Has It All, *The Los Angeles Times.* October. Accessed July 30, 2011.

Searles Valley Historical Society (SVHS). 2011. Trona on the Web: Points of Interest. Updated on March 3. On the web at: http://www.trona-ca.com/historical.htm Accessed on July 30, 2011.



LEGEND

Alternative Site Locations

- Locations Carried Forward for Further Analysis
- Locations not Carried Forward for Further Analysis
- HHSEGS Boundary
- REGPA Boundary
- County Boundary
- Parks (Regional)
- Urban Areas

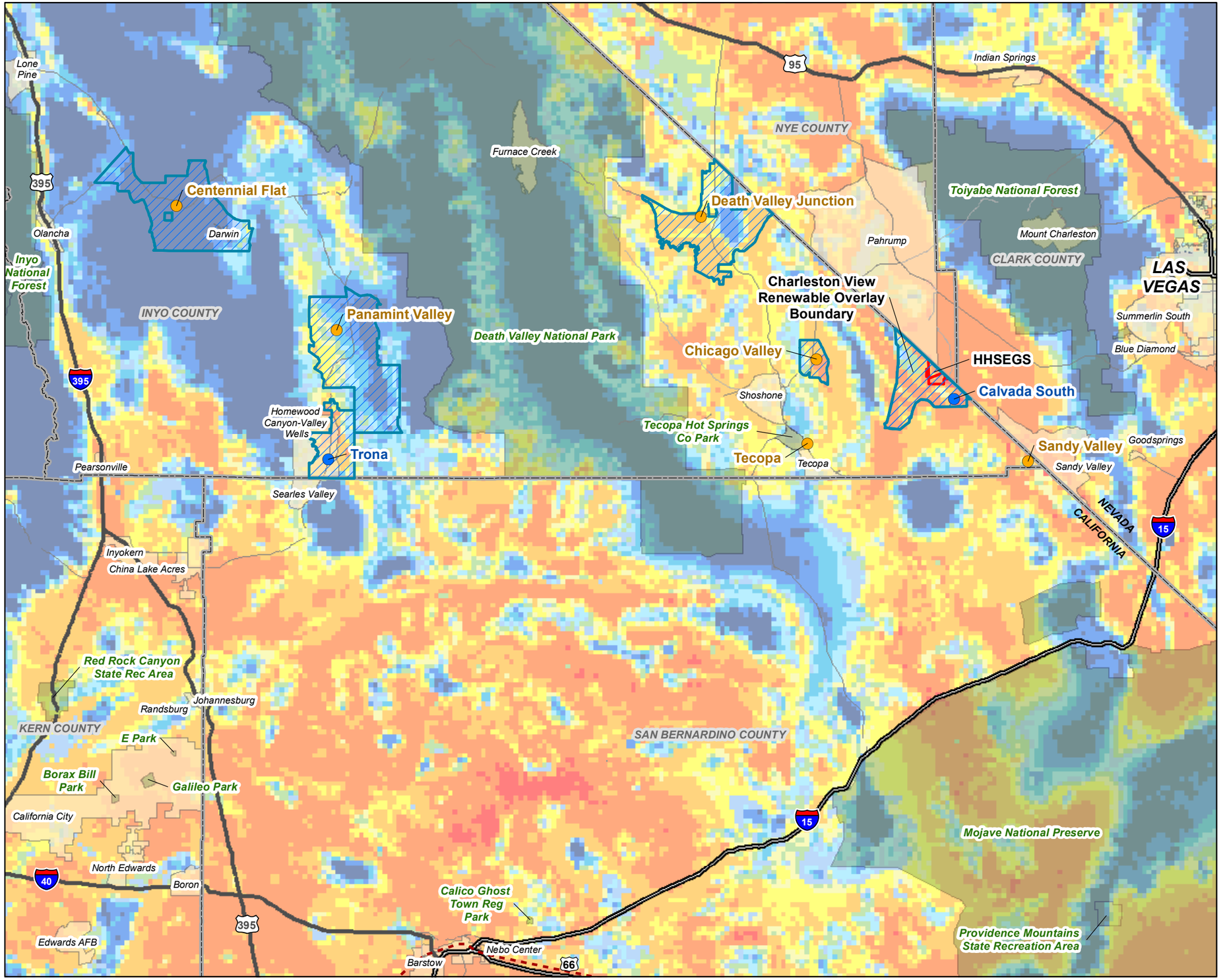
N

0 7 14
Miles

Figure 6.1-1
Alternative Projects Map
Hidden Hills Solar Electric Generating System

SAC \\ZION\SACGIS\PROJ\SOLARPROJECTS\HIDDENHILLS\MAPFILES\2011_HIDDENHILLS\AFC_MAPS\ALTERNATIVES\HIDDENHILLS_ALTERNATIVEPROJECTSMAP.MXD SSCOPES 7/25/2011 12:39:16 PM

CH2MHILL



VICINITY MAP

LEGEND

Alternative Site Locations

- Locations Carried Forward for Further Analysis
- Locations not Carried Forward for Further Analysis
- HHSEGS Boundary
- REGPA Boundary
- County Boundary
- Parks (Regional)
- Urban Areas

Tortoise Habitat Potential

- 0
- 0.1
- 0.2
- 0.3
- 0.4
- 0.5
- 0.6
- 0.7
- 0.8
- 0.9
- 1

N

0 7 14
Miles

Figure 6.2-1
USGS Tortoise Habitat Model
Hidden Hills Solar Electric Generating System

CH2MHILL

SAC \\ZION\SACGIS\PROJ\SOLARPROJECTS\HIDDENHILLS\MAPFILES\2011_HIDDENHILLS\AFC_MAPS\ALTERNATIVES\HIDDENHILLS_ALTERNATIVEPROJECTSMAP_TORTOISE.MXD SSCOPES 7/25/2011 12:48:19 PM