

## 4.0 Project Alternatives

### 4.1 Introduction

Alternatives to the Palen Solar Power Project (PSPP or Project) as proposed are presented in this section. Alternatives include the “No Action” (also called “No Project”) alternative, alternative Project sites, an alternative site layout, a smaller plant alternative, freeze protection and auxiliary boiler heating alternatives, alternative water sources, and alternative power generation technologies.

This section summarizes the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) requirements with respect to alternatives evaluations and discusses the methodology used to identify and screen alternatives project objectives, and site screening criteria; the alternatives considered, including the “No Project” alternative; alternative sites, including the reasons for selection of the proposed site; site layout alternatives; a smaller plant alternative; boiler heating and freeze protection heating alternatives; water supply alternatives; and alternative power generation technologies.

As this Section makes clear, many of the alternatives to the Project would not meet the Project’s basic objectives or the necessary screening criteria, and/or would not lessen the Project’s potential environmental effects. In each instance in which an alternative would achieve the Project objectives and lessen potential effects, the Project has been modified to adopt that alternative.

#### Summary

Alternatives evaluated include the “No Action” (also called “No Project”) alternative, alternative Project sites, an alternative site layout, a smaller plant alternative, freeze protection and auxiliary boiler heating alternatives, alternative water sources, and alternative power generation technologies. “No Project” would not meet Project objectives: the selected site was the most suitable among the various sites considered based on economic, technical, environmental, transmission access, and other criteria. A smaller facility would not meet Project objectives and would not offer economies of scale. With natural gas service difficult to arrange in the remote Project location, none of the other boiler fuel alternatives were economically preferable to the selected propane option. Even with dry cooling, the Project requires water, and there are no feasible alternatives to site groundwater. Other renewable technology alternatives were rejected because one of the Applicants (Solar Millennium) is an industry leader in parabolic trough technology

#### 4.1.1 CEQA Requirements

CEQA requires the lead agency to consider “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” (Title 14 Code of Regulations [CCR] Section 15126.6(a)). The CEQA Guidelines (Title 14 CCR Section 15126.6(c)) further provide that “among the factors that may be used to eliminate alternatives from detailed consideration in an Environmental Impact Report” are:

- Failure to meet most of the basic project objectives,
- Infeasibility, or
- Inability to avoid significant environmental impacts.

### 4.1.2 NEPA Requirements

Like CEQA, NEPA requires the identification and analysis of a reasonable range of alternatives. NEPA's requirements for an alternatives analysis are found in NEPA Section 4332, 42 United States Code 4332(2)(C)(iii), and in Section 1502.14 of the White House Council on Environmental Quality (CEQ) NEPA Regulations (Title 40 Code of Federal Regulations [CFR] 1500-1508). Section 1502.14(a) requires Federal agencies to explore a reasonable range of alternatives, "and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." CEQ Guidance concerning the NEPA regulations adds that reasonable alternatives include those that are "[p]ractical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant" (CEQ NEPA's 40 Most Asked Questions, Answer to Question #2). In short, NEPA requires an Environmental Impact Statement (EIS) to thoroughly explore and evaluate all reasonable alternatives that meet the purpose and need of the proposed action, including those that are not within the jurisdiction of the acting agency. NEPA also requires an explanation of the reasons that an alternative has been eliminated from detailed study.

The Federal Land Policy and Management Act (FLPMA) Section 1765 informs the Bureau of Land Management's (BLM's) NEPA review of the alternatives it must consider in an EIS. Per FLPMA Section 1765, the BLM must, when it grants a right-of-way (ROW), "minimize damage to scenic and esthetic values and fish and wildlife habitat and otherwise protect the environment;" "require compliance with State standards for public health and safety, environmental protection, and siting, construction, operation and maintenance of [ROWs];" and "require location of the [ROW] along a route that will cause least damage to the environment, taking into consideration feasibility and other factors."

The California Energy Commission (CEC) will be the lead state agency for CEQA compliance for the Project. The BLM will be the Project's Federal agency for NEPA compliance. The CEC and BLM are conducting a joint review of the PSPP and will issue a combined CEQA/NEPA document (Draft Staff Assessment/Draft Environmental Impact Statement). The following alternatives discussion is intended to support the combined CEQA/NEPA document.

## 4.2 Alternatives Screening Methodology

A range of potential alternatives to the proposed Project that could reasonably attain most of the basic objectives are identified and evaluated in this section. Alternatives include the "No Action" (also called "No Project") alternative, alternative project sites, an alternative site layout, a smaller plant alternative, freeze protection and auxiliary boiler heating alternatives, alternative water sources, and alternative power generation technologies.

Alternative solar technologies were not considered because the use of an alternative solar technology would not avoid or substantially reduce environmental impacts compared to the implementation of the Project as proposed. In addition, Solar Millennium, a Project Applicant, is a leader in parabolic trough technology and has demonstrated expertise in this technology; hence, as the Applicant, an alternative solar technology would not meet one of the Project's basic objectives -- to use solar troughs. Alternative transmission line routes were not considered because the final location of the Southern California Edison (SCE) substation interconnect has not yet been finalized.

While the following screening methodology is presented in terms of alternative project locations (sites), the same process essentially applies to alternative site layouts, technologies, water sources, etc. In accordance with Title 14 CCR Section 15126.6 (c), and consistent with Title 40 CFR Section 1502.14, alternatives were not carried forward for further analysis if:

- 1) The alternative would not meet most of the basic Project objectives,

- 2) The alternative would not avoid or substantially lessen significant environmental impacts of the proposed Project, or
- 3) The alternative was not “feasible.” Per Title 14 CCR Section 15126.6(f)(1), the factors that should be taken into account in determining whether an alternative is feasible are:
  - a) Site suitability,
  - b) Economic viability,
  - c) Availability of infrastructure,
  - d) Land use/land use plan consistency or regulatory/jurisdictional limitations, and
  - e) Site control.

In order to implement this screening process for selecting the Project site, the Applicants needed to:

- Define the Project objectives, purpose, and need
- Identify the potentially significant environmental impacts associated with the proposed Project, and
- Further define the feasibility criteria.

Project objectives, purpose, and need; potentially significant environmental impacts; and feasibility criteria are presented below.

#### **4.2.1 Project Objectives, Purpose and Need**

The Project’s objectives, purpose, and need are restated below from Section 2.2.1, Project Description. They are included because they guided the Project’s alternatives evaluation process as one of the important parts of the overall Project development process.

##### **4.2.1.1 Project Objectives and Purpose**

The specific objectives and purpose of the Project are:

- To develop a utility-scale solar energy project utilizing parabolic trough technology.
- To construct and operate an environmentally friendly, economically sound, and operationally reliable solar power generation facility that would contribute approximately 1,000,000 megawatt hours (MWh) of clean, renewable solar energy per year to the State of California’s renewable energy goals.
- To locate the project in an area with high solar insolation (i.e., high intensity of solar energy).
- To interconnect directly to the California Independent System Operator (CAISO) grid through the SCE electrical transmission system while minimizing additions to electrical infrastructure (e.g., avoiding lengthy new transmission lines).
- Commence construction in 2010 to qualify for the American Recovery and Reinvestment Act (ARRA) of 2009’s Renewable Energy Grant Program

##### **4.2.1.2 Project Need**

The Federal government and the State of California have clearly established the need for the nation and State to increase the development and use of renewable energy in order to enhance the nation’s energy independence, meet environmental goals, and create new economic and employment growth opportunities. The Project will help meet these societal needs.

More specifically, the Project will further the development of renewable energy and thereby:

- Assist California in meeting its Renewable Portfolio Standard (RPS) goals of 20 percent of retail electric power sales by 2010 under existing law (Senate Bill 1078 – Chapter 516, Statutes of 2002) and 33 percent of electrical power retail sales by 2020 under pending legislation.
- Support U.S. Secretary of the Interior Salazar's Order 3283 and 3285 making the production, development, and delivery of renewable energy top priorities for the United States.
- Support Governor Schwarzenegger's Executive Order S-14-08 to streamline California's renewable energy project approval process and to increase the State's Renewable Energy Standard to 33 percent renewable power by 2020.
- Sustain and stimulate the economy of Southern California by helping to ensure an adequate supply of renewable electrical energy, while creating additional construction and operations employment and increased expenditures in many local businesses.
- Generate electricity without significant emissions of greenhouse gases, thereby meeting the statewide reduction goals of Assembly Bill (AB) 32.

Two integral goals of the ARRA of 2009's Renewable Energy Grant Program, for which the Project hopes to qualify, are to enhance America's energy independence and create near-term employment opportunities for Americans. The PSPP clearly and unambiguously will help meet these vital societal needs.

#### **4.2.2 Alternative Site Selection Criteria**

In a report titled "California Solar Resources," the CEC provided estimates of the solar resources located within California and potentially available for use in meeting the RPS and the California Power Authority's approved Energy Action Plan goals. The CEC provided estimates based on the "gross" potential (i.e., the potential unconstrained by technical, economic or environmental requirements) and the "technical" potential (i.e., unconstrained by economic or environmental requirements). Using National Renewable Energy Laboratory (NREL) direct beam insolation values on a grid size of 10 kilometers (6.2 miles) by 10 kilometers with NREL's Climatological Radiation Model, the CEC identified areas suitable for concentrating solar power (CSP) systems in California. The CEC analysis shows that the best locations for CSP facilities generally tend to be in the southeastern portion of the State. For example, using the criteria selected by the CEC, the total "technical" potential area within Riverside County (where the proposed Project site is located), is approximately 419,267 acres.

The Applicant conducted a similar analysis using NREL data, first analyzing base maps of solar energy values and then applying exclusion criteria to identify study areas for further analysis. The following exclusion criteria were applied:

- 1) Solar resource: The site must receive insolation of no less than 7.0 kilowatt-hours per square meter per day (kWh/m<sup>2</sup>/day).
- 2) Site size, shape, grade, hydrology, land use: The site must be large enough (at least 4,000 contiguous acres) and of adequate proportions to include two 250-MW parabolic trough solar thermal plants. The site also must be large enough to site the plants outside of large washes, to the extent possible. The site needs to have no more than a two percent grade and should not be located in a flood zone. Competing land uses and land use designations may make the site more difficult to develop.
- 3) Environmental sensitivity: The site should not be highly pristine or biologically sensitive (e.g., not within a designated wilderness area, Area of Critical Environmental Concern [ACEC], or a Desert

Wildlife Management Area [DWMA]). The site should also not be located within a military base or park.

- 4) Proximity to transmission: The site should be located within approximately 10 miles of a CAISO-interconnected transmission line with a rating of 230-kilovolts (kV) or higher.
- 5) Road access: The site should be in reasonable proximity to existing large, paved roads or freeways.
- 6) Site control: The land must be available for sale or lease/ROW, at a reasonable cost (e.g., high-value irrigated agricultural lands were excluded). If private land, the site should not be subdivided between more than three landowners to avoid lengthy and/or unsuccessful negotiations. If private land, a lease or purchase option arrangement is necessary so that a large capital investment would not be necessary until the license is obtained.
- 7) Labor availability: The site should be close enough to areas with large construction labor pools so as to maximize the number of construction workers within daily commuting range.

Several factors that have been used to screen alternatives for other proposed large-scale projects were not considered here. Water availability was not considered, since, as a dry-cooled facility, the plant's water needs are minimal; thus, the Project would minimize potential impacts on local water supplies and other water users. Military low-flight areas were not considered, since the Project's tallest structures will meet low-flight area standards. Proximity to natural gas supply was also not considered to be a requirement since the Project's start up boilers can also be powered using propane.

As discussed in Section 4.3.2, application of the above criteria eliminated all other potential Project locations from being carried forward for more detailed analysis as alternatives to the proposed Project site. The site screening process that led to the selection of the proposed Project site and the elimination of alternative sites is discussed in the following section.

It is important to note that Solar Millennium, LLC, a PSPP Applicant together with Chevron Energy Solutions (referred throughout the document as "the Applicants"), evaluated sites in other portions of the California desert, as Solar Millennium plans to develop multiple solar projects in California. The firm is proposing a completely separate solar project in the northern High Desert of California on a site near Ridgecrest in Kern County, in one of the other areas of the California desert with high solar intensity and other suitable attributes. Also, Solar Millennium and Chevron Energy Solutions are joint Applicants on another solar project near Blythe, approximately 35 miles east of the Project site and also within the U.S. Interstate 10 (I-10) corridor. All three of these projects are on BLM land and thus are under the jurisdiction of both the CEC and BLM. However, the three projects are subject to separate environmental review processes and separate Application for Certifications (AFCs) are being prepared for all three Projects.

The alternatives discussion presented below focuses only on the alternatives considered for a Project site generally speaking in or near the Desert Center area of the I-10 corridor. It does not include the evaluation process that led to the selection of the Blythe site because that will be addressed in the Blythe Solar Project (BSPP) AFC and subsequent CEQA/NEPA document prepared by the CEC and BLM. However, it should be noted that the same alternative sites were considered for both the BSPP and PSPP; all the others were rejected from further consideration ---except the *two* sites for which solar projects have been proposed by the Applicants.

An altogether separate set of sites were considered for the solar project proposed near Ridgecrest. The site evaluation that led to the selection of the proposed site will be addressed in the Ridgecrest Solar Power Project (RSPP) AFC. It is not discussed in the following pages.

The separate AFC for the BSPP, proposed near Blythe has been submitted at the same time as this PSPP AFC. The RSPP AFC is currently in preparation and is scheduled for separate submittal to the CEC shortly after submittal of the PSPP AFC, which is the subject of this alternatives discussion.

### 4.3 Alternatives Considered

The following paragraphs discuss the No Project alternative and the process that led to the selection of the proposed site over other site alternatives. Other alternatives to various aspects of the Project are also addressed.

#### 4.3.1 No Project Alternative

Under the No Project alternative, the Project would not be constructed, and the electrical power that would have been generated will be generated by other facilities, presumably natural gas-fired generation. Since solar power is generated close to peak consumption periods of the day, the peaking power needs met by Project-generated power would likely be met by fossil fuel-fired peaking units such as simple-cycle gas turbines and other rapid starting equipment (e.g., reciprocating engines) that would produce higher levels of air emissions than a solar thermal power plant.

Because the Project facilities would not exist, its potential adverse environmental impacts would not occur. However, the Project's beneficial impacts would also not occur, which would result in greater fossil fuel consumption to meet increasing electricity demand and, as a result, no Project-related reductions in air pollutants, including the gases that contribute to global climate change.

Moreover, the No Project alternative would not assist the State and the nation in meeting renewable energy goals. In 2002, California established the RPS program with a goal of increasing the percentage of renewable energy in the State's electricity mix to 20 percent by 2017. The 2003 Energy Report recommended accelerating the 20 percent goal for renewables to 2010, while the 2004 Energy Report and the State's 2005 Energy Action Plan recommended increasing the target percentage to 33 percent by 2020. The 2006 Energy Report Update states that "California must accelerate its pace of development if it is to meet its long-term Renewable Portfolio Standard Goal of generating 33 percent of the State's electricity from renewable sources by 2020, as recommended by Governor Schwarzenegger, the Energy Commission, and the California Public Utilities Commission." The 2007 Integrated Energy Policy Report (IEPR) states that "renewable resources are an essential tool for reaching AB 32 goals", but that "program adjustments" are needed to meet the 2010 RPS goals. The 2007 IEPR cites the statements "critical imperative to reduce greenhouse gas emissions" and "management of the risk borne by ratepayers for electricity generation" as the two main considerations driving the need to achieve the RPS goals. The IEPR states that the goal of 33 percent renewables by 2020 is achievable "with a concerted effort by and coordinated support from government, industry, and the public." The 2008 IEPR reiterates this goal.

Beyond the State RPS program, there is significant State and Federal focus on promoting and expediting the development of renewable resources:

- On August 8, 2007, the U.S. Department of the Interior, BLM, California Desert District, and the CEC staff signed a memorandum of understanding concerning joint environmental review for solar thermal power plant projects. The memorandum sets out a 12-month schedule for joint AFC/EIS review of applications submitted for solar projects located on BLM lands.
- On November 17, 2008, Governor Schwarzenegger signed Executive Order S-14-08, which raises California's renewable energy goals to 33 percent by 2020.

- On January 16, 2009, Department of Interior Secretary Kempthorne's Order 3283 established BLM renewable coordination offices to expedite permitting of solar projects and electrical transmission facilities.
- On March 11, 2009, Department of Interior Secretary Salazar's Order 3285 established the Departmental Task Force on Energy and Climate Change to increase renewable energy development on public lands.

The No Project alternative would mean that the proposed solar project would not be developed. Consequently, the No Project alternative would not support the program goals of the State's RPS, the Governor's Executive Order, or the orders issued by successive Secretaries of the Interior. The purpose of the Project is to generate renewable solar power and provide electric power to California's electrical users. In short, the No Project alternative would not provide the additional power needed in California in a manner that assists the State in meeting its renewable power and greenhouse gas reduction goals.

### 4.3.2 Project Site Alternatives

Using the site screening process described above, five candidate site locations (including the proposed site) were identified for a 500-MW project. Please note that the Applicants did not restrict the site selection efforts merely to the lower portions of the California desert. The demonstration of this fact is that Solar Millennium also is proposing to develop a solar project near Ridgecrest, California in the Kern County portions of the High Desert to the north of the Project site, in an area of very high solar insolation. The approximate locations of the sites other than the proposed site are shown on Figure 4-1 and described in Table 4-1.

**Table 4-1 Alternative Sites Considered and Rejected**

<b>Site</b>	<b>General Description/Location</b>
<b>Palen Pass</b>	BLM property located adjacent to Route 177 (Rice Road), north of Desert Center, adjacent to double circuit 230-kV transmission lines.
<b>Desert Center</b>	BLM property located due west of Desert Center, immediately adjacent to the possible site of the planned SCE Red Bluff substation.
<b>Palo Verde Mesa</b>	BLM and private property in general area west of Blythe, California, located within three miles of the possible site of the planned SCE Colorado River substation.
<b>Cibola</b>	BLM and private property in general area south of Blythe, California, located within 10 miles of the possible site of the planned SCE Colorado river substation.

All of the alternative sites lie within the Colorado Desert in what is often called the "I-10 corridor" area of eastern Riverside County, California. Much of this area is managed under the Northern and Eastern Colorado Desert Coordinated Management Plan by the BLM under the multiple use objectives of FLPMA and the California Desert Conservation Area (CDCA) Resource Management Plan. With the CDCA Plan, considerable land areas are already designated for other land uses, including but not limited to off-road vehicle use, national parks and military areas, as well as wilderness areas, ACECs and DWMA's. Therefore, there are relatively few alternative site locations that meet some or all of the site screening criteria identified above and are available for utility-scale solar development.

As shown in Figure 4-1, all of the alternative sites analyzed have an adequate solar resource (above 7.0 kWh/m<sup>2</sup>/day). All have adequate access to transmission lines (near the I-10 utility corridor or another designated utility corridor), have a large enough land area to support a 500-MW project, and have similar adequate labor availability. While none of the sites are located on military bases, within parks,

designated wilderness areas, or ACECs, one raises potentially significant environmental sensitivity concerns (see Figure 4-2) and none would substantially reduce Project impacts. For this and other reasons, and as discussed below, each of the sites failed to meet necessary screening criteria and therefore none were carried forward for detailed analysis.

The Applicants are proposing to deliver the power generated from the Project by constructing a new gen-tie line to SCE's planned Red Bluff substation, likely to be somewhere to the west of the PSPP site in the vicinity of Desert Center. SCE has not yet finalized the location of this substation. Because the exact physical location of the Red Bluff substation has not been finalized, no PSPP transmission route alternatives can be analyzed at this time. Once the location has been finalized, alternative transmission routes will be analyzed. It is the Applicants' expectation that the substation location will be made available in the summer of 2009. However, as it is expected that the substation will be located in the general vicinity of Desert Center, this general location has been utilized for the comparison of alternative site locations.

#### 4.3.2.1 Site Size, Shape, Grade, Hydrology, Land Use

Three of the alternative sites did not meet criteria in this category. The Palen Pass site has an excessively steep grade (four to five percent). It is also crossed by several large transmission lines. The Desert Center site is located in a flood zone. The Palo Verde Mesa site has a non-optimal shape, as it is constrained by large (500-kV) transmission lines crossing the site, a competing solar ROW to the west, and agricultural farmland to the east. The Cibola site is constrained by a lower-voltage transmission line crossing the site, large washes, and a grade that varies from two to four percent.

#### 4.3.2.2 Environmental Sensitivity

One of the alternative sites poses significant environmental constraints. The Desert Center site is located in a DWMA and in desert tortoise critical habitat. None of the other sites appears to offer environmental advantages compared to the proposed site.

#### 4.3.2.3 Site Control

Two of the alternative sites considered showed poor probability of obtaining site control. The Palo Verde Mesa and Cibola sites are located on a combination of BLM land with a large number of private parcels. It is not clear for either site that the private land could be brought under the needed lease or purchase option.

A summary of the site selection criteria and reasons for elimination of alternative sites from further consideration are presented below and summarized in Table 4-2.

**Table 4-2 Comparison of Proposed Site and Alternative Sites**

Site	Site Suitability	Site Control	Transmission	Environmental Sensitivity
Proposed Project	Medium – Slope two percent. Corner of site is crossed by 161-kV SCE transmission line (discussions underway with SCE re: mutual accommodation).	Good – BLM and a single 40-acre private property under Applicant purchase option	Good– In general area of possible locations of future SCE Red Bluff substation	Medium – No outstanding resource values; ~3% of one corner of site degraded, but nominally at very fringe of designated Desert Tortoise (DT) critical habitat

**Table 4-2 Comparison of Proposed Site and Alternative Sites**

Site	Site Suitability	Site Control	Transmission	Environmental Sensitivity
Alt #1 Palen Pass	Poor – Slope close to four percent (excessive for CSP plant). Site crossed by occupied transmission corridor.	Good - BLM property, single landowner	Good – Adjacent to 230-kV transmission line.	Medium – No outstanding resource values; not in critical habitat or species conservation area, but adjacent to Joshua Tree National Park.
Alt #2 Desert Ctr.	Poor – In flood zone. Otherwise, slope two percent.	Good – BLM property, single landowner	Good – In general area of possible locations of future SCE Red Bluff substation	Poor – In DT DWMA and DT critical habitat.
Alt #3 Palo Verde Mesa	Poor – Site big enough for one 250-MW unit located on BLM or private land; second unit would need high value private agricultural land. Slope two percent; site crossed by occupied transmission corridor.	Poor – BLM and significant amount of private property	Good – In general area of possible locations of future Colorado River substation	Medium – No outstanding resource values; site not in critical habitat or species conservation area, etc., but close to Mule Mountain ACEC
Alt #4 Cibola	Poor - Low-voltage transmission line and several large washes cross site. Slope from two to four percent.	Poor – BLM and significant amount of private property	Good – In general area of possible locations of future Colorado River substation	Good – No outstanding resource values; site not in critical habitat, species conservation area, etc.

#### 4.3.2.4 Alternative Sites Would Fail to Meet Project Objectives

A primary set of screening criteria categories, solar resource and site suitability, address two of the project objectives: to construct two 250-MW parabolic trough solar thermal power plants and to locate them on a contiguous, sufficiently large area of land with high Direct Normal Insolation and slopes of two percent or less. The Palen Pass, Palo Verde Mesa, and Cibola sites fail to meet these objectives.

Additional objectives include siting the Project in areas that are not highly pristine or biologically sensitive (e.g. not a designated wilderness area, ACEC or a DWMA) and that are consistent with existing land use plans. One of the three alternative sites poses significant environmental constraints: the Desert Center site is located in a DT DWMA and in DT critical habitat.

The Palen Pass site has an excessively steep grade (four percent). It is also crossed by several large transmission lines. The Desert Center site is located in a flood zone. The Palo Verde Mesa site has a suboptimal shape, as it is constrained by large (500-kV) transmission lines crossing the site, a competing solar ROW to the west, and agricultural farmland to the east. The Cibola site is constrained by a lower-voltage transmission line crossing the site, large washes, and a grade that varies from two to four percent.

#### 4.3.2.5 Alternative Sites Would Not Avoid or Substantially Reduce Environmental Impacts

All of the alternative sites considered would require about eight square miles of contiguous, rectangularly-shaped land area and linear corridors of varying lengths. The Desert Center site is in a DT DWMA and in DT critical habitat. The Cibola site hosts several large washes. As such, these alternative sites would increase, not decrease, potential effects on important resources, compared to the proposed site for the Project. The Palen Pass and Palo Verde Mesa sites do not substantially reduce environmental impacts compared to the proposed Project site.

#### 4.3.2.6 Selection of Proposed Site

Table 4-2 compares the ability of the alternative sites to meet screening criteria. As shown in the table, no alternative site would feasibly attain most of the basic objectives of the Project while also avoiding or substantially reducing any potentially significant impacts of the Project.

The Project site and the alternative sites are all able to meet the basic objective of hosting two 250-MW solar power plants, but the Project site has several advantages over the others. The Project is located entirely on BLM land; it has a slope of two percent; it shows little environmental sensitivity. The entire site is considered to be low-value habitat for desert tortoise, even though a small portion of the southwest corner of the site extends into what is nominally the literal edge of designated DT critical habitat. This area (<200 acres of a 3,870-acre area disturbed by Project construction and operation), actually was determined by 2009 environmental surveys to be low quality DT habitat, does not meet several of the criteria for critical habitat designation, and reflects that the edges of such designated areas unavoidably must reflect section lines rather than natural barriers when such sharp demarcations do not exist.

During World War II, the site was used (disturbed) by General Patton's tanks for training exercises as part of the 18,000-square mile California-Arizona Maneuver Area. The site is easily accessible from major roads and is not located in a designated wilderness area (or wilderness study area), ACEC, or DWMA.

Given the clear preferability of the proposed site for the Project, both in terms of meeting necessary site screening criteria and reducing environmental impacts, none of the alternative sites was carried forward for detailed analysis.

### 4.4 Alternative Site Layout

The proposed 500-MW Project configuration is the result of geographic, cultural resources-related and design and operating limitations.

- Topography: The Project configuration has been limited by site area geographic constraints such as I-10 to the south, private property to the north, east and west, and the Palen Dry Lake dunes to the north of the site.
- Cultural resources: The requested ROW area was reduced to avoid land near the dunes/Palen Dry Lake that might contain cultural resources.

There is a 161-kV SCE transmission line that crosses the site. The project will not interconnect to this line. This is not included in "transmission line route alternatives."

An alternative to the site layout that is currently under consideration is to leave the 161-kV SCE transmission line that currently crosses the southwest corner of the Project site in place. Under this alternative, the solar field would be constructed around the existing transmission towers, so as to cause the least impact to the structure. Also, the existing wood-pole towers could be consolidated and elevated

using monopole structures. Discussions are underway with SCE concerning ways that both the existing transmission line and the solar plant use can be mutually accommodated with the BLM ROW.

#### **4.5 Plant Size**

The Applicants also considered the alternative of developing the Project as a single 250-MW plant. Generally, building one plant would have fewer environmental impacts. However, given the infrastructure requirements and environmental impacts associated with building a single 250-MW plant, building two plants allows for economies of scale and reduces the infrastructure impacts, including habitat fragmentation, transmission access, and water and gas development. In addition, a single 250-MW plant would not be as effective in meeting the Project objective of supporting attainment of renewable energy mandates and objectives. For these reasons, the development of a smaller project was rejected.

#### **4.6 Freeze Protection and Auxiliary Boiler Heating Alternatives**

The Applicant considered several alternatives for generating energy freeze protection of the heat transfer fluid (HTF) and quick start for the auxiliary boiler during the early morning hours. The four options that can achieve this are:

- Electricity purchased from SCE,
- Propane acquired from a third-party distributor,
- Solar energy from the Project, or
- Installation of a natural gas pipeline

A natural gas pipeline was rejected because of difficulties in arranging natural gas distribution services in the remote Project area.

As discussed in Section 5.2, Air Quality, emissions related to the propane option are relatively minor and are well below the thresholds of the Federal permitting and Clean Air Act programs that are applicable to major sources of emissions. As the solar and purchased electricity approaches also do not pose air quality concerns, the alternatives analysis focused on economic efficiency.

Electricity delivered via the Project's transmission interconnect could be used for generating energy freeze protection of the HTF and quick start for the auxiliary boiler. This would entail the installation of several small electric boilers. This alternative is high in capital cost.

The Applicant has researched the alternative of designing a heating system that would use propane as the fuel. Propane would be delivered to the Project by a third-party distributor in bulk using trucks. The propane would be stored on site near the propane heating system. This alternative would be the most economical, but would involve a slight impact from truck traffic and air emissions from the traffic increase.

The Applicants analyzed the option of using solar energy to heat the HTF, in essence using the Project's own thermal energy to heat its own HTF. This option would eliminate the need for an alternative fuel source, but would delay the daily heating to operating temperatures of the HTF. This delay in morning hour production would significantly impact the efficiency and power generation of the overall plant. The loss in production would make the Project economically infeasible.

Considering the various factors, the Applicants have selected the option of utilizing propane as the fuel for HTF freeze protection and for quick start up of the entire facility.

## 4.7 Water Supply Alternatives

The Project was initially planned with wet cooling due to the considerable operational efficiencies and economic advantages associated with this technology. However, after careful research and analysis of the proposed Project site conditions and development plan, and in the context of the current water supply situation in California and State water policy, the Applicants have chosen to propose dry cooling. No water will be used for power plant cooling. This means that the Project will be in compliance with State Water Resources Control Board Policy 75-58.

Even a dry cooled facility requires some water use, although it is a small fraction of what is required for wet cooling. Water will be needed for plant requirements such as solar mirror washing, feed water makeup, firewater supply, onsite domestic use, makeup water for ancillary equipment, heat rejection, and dust control. The total anticipated water usage for operational requirements of the proposed facilities is approximately 300 acre-feet per year, or 150 acre-feet per plant per year. The Project will also need approximately 1,560 acre-feet of water during the construction period for soil compaction and dust control.

As part of the initial site analysis, the Applicant investigated potential alternatives to meet the water requirements for the proposed Project. Three potential water sources were investigated including the selected alternative. The other two alternatives were reclaimed water from a wastewater treatment plant and extraction and transfer of water from the Salton Sea. All three alternatives and the reasons for selection/rejection are described in Table 4-3.

**Table 4-3 Alternative Water Sources Considered**

Source	Characteristics
Groundwater from on-site wells (Proposed Project)	This alternative was selected because an existing well on the site is expected to be adequate for the Project's needs without significant impact to other users or the groundwater basin. A second well will be installed to provide security of supply, e.g., in case of a pump outage in one well.
Reclaimed water from the Lake Tamarisk Wastewater Treatment Plant	A small wastewater treatment plant that produces tertiary treated water is located within the Desert Center Lake Tamarisk golfing resort (CSA 51), approximately 11 miles west of the Project site. The treatment plant would be able to supply only 94 acre-feet per year, which would not satisfy the 300 acre-feet per year requirement of the Project for mirror washing and general operations. It would not be economically feasible to build an 11-mile long pipeline from the treatment center to the Project site in order to supply less than 30 percent of the Project's operational water needs.
Extraction and transfer from Salton Sea with desalination	<p>Another alternative considered would be to construct a desalination plant near El Centro and exchange this new agricultural water for an equal volume of Colorado River water via the Imperial Irrigation District and Metropolitan Water District (MWD). In concept, water would be extracted from the MWD Aqueduct near Coxcomb Landing Strip and piped to the Project site.</p> <p>This option was rejected because it would require an approximately 50-mile long pipeline, which would render it economically unviable and might require a highly complicated water exchange agreement between water districts. This could introduce additional uncertainties and costs, and could jeopardize the Project schedule.</p>

The Project site is located outside water district boundaries. The Project's proposed water use, which will be supplied by onsite wells and does not use any water for power plant cooling, is consistent with California water law and policy, as discussed in Section 5.17, Water Resources.

#### **4.8 Power Generation Technology Alternatives**

An objective of the Project is to support the State's policies/goals with respect to increasing the use of renewable energy sources. Fossil fuel technologies (simple-cycle, combined-cycle, advanced combustion turbine technologies, integrated gas combined cycle, fluidized bed boilers, etc.) by definition do not support this objective and thus were not considered as alternatives for the Project. In addition, nuclear power is not renewable energy and is prohibited by California law at present because of concerns about nuclear waste disposal.

As for alternative renewable energy sources, the proposed Project would generate power by using concentrating solar thermal trough technology to produce high-pressure steam to drive a steam turbine generator. Other renewable energy technologies, including, for example, photovoltaic solar energy, have not been analyzed as alternatives because Solar Millennium is a technology leader in parabolic trough technology and has expertise with this technology. In addition, there is little evidence that the use of other technologies would meaningfully decrease the Project's potential environmental impacts.

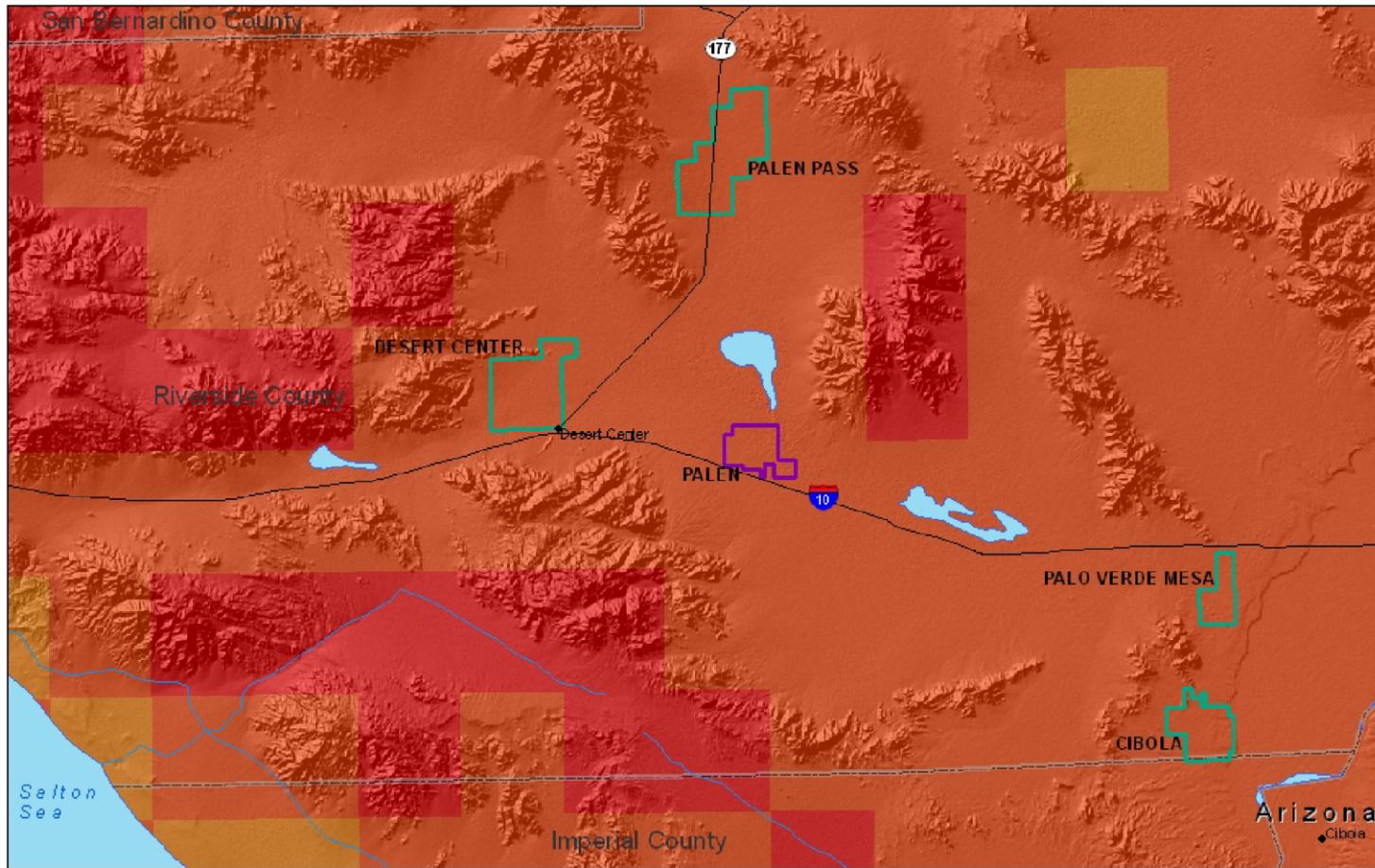
#### **4.9 References**

CEC, 2005. Integrated Energy Policy Report.

CEC, 2002-08. Committee Draft Integrated Energy Policy Reports.

CEQ, 1981. <http://ceq.hss.doe.gov/nepa/regs/40/40p3.htm>. Accessed July 2009.

State Water Resources Control Board, 1975. State Water Resources Control Board Resolution No. 75-58 Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling.



Data Sources:  
 United States Fish and Wildlife Service  
 (<http://criticalhabitat.fws.gov/>)

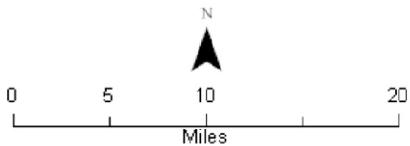
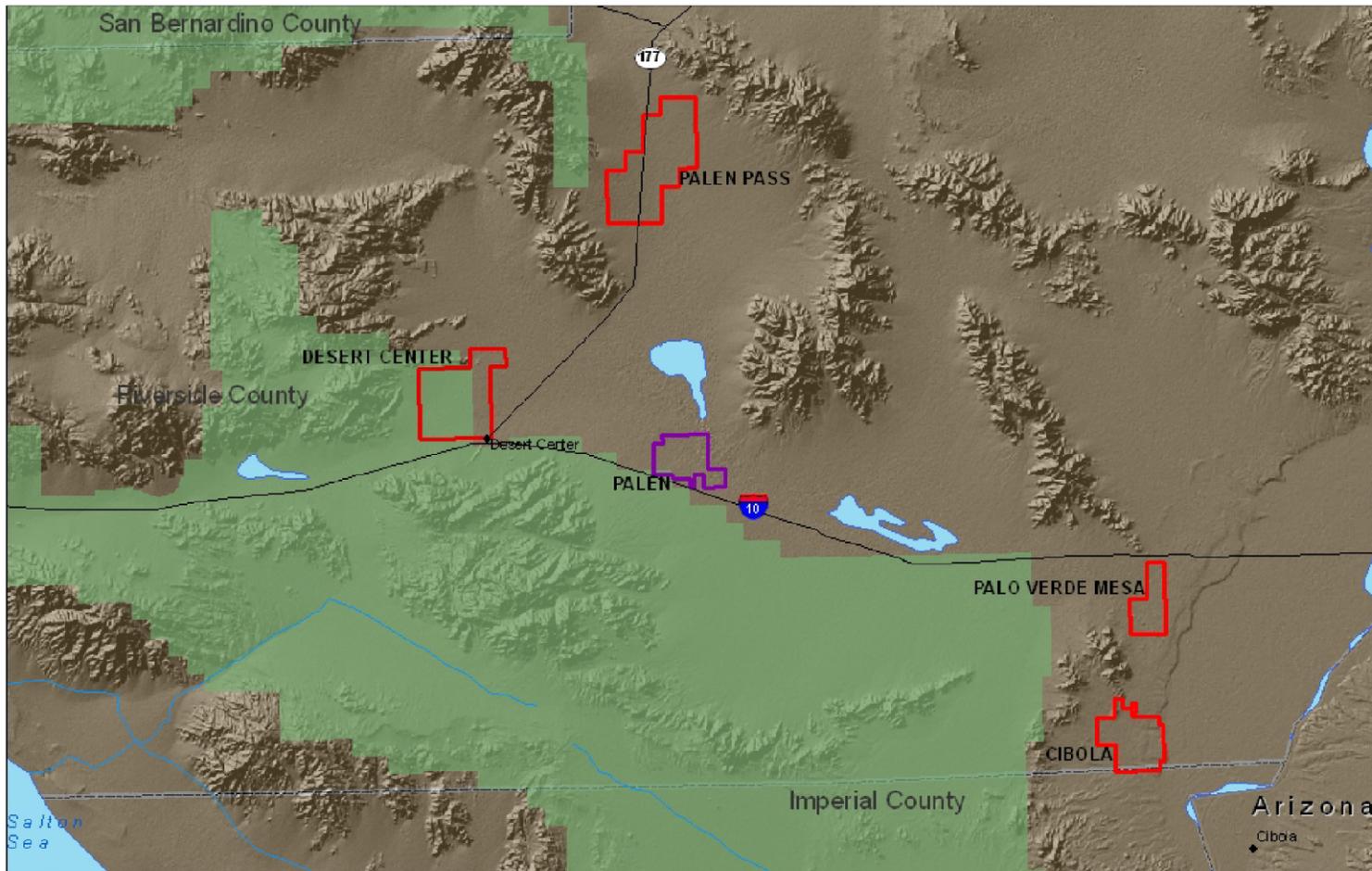
**Palen Solar Power Project**

**Figure 4-1  
 Alternative Sites Initially  
 Considered and  
 Solar Resource Quality**



AECOM

Project: 12944-001  
 Date: August 2009



Alternative Site
  Planned Site
  Desert Tortoise Critical Habitat



Data Sources:  
 United States Fish and Wildlife Service  
 (<http://criticalhabitat.fws.gov/>)

**Palen Solar Power Project**  
  
**Figure 4-2**  
**Alternative Sites and**  
**Desert Tortoise Critical Habitat**

 <b>Solar Millennium</b>

Project: 12944-001 Date: August 2009