Final Staff Assessment

BEACON SOLAR ENERGY PROJECT

Application For Certification (08-AFC-2)
Kern County

CALIFORNIA ENERGY COMMISSION

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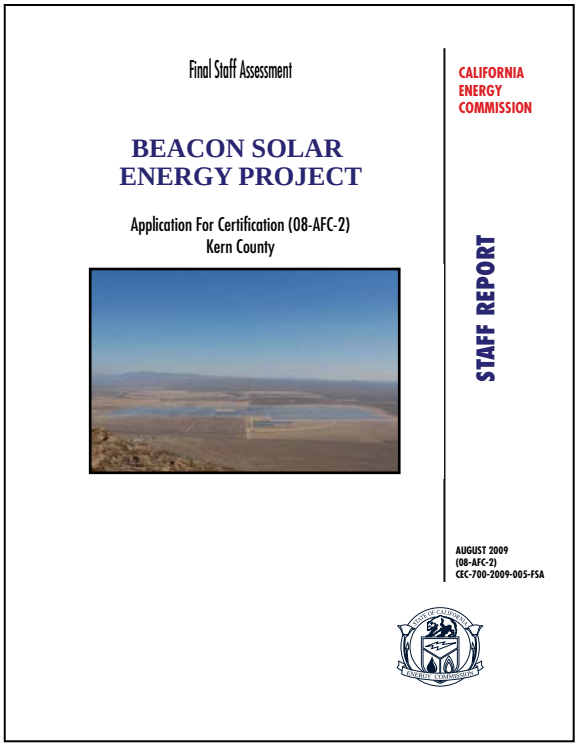

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BEACON SOLAR ENERGY PROJECT
(08-AFC-2)
FINAL STAFF ASSESSMENT

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INTRODUCTION

This Final Staff Assessment (FSA) contains the California Energy Commission staff's independent evaluation of the Beacon Solar Energy Project (BSEP) Application for Certification (08-AFC-2). The FSA examines engineering, environmental, public health and safety aspects of the BSEP project, based on the information provided by the applicant and other sources available at the time the FSA was prepared. The FSA contains analyses similar to those normally contained in an Environmental Impact Report (EIR) required by the California Environmental Quality Act (CEQA). When issuing a license, the Energy Commission is the lead state agency under CEQA and its process is functionally equivalent to the preparation of an EIR.

The Energy Commission staff has the responsibility to complete an independent assessment of the project's engineering design and identify the potential impacts on the environment, the public's health and safety, and determine whether the project conforms to all applicable laws, ordinances, regulations and standards (LORS). Upon identifying any potentially significant environmental impacts, staff recommends mitigation measures in the form of conditions of certification for construction, operation and eventual closure of the project.

The FSA which will serve as staff's formal testimony in evidentiary hearings to be held by the Energy Commission Committee assigned to hear this case. The Committee will hold evidentiary hearings and will consider the recommendations presented by staff, applicant, interveners, government agencies, and the public prior to proposing its decision. In the last step, the full Energy Commission will issue the final decision.

ENERGY COMMISSION'S "IN LIEU" PERMITTING PROCESS

Staff has implemented an objective of the Renewable Energy Action Team (REAT), as identified in the Governor's Executive Order S-14-08, to create a "one stop" process for permitting renewable energy generation facilities under California law. This permit streamlining process is being implemented according to the Energy Commission's "in lieu permit" authority established under the Warren-Alquist Act. Accordingly, staff coordinated a joint environmental review with other agencies such as the U.S. Fish and Wildlife Service, California Department of Fish and Game, California State Water Resources Control Board, Kern County Air Pollution Control District and Kern County to ensure that substantive requirements of these agencies, including requirements of state and local permits that would ordinarily be issued but for the Energy Commission's exclusive jurisdiction, are incorporated into the Commission's certificate if the project is approved. By implementing this cooperative approach, staff was able to reduce the overall permit processing time otherwise necessary to issue an Incidental Take Permit, Streambed Alteration Agreement, Waste Discharge Requirements and General Permit for dredge and fill of waters of the State.

PROJECT LOCATION AND DESCRIPTION

The proposed 2,012-acre project site is located in eastern Kern County at the western edge of the Mojave Desert, just east of the southern end of the Sierra Nevada mountain range. The site is located approximately four miles northwest of California City's northern boundary, approximately 15 miles north of the town of Mojave, and approximately 24 miles northeast of the City of Tehachapi. Koehn Lake is located approximately five miles to the east-northeast, and Red Rock Canyon State Park is located approximately four miles to the north.

The site is vacant and previously disturbed from past agricultural activities, which ceased in the early 1980s. The site is relatively flat with elevations ranging from approximately 2,220 feet above mean sea level in the southwest to 2,025 feet in the northeast. Pine Tree Creek is a dry desert wash that trends south-southwest to north-northeast through the center of the site. The applicant proposes to reroute the wash to the southern and eastern boundaries of the project site. There is also a fault zone crossing the site from southwest to northwest resulting in up to a 10-foot step change in elevation across the fault zone. The fault zone is described in more detail in the **Geology and Paleontology** section of this FSA.

The applicant's basic process for solar electric power generation would be to utilize parabolic trough solar collectors to concentrate solar energy onto heat collection elements (HCE) that contain a fluid, referred to as *heat transfer fluid* (HTF). After being heated by the solar troughs, the HTF is run through a heat exchanger where it heats water into steam. In the next stage, the steam is converted into electricity utilizing a Rankine-cycle reheat steam turbine electric generator, which is housed in the power block facility. After the steam is cycled through the turbine, it is processed through a cooling tower where it is condensed back to a liquid form (water) and recycled through the system again to drive the steam turbine generator.

The project site arrangement generally consists of a 1,266-acre, rectangular arrangement of parabolic trough solar collectors surrounding a centrally located power block. The power block facility houses the majority of electrical generation equipment and related systems, with exception of the solar field. The solar collectors would be constructed in long rows (troughs) across the project site and aligned side by side in a north-south orientation to allow the troughs to slowly rotate from east to west, tracking the movement of the sun. Adjoining the solar field, immediately to the west, are various support facilities, including administration and storage buildings, and evaporation ponds.

PUBLIC AND AGENCY COORDINATION

On March 27, 2008, the Energy Commission staff issued a notification of receipt of the Application for Certification (AFC), together with a project description, to property owners within 1,000 feet of the proposed project and those located within 500 feet of the linear facilities. Staff sent a similar notification and a copy of the AFC to a comprehensive list of agencies and libraries. Staff's notification letters requested public and agency review and comment on the AFC, and invited continued participation in the Energy Commission's certification process.

The Energy Commission's Public Adviser's Office (PAO) reviewed information available from the applicant and others and then conducted its own, extensive outreach efforts to identify certain local officials, as well as interested entities within a six-mile radius around the proposed site for the Beacon Solar Energy Project. These entities include schools, churches, community, cultural and health-care facilities, and day-care and senior-care centers, as well as business, environmental, governmental, and ethnic organizations. By means of mailing letters and bilingual (English and Spanish) notices, the PAO notified these entities of the Committee's Informational Hearing and Site Visit for the project, held on June 11, 2008, in California City. The PAO also identified and similarly notified 13 local officials with jurisdiction in the project area. These officials included the board of supervisors and the executive officer for Kern County, as well as the city council and manager for California City.

The PAO also arranged for advertisements in English and Spanish in the June 5, 2008 issue of the *Mojave Desert News* and requested public service announcements in English and Spanish at television and radio stations broadcasting in the project area.

In addition to the outreach efforts of the PAO, staff has continued to solicit comments on the AFC from local, state and federal agencies that have an interest in the project including Kern County Planning Department and Public Works Department, Kern County Air Pollution Control District, Cal-Trans, Lahontan Regional Water Quality Control Board, U.S. Fish and Wildlife Service, and California Department of Fish and Game. Staff has also considered the comments of interveners, community groups, and individual members of the public.

PUBLIC WORKSHOPS

On July 22, 2008, staff conducted a publicly noticed Data Response and Issue Resolution workshop at the California City Council Chambers and discussed the topics of Air Quality, Biology, Cultural Resources, Socioeconomics, Soils, Transmission System Engineering, Waste Management, and Water Resources. The purpose of the workshop was to provide members of the community and governmental agencies opportunity to obtain project information, and to offer comments they may have had regarding any aspect of the proposed project.

On August 25, 2008, staff conducted a second publicly noticed Data Response and Issue Resolution workshop at the office of the U.S. Fish and Wildlife Service in Ventura, California and discussed potential project-related impacts to desert tortoise, Mohave ground squirrel, and other species of special concern.

On November 6 2008, staff conducted a third publicly noticed Data Response and Issue Resolution workshop at the California City Council Chambers and discussed the proposed evaporation ponds, the proposed rerouting of Pine Tree Creek, mitigation plans and compensation ratios for special status species and associated habitat, water usage, potential impacts to groundwater, and evaluation of locations within the site and transmission line boundaries that may be eligible for listing on the California Register of Historic Resources.

On April 14, 2009, staff conducted a fourth publicly noticed workshop at the California City Council Chambers and discussed staff's Preliminary Staff Assessment (PSA). Staff solicited and addressed public comments during the morning and afternoon workshop sessions.

LIBRARIES

On March 27, 2008, the Energy Commission staff sent the BSEP Application for Certification to various libraries located in Kern County (California City Branch, Mojave Branch, Wanda Kirk Branch, Ridgecrest Branch, and Tehachapi Branco) and to libraries in Eureka, Fresno, Los Angeles, Sacramento, San Diego, and San Francisco. On April 1, 2009, staff sent the PSA to the same libraries and asked the librarian to make the document available to the public.

ENVIRONMENTAL JUSTICE

California law defines environmental justice as "the fair treatment of people of all races, cultures and income with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies" (Government Code Section 65040.12 and Public Resources Code Section 72000).

All Departments, Boards, Commissions, Conservancies and Special Programs of the Resources Agency must consider environmental justice in their decision-making process if their actions have an impact on the environment, environmental laws, or policies. Such actions that require environmental justice consideration may include:

- Adopting regulations;
- Enforcing environmental laws or regulations;
- Making discretionary decisions or taking actions that affect the environment;
- Providing funding for activities affecting the environment; and
- Interacting with the public on environmental issues.

In considering environmental justice in energy facility siting cases, staff uses a demographic screening analysis to determine whether a low-income and/or minority population exists within the potentially affected area of the proposed site. The demographic screening is based on information contained in two documents: *Environmental Justice: Guidance Under the National Environmental Policy Act* (Council on Environmental Quality, December, 1997) and *Guidance for Incorporating Environmental Justice Concerns in EPA's Compliance Analyses* (U.S. Environmental Protection Agency, April, 1998). The screening process relies on Year 2000 U.S. Census data to determine the presence of minority and below-poverty-level populations.

Environmental Justice: Guidance Under the National Environmental Policy Act, defines minority individuals as members of the following groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population is identified when the minority population of the potentially affected area is (1) greater than 50%; or (2) or when one or more U.S. Census blocks in the potentially affected area have a minority population of greater than 50%.

In addition to the demographic screening analysis, staff follows the steps recommended by the U.S. EPA's guidance documents which are: outreach and involvement; and if warranted, a detailed examination of the distribution of impacts on segments of the population.

Staff has followed each of the above steps for the following 11 sections in the FSA: Air Quality, Hazardous Materials, Land Use, Noise, Public Health, Socioeconomics, Soils and Water, Traffic and Transportation, Transmission Line Safety/Nuisance, Visual Resources, and Waste Management. Over the course of the analysis for each of the 11 areas, staff considered potential impacts and mitigation measures and whether there would be a significant impact on an environmental justice population.

As a result of staff's analysis, staff determined there are no environmental justice issues for the proposed Beacon Solar Energy Project. Staff identified the following economic benefits from the project: capital costs; construction and operation payroll; sales taxes; and school impact fees.

PROJECT'S COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS); AND STATE WATER USE POLICIES

With the exception of **Soil and Water Resources**, staff believes that with the Commission's adoption of staff's proposed mitigation measures and the proposed conditions of certification, the BSEP project would comply with all applicable laws, ordinances, regulations, and standards (LORS). In addition to the LORS, there are state policies (not considered LORS) prohibiting the use of potable water for power plant cooling, as proposed by the applicant. The proposed BSEP would not comply with these state water use policies. See **Soil and Water Resources** and **Alternatives** sections for a discussion of LORS and state water use policies.

PROJECT'S ENVIRONMENTAL IMPACTS

With the exception of **Visual Resources**, staff believes that with the Commission's adoption of staff's proposed mitigation measures and the proposed conditions of certification, the BSEP project would not cause significant adverse impacts. The conclusions of each technical area are summarized in the table below and the subsequent text.

Executive Summary Table 1
Summary of Impacts to Each Technical Area

Technical Area	Complies with LORS	Impacts Mitigated
Air Quality	Yes	Yes
Biological Resources	Yes	Yes
Cultural Resources	Yes	Yes
Efficiency	Not Applicable	Not Applicable
Facility Design	Yes	Yes
Geology and Paleontology	Yes	Yes
Hazardous Materials	Yes	Yes
Land Use	Yes	Yes
Noise and Vibration	Yes	Yes
Public Health	Yes	Yes
Reliability	Not Applicable	Not Applicable
Socioeconomic Resources	Yes	Yes
Soil and Water Resources	***No***	Yes
Traffic and Transportation	Yes	Yes
Transmission Line Safety/Nuisance	Yes	Yes
Transmission System Engineering	Yes	Yes
Visual Resources	Yes	***No***
Waste Management	Yes	Yes
Worker Safety and Fire Protection	Yes	Yes

SOIL AND WATER RESOURCES

As proposed, the BSEP would not comply with several LORS nor comply with state policies regarding the use of fresh water, as defined in the Energy Commission's 2003 Integrated Energy Policy Report (IEPR) and the California Water Resources Control Board's Resolution 75-58. For a more detailed discussion of state water policy and related LORS, see staff's technical analyses in the **Soil and Water Resources**, and **Alternatives** sections.

VISUAL RESOURCES

The introduction of the BSEP would change the existing physical setting of the Fremont Valley floor from a moderately disturbed desert floor landscape to a highly human-altered landscape. This change principally would be due to 1,244 acres of the project site being covered with parabolic trough solar collectors. In addition, the introduction of the radiance from the parabolic trough arrays during operation would be prominent from elevated locations. Staff concludes the project would introduce a substantial significant "Aesthetic" impact under the California Environmental Quality Act and Guidelines at two sensitive viewpoints that would be unmitigable.

ALTERNATIVES SUMMARY

Although staff concluded the "no project' alternative is not a reasonable alternative to the proposed project, staff concluded there are at least four feasible project alternatives that are reasonable alternatives to the proposed BSEP. Each of the four alternatives is

a feasible alternative to the proposed BSEP because each alternative could reduce the BSEP's consumption of potable water by up to 97%. The first alternative would utilize the proven technology of dry cooling which does not require the use of water in the cooling process. The second alternative would utilize tertiary treated wastewater obtained from the Rosamond Community Services District. The third alternative would utilize tertiary treated wastewater from the city of California City. The fourth alternative would utilize photovoltaic (PV) solar panels for power generation, as PV panels do not require a cooling system or the related water use.

Both PV panels and dry cooling have the added benefit of not only eliminating 97% of the water use but also eliminating the need for evaporation ponds which are a source of concern to staff, the California Department of Fish and Game and the United States Fish and Wildlife Service (see the **Biological Resources** section for discussion of evaporation ponds). Staff has concluded that utilizing either PV technology or tertiary treated wastewater or dry cooling would facilitate the project's compliance with applicable LORS and state policies regarding the use of high quality, fresh water in power plant cooling systems. Staff's conclusion is that each of the separate alternatives is reasonable, technically feasible and economically feasible to incorporate.

NOTEWORTHY PUBLIC BENEFITS

BSEP offers the benefit of providing nearly 100% of its power generation from the sun. The daylight operating hours generally coincide with the hours when peaking capacity and energy is needed to support the California ISO transmission grid. In addition, staff has identified the following significant and environmentally important public benefits:

1. BSEP would contribute to meeting goals under California's Renewable Portfolio Standard Program (Senate Bill (SB) 1078; as amended by SB 107), which establishes that 20% of the total electricity sold to retail customers in California per year by December 31, 2010 must consist of renewable energy;

2. BSEP would contribute to meeting the Governor's Executive Order #S-14-08 which establishes that renewable energy must contribute 33% of the supply for meeting total state energy demands by 2020;

3. BSEP would contribute to the state accomplishing its goals for reducing global carbon emissions in accordance with the California Global Warming Solutions Act of 2006 (Assembly Bill 32); and

4. BSEP would generate both short term construction-related and long term operational-related increases in local expenditures and payrolls, as well as sales tax revenues.

INTRODUCTION

Eric K. Solorio

PURPOSE OF THIS REPORT

This Final Staff Assessment (FSA) is the California Energy Commission staff's independent analysis of the proposed Beacon Solar Energy Project (hereafter referred to as BSEP). For clarity, this FSA is a staff document. It is neither a California Energy Commission Committee document nor a draft decision. The FSA describes the following:

- the proposed project;
- the existing environment;
- whether the facilities can be constructed and operated safely and reliably in accordance with applicable laws, ordinances, regulations, and standards (LORS);
- the environmental consequences of the project including potential public health and safety impacts;
- the potential cumulative impacts of the project in conjunction with other existing and known planned developments;
- mitigation measures proposed by the applicant, staff, interested agencies, local organizations, and interveners which may lessen or eliminate potential impacts;
- the proposed conditions under which the project should be constructed and operated, if it is certified; and
- project alternatives.

The analyses contained in this FSA are based upon information from the: 1) Application for Certification (AFC), 2) responses to data requests, 3) supplementary information from local, state, and federal agencies, interested organizations, and individuals, 4) existing documents and publications, 5) independent research, and 6) comments at workshops. The analyses for most technical areas include discussions of proposed conditions of certification. Each proposed condition of certification is followed by a proposed means of verification that the condition of certification has been met. The FSA presents final conclusions about potential environmental impacts and conformity with LORS, as well as proposed conditions that apply to the design, construction, operation, and closure of the facility.

The Energy Commission staff's analyses were prepared in accordance with Public Resources Code section 25500 et seq.; California Code of Regulations, title 20, section 1701 et seq.; and the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.).

ORGANIZATION OF THE FINAL STAFF ASSESSMENT

The FSA contains an Executive Summary, Introduction, Project Description, and Project Alternatives. The environmental, engineering, and public health and safety analysis of

the proposed project is contained in a discussion of 20 technical areas. Each technical area is addressed in a separate chapter. These chapters are followed by a discussion of facility closure, project construction and operation compliance monitoring plans, and a list of staff that assisted in preparing this report.

Each of the 20 technical area assessments includes a discussion of:

- laws, ordinances, regulations, and standards (LORS);
- the regional and site-specific setting;
- project specific and cumulative impacts;
- mitigation measures;
- closure requirements;
- conclusions and recommendations; and
- conditions of certification for both construction and operation (if applicable).

ENERGY COMMISSION SITING PROCESS

The Energy Commission has the exclusive authority to certify the construction, modification, and operation of thermal electric power plants 50 megawatts (MW) or larger. The Energy Commission certification is in lieu of any permit required by state, regional, or local agencies and federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). The Energy Commission must review thermal power plant applications for certification (AFC) to assess potential environmental impacts including potential impacts to public health and safety, potential measures to mitigate those impacts, and compliance with applicable governmental laws or standards (Pub. Resources Code, § 25519 and § 25523(d)).

The Energy Commission's siting regulations require staff to independently review the AFC and assess whether all of the potential environmental impacts have been properly identified, and whether additional mitigation or other more effective mitigation measures are necessary, feasible, and available (Cal. Code Regs., tit. 20, § 1742 and § 1742.5(a)).

In addition, staff must assess the completeness and adequacy of the measures proposed by the applicant to ensure compliance with health and safety standards, and the reliability of power plant operations (Cal. Code Regs., tit. 20, § 1743(b)). Staff is required to develop a compliance plan (coordinated with other agencies) to ensure that applicable laws, ordinances, regulations, and standards are met (Cal. Code Regs., tit. 20, § 1744(b)).

Staff conducts its environmental analysis in accordance with the requirements of CEQA. No additional environmental impact report (EIR) is required because the Energy Commission's site certification program has been certified by the California Resources Agency as meeting all requirements of a certified regulatory program (Pub. Resources Code, § 21080.5 and Cal. Code Regs., tit. 14, § 15251 (j)). The Energy Commission is the CEQA lead agency.

The staff prepares a Preliminary Staff Analysis (PSA) that presents for the applicant, intervenors, organizations, agencies, other interested parties, and members of the public staff's draft analysis, conclusions, and recommendations. Where it is appropriate, the PSA incorporates comments received from agencies, the public, and parties to the siting case and comments made at the workshops.

When necessary, staff provides a comment period to resolve issues between the parties and to narrow the scope of disputed issues presented at evidentiary hearings. During the comment period that normally follows the publication of the PSA, staff will conduct one or more workshops to discuss its findings, proposed mitigation, and proposed compliance-monitoring requirements. Based on the workshops and written comments, staff may refine its analysis, correct errors, and finalize conditions of certification to reflect areas where agreements have been reached with the parties and will then publish a Final Staff Assessment (FSA).

The FSA is only one piece of evidence that will be considered by the Committee (two Energy Commission Commissioners who have been assigned to this project) in reaching a decision on whether or not to recommend that the full Energy Commission approve the proposed project. At the public hearings, all parties will be afforded an opportunity to present evidence and to rebut the testimony of other parties, thereby creating a hearing record on which a decision on the project can be based. The hearing before the Committee also allows all parties to argue their positions on disputed matters, if any, and it provides a forum for the Committee to receive comments from the public and other governmental agencies.

Following the hearings, the Committee's recommendation to the full Energy Commission on whether or not to approve the proposed project will be contained in a document entitled the Presiding Member's Proposed Decision (PMPD). Following publication, the PMPD is circulated in order to receive written public comments. At the conclusion of the comment period, the Committee may prepare a revised PMPD. At the close of the comment period for the revised PMPD, the PMPD is submitted to the full Energy Commission for a decision.

AGENCY COORDINATION

As noted above, the Energy Commission certification is in lieu of any permit required by state, regional, or local agencies and federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). However, the Commission typically seeks comments from and works closely with other regulatory agencies that administer LORS that may be applicable to proposed projects. These agencies may include as applicable the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, California Coastal Commission, State Water Resources Control Board/Regional Water Quality Control Board, California Department of Fish and Game, and the California Air Resources Board.

OUTREACH

The Energy Commission's outreach program is primarily facilitated by the Public Adviser's Office (PAO). This is an ongoing process that to date has involved the following efforts:

LIBRARIES

On March 27, 2008, the Energy Commission staff sent the BSEP Application for Certification to various libraries located in Kern County (California City Branch, Mojave Branch, Wanda Kirk Branch, Ridgecrest Branch, and Tehachapi Branch) and to libraries in Eureka, Fresno, Los Angeles, Sacramento, San Diego, and San Francisco.

INITIAL OUTREACH EFFORTS

The PAO reviewed related information available from the applicant and others and then conducted its own, extensive outreach efforts to identify certain local officials, as well as interested entities within a six-mile radius around the proposed site for the Beacon Solar Energy Project. These entities include schools; churches; community, cultural and health-care facilities; and day-care and senior-care centers, as well as business, environmental, governmental, and ethnic organizations. By means of mailing letters and bilingual (English and Spanish) notices, the PAO notified these entities of the Informational Hearing and Site Visit for the project, held on June 11, 2008, in California City. The PAO also identified and similarly notified 13 local officials with jurisdiction in the project area. These officials included the board of supervisors and the executive officer for Kern County, as well as the city council and manager for California City.

In addition, the PAO arranged for advertisements in English and Spanish in the June 5, 2008 issue of the *Mojave Desert News* and requested public service announcements in English and Spanish at television and radio stations broadcasting in the project area.

Energy Commission regulations require staff to notice, at a minimum, property owners within 1,000 feet of a project and 500 feet of a linear facility (such as transmission lines, gas lines, and water lines). This was done for the BSEP project. Staff's ongoing public and agency coordination activities for this project are discussed under the Public and Agency Coordination heading in the **Executive Summary** section of the FSA.

ENVIRONMENTAL JUSTICE

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," focuses federal attention on the environment and human health conditions of minority communities and calls on federal agencies to achieve environmental justice as part of this mission. The order requires the U.S. Environmental Protection Agency (U.S. EPA) and all other federal agencies (as well as state agencies receiving federal funds) to develop strategies to address this issue. The agencies are required to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations.

For all siting cases, Energy Commission staff conducts an environmental justice screening analysis in accordance with the *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA (National Environmental Policy Act) Compliance Analysis,* dated April 1998. The purpose of the screening analysis is to determine whether a minority or low-income population exists within the potentially affected area of the proposed site.

California Statute section 65040.12(c) of the Government Code defines *environmental justice* to mean "fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies." Staff's specific activities, with respect to environmental justice for the BSEP project, are discussed in the **Executive Summary**.

PROJECT DESCRIPTION

Eric K. Solorio

INTRODUCTION

Beacon Solar, LLC, a Delaware limited liability company and wholly owned subsidiary of NextEra Energy Resources, LLC (applicant), filed an Application for Certification (AFC) with the California Energy Commission (Energy Commission) on March 14, 2008, to construct and operate a nominal 250 megawatt (MW) solar thermal power plant. Staff's initial data adequacy review of the Beacon Solar Energy Project (BSEP) AFC determined that it did not meet all the requirements for the 12-month process as established by section 1704, including appendix B of chapter 5, title 20, of the California Code of Regulations. Specifically, the AFC was deficient in six of 23 areas: air quality, biological resources, cultural resources, geologic hazards, land use, and socioeconomics. On April 21, 2008, the applicant provided additional information to supplement the AFC. At a business meeting held on May 7, 2008, the Energy Commission adopted the executive director's data adequacy recommendation, thereby deeming the AFC complete for filing purposes.

PROJECT PURPOSE AND OBJECTIVES

The project purpose is to benefit NextEra Energy Resources, LLC (NextEra) stockholders by earning a profit on investment while achieving the stated project objectives (BS 2008a and BS 2008i). As described in the AFC, the applicant's specific project objectives are as follows:

1. to construct, operate, and maintain an efficient, economic, reliable, safe, and environmentally sound solar-powered generating facility that will help achieve: (i) the state of California objectives mandated by SB 1078 (California Renewable Portfolio Standard Program), (ii) AB 32 (California Global Warming Solutions Act of 2006), and (iii) other local mandates adopted by the state's municipal electric utilities to meet the requirements for the long-term, wholesale purchase of renewable electric energy for distribution to its customers;

2. to develop a site with available water resources to allow wet cooling in order to optimize power generation efficiency and reduce project cost;

3. to develop a site with an excellent solar resource;

4. to develop a previously disturbed site with close proximity to transmission infrastructure in order to minimize environmental impacts;

5. to interconnect directly to the Los Angeles Department of Water and Power (LADWP) electrical transmission system; and

6. to develop a new utility-scale solar energy project using proven concentrated solar trough technology.

Based upon the applicant's design objectives, staff concluded the project's objectives also include operating for 30 years. It is worth noting that considering the applicant's stated objective of using on-site water for wet-cooling and overall processes and the fact that the AFC identifies the on-site water as being potable water, staff therefore infers that the applicant's objectives include the use potable water for wet cooling and overall power generation processes

PROJECT LOCATION AND SITE DESCRIPTION

The proposed 2,012-acre project site is located in eastern Kern County at the western edge of the Mojave Desert, just east of the southern end of the Sierra Nevada mountain range. The site is located approximately 4 miles northwest of California City's northern boundary, approximately 15 miles north of the town of Mojave, and approximately 24 miles northeast of the City of Tehachapi (see **Project Description Figure 1**). Koehn Lake is located approximately five miles to the east-northeast, and Red Rock Canyon State Park is located approximately four miles to the north.

The project site is approximately 2,012 acres and is previously disturbed from past agricultural activities, which ceased in the early 1980s. Photographs of the site are shown in **Project Description Figure 2**. The site is relatively flat, with elevations ranging from approximately 2,220 feet above mean sea level in the southwest to 2,025 feet in the northeast. Pine Tree Creek, a desert wash, trends south-southwest to north-northeast through the center of the site. There is also a fault zone crossing the site from southwest to northwest resulting in up to a 20-foot step change in elevation across the fault scarp. The fault zone is described in more detail in the **GEOLOGY AND PALEONTOLOGY** section of this Preliminary Staff Assessment (PSA).

PROJECT FEATURES

SOLAR FIELD, POWER GENERATION EQUIPMENT, AND PROCESS

This section describes the proposed project site arrangement, processes, systems, and equipment. The project site arrangement generally consists of a 1,266-acre, rectangular arrangement of parabolic trough solar collectors surrounding a centrally located power block. The power block facility houses the majority of electrical generation equipment and related systems, with exception of the solar field. The solar collectors would be constructed in long rows (troughs) across the project site and aligned side by side in a north-south orientation to allow the troughs to slowly rotate from east to west, tracking the movement of the sun. Adjoining the solar field, immediately to the west, are various support facilities, including administration and storage buildings, and evaporation ponds. The site also includes Pine Tree Creek, which currently bisects the site. Pine Tree Creek is a dry desert wash that the applicant proposes to reroute to the southern and eastern boundaries of the project site. Together, the solar field, support facilities, transmission lines, and the drainage feature consume the majority of the 2,012-acre proposed project site. Please refer to **Project Description Figure 3** to see an illustration of the proposed site arrangement and refer to **Project Description Figure 6** to see a photo of typical solar collector troughs.

The process for solar electric power generation would be to utilize parabolic trough solar collectors to concentrate solar energy onto heat collection elements (HCE) that contain a fluid, referred to as *heat transfer fluid* (HTF). After being heated in the solar troughs, the HTF is run through a heat exchanger where it heats water into steam. In the next stage, the steam is converted into electricity utilizing a Rankine-cycle reheat steam turbine electric generator, which is housed in the power block facility. After the steam is cycled through the turbine, it is processed through a cooling tower where it is condensed back to a liquid form (water) and recycled through the system again to drive the steam turbine generator. The solar heat used in the boiler (steam) process would be supplemented by two propane-fired auxiliary boilers that would provide steam to supplement plant start-up and also preheat HTF whenever its temperature drops below 76 degrees Fahrenheit (°F), (08-AFC 2-9). The total supplemental heat derived from the propane-fired auxiliary boilers is not expected to surpass 1 percent of power generation.

The power block facility would include the main electrical building, two propane-fired auxiliary boilers, an air emission control system for the combustion of propane in the auxiliary boilers, a steam turbine generator, a cooling tower, water treatment equipment, a hazardous materials storage area, propane storage and delivery system, auxiliary equipment (emergency diesel generator, diesel fire pump, etc.), a raw water storage tank (2.9 million gallons), a treated water storage tank (2.4 million gallons), a de-mineralized water storage tank (150,000 gallons), and a neutralization water storage tank (80,000 gallons). Other support facilities include:

- a land farm for remediation of contaminated soils;
- an administration building and warehouse;
- three 2-acre, evaporation ponds (6acres total);
- on-site access and maintenance roads (dirt road);
- rerouted and engineered desert dry wash; and
- perimeter fencing.

Please see **Project Description Figures 3, 4, and 5**.

WATER DEMAND AND SOURCE OF SUPPLY

If built as proposed, the project would consume approximately 1,400 acre-feet of potable water per year. There are 12 existing water supply wells that were previously used to support alfalfa farming on the project site. As shown on **Project Description Figure 3**, the applicant proposes that three of these wells (Nos. 41, 49, and 63) be used to supply the project's water needs. The wells draw water from a lower aquifer at a depth of approximately 600 feet below ground surface. The most significant demand for water would be the proposed wet cooling tower. Additional water would be required for make-up to the solar thermal and steam turbine system, washing of solar reflectors and collectors, potable water needs, and fire protection. The water is expected to be treated on site using a package water treatment system. The treatment system would be comprised of equipment for filtering, softening, de-mineralizing, and sanitizing the raw water.

WATER TREATMENT SYSTEMS

The water treatment process includes the post-treatment brine concentrator system, which allows the treatment process to be classified as a partial ZLD system. The discharge (blowdown) from the brine concentrator system consists of highly concentrated waste water that is directed to evaporation ponds.

The overall water treatment system will include a pre-treatment ion exchange unit to reduce scale-forming species from entering the cooling water system. The pre-treatment system will contain cation exchange vessels, a degasifier, and anion exchange vessels, along with associated piping, pumps, valves and tanks.

To further inhibit mineral scale formation, an organic phosphate inhibitor solution may be fed into the circulating water system in an amount proportional to the circulating water blowdown flow. The inhibitor solution feed equipment includes a bulk storage tank and two full-capacity metering pumps. To inhibit biofouling, sodium hypochlorite is shock-fed into the circulating water system as a biocide. The sodium hypochlorite feed equipment also includes a bulk storage tank and two full capacity metering pumps.

EVAPORATION PONDS

Three evaporation ponds will be required, each with a nominal surface area of two acres, for a total surface area of six acres. The ponds will be designed with an average depth of eight feet which allows for two feet of freeboard, three feet of wastewater and three feet of accumulated solids.

The pond liner system is expected to consist of a 60 mil high density polyethylene (HDPE) primary liner and a minimum 40 mil HDPE secondary liner. Between the liners is a synthetic drainage geonet that is used as part of the leachate collection and removal system (LCRS). There will be a hard surface protective layer on top of the 60 mil HPDE, which will consist of a non-woven geotextile, one foot thick granular fill/free draining material and a one foot thick hard surface such as roller-compacted concrete.

WASTEWATER AND SLUDGE

The BSEP would have two types of wastewater streams. The primary wastewater stream would come from cooling tower blowdown and be piped to on-site evaporation ponds where the solids would settle to the bottom and the water would evaporate. For safety and operational purposes, the ponds will be cleaned when three feet of sludge has accumulated in the base of the ponds, which is estimated to be every four and one-half years.

PROPANE STORAGE AND DELIVERY SYSTEM

The propane storage and delivery system would consist of an uploading station, storage tanks, vaporizing skids, and other ancillary equipment. Safety pressure relief valves, regulators, excess flow valves, and an emergency shutdown system would be included in the storage and delivery system. There would be two storage tanks designed and built in accordance with ASME Section VIII. Each tank would be constructed from carbon steel and have storage capacity of 18,000 gallons.

AIR POLLUTION CONTROL

Air pollution emissions from the combustion of propane in the auxiliary boilers would be controlled using the best available control technology (BACT). To ensure that the systems perform correctly, continuous emission monitoring for nitrogen oxides (NO_x), carbon monoxide (CO), and other pollutants would be performed. Annual propane usage is expected to be approximately 410,000 gallons.

HAZARDOUS WASTE MANAGEMENT

Several methods would be used to properly manage and dispose of hazardous wastes. Waste lubricating oil would be recovered and recycled by a waste oil recycling contractor. Chemicals would be stored in appropriate chemical storage facilities. Bulk chemicals would be stored in large storage tanks, while most other chemicals would be stored in smaller returnable delivery containers. All chemical storage areas would be designed to contain leaks and spills in concrete containment areas. The applicant would have an approved Risk Management Plan in place to deal with any potential problems related to the use and handling of hazardous waste.

FIRE PROTECTION

The fire protection system would be designed to protect personnel and limit property loss and plant downtime in the event of a fire. The primary source of fire protection water would be the raw water storage tank. An electric jockey pump and electric motor-driven main fire pump would be provided to increase the water pressure to the level required to serve all fire fighting systems. In addition, a backup diesel engine-driven fire pump would be provided to pressurize the fire loop if the power supply to the electric motor-driven main fire pump fails. Fire support services to the site would be under the jurisdiction of the Kern County Fire Department (KCFD). Station 14 is 19 miles from the project site, located at 1953 Highway 58, Mojave, California, and would be the first responder to BSEP with a response time of approximately 23 minutes. Kern County Fire Department also has mutual aid agreements with California City Fire Department and Edwards Air Force Base for responses requiring more assistance.

In Kern County, hazardous materials permits and spills are handled and investigated by KCFD. Kern County firefighters receive specialized training to address emergency responses to industrial hazards, and response would come from the same facilities as for fire services response.

TRANSMISSION SYSTEM INTERCONNECTION AND UPGRADES

The proposed BSEP project would be located approximately 1.5 miles north of the 230 kilovolt (kV) Barren Ridge Switching Stationed owned by the Los Angeles Department of Water and Power (LADWP). The BSEP project would interconnect to the Barren Ridge Switching Station as the primary point of interconnection (POI). According to an LADWP Systems Impact Study (SIS), dated July 31, 2008, the proposed primary POI configuration has demonstrated acceptable system performance, and system additions would be provided solely for the BSEP primary POI configuration at the Barren Ridge Switching Station (DB 2008l).

The new interconnection would be made by using the Option 1 route, as identified in the AFC. The Option 1 route would be approximately 3.5 miles in length. The interconnection would be made by installing a new 230-kV line using up to 39 concrete monopoles. Each monopole would average 79 feet in height and be spaced approximately 500 feet apart (see **Project Description Figure 3**).

LADWP is currently proposing to develop the Barren Ridge Renewable Transmission Project (BRRTP), which will include upgrades and building a new transmission line from Barren Ridge Switching Station to Castaic Power Plant near Santa Clarita. The upgrade is meant to serve new renewable power generation projects in the Mojave Desert and Tehachapi Mountain areas. However, as stated above, the BSEP project is not dependant on the BRRTP improvements.

TELECOMMUNICATIONS FACILITIES

The BSEP will obtain telecommunications service by connecting to existing capacity located on Neuralia Road, directly east of the project site. The new service connection will be made by obtaining an easement to use the existing utility poles and maintenance access road owned by Southern California Edision (SCE). The existing SCE electrical distribution line runs from Neuralia Road to through the project site.

PROJECT CONSTRUCTION AND OPERATION

If approved by the Energy Commission, the applicant expects project construction to take 25 months to complete, with an average workforce of 477 employees and a peak workforce of approximately 836 workers. Development and construction is expected to cost approximately $950 million. Typical operating hours for the project would be an average of approximately 12 hours per day equating to an annual average of 4,380 hours per year (DB 2008l).

FACILITY CLOSURE

The BSEP would be designed for an operating life of between 30 years to 40 years. Depending on maintenance factors, at an appropriate point beyond the designed operating life, the project would cease operation and close down. At that time, it would be necessary to ensure that the closure occurs in such a way that public health and safety and the environment are protected from adverse impacts.

Although the setting for this project does not appear to present any special or unusual closure problems, it is impossible to foresee what the situation would be in 30 years or more when the project ceases operation. Therefore, provisions must be made which provide the flexibility to deal with the specific situation and project setting at the time of closure. Facility closure would be consistent with laws, ordinances, regulations, and standards in effect at the time of closure.

REFERENCES

BS 2008a - FPL Energy/M. O'Sullivan (tn 45646). Application for Certification, dated 03/13/08. Submitted to CEC/Docket Unit on 03/14/08.

BS 2008c - Beacon Solar, LLC/G. Palo (tn 45972). AFC Volume 3 - Data Adequacy Supplement, dated 04/18/08. Submitted to CEC/Docket Unit on 04/21/08.

BS 2008f – FLP Energy (tn 46698). CEC Informational Hearing - Applicant's Slide Presentation, dated 06/11/08. Submitted to CEC/Docket Unit on 06/16/08.

BS 2008h - Beacon Solar, LLC/M. Argentine (tn 48141). Applicant's Response to Questions from Rancho Seco Residents, dated 09/19/08. Submitted to CEC/Docket Unit on 09/22/08.

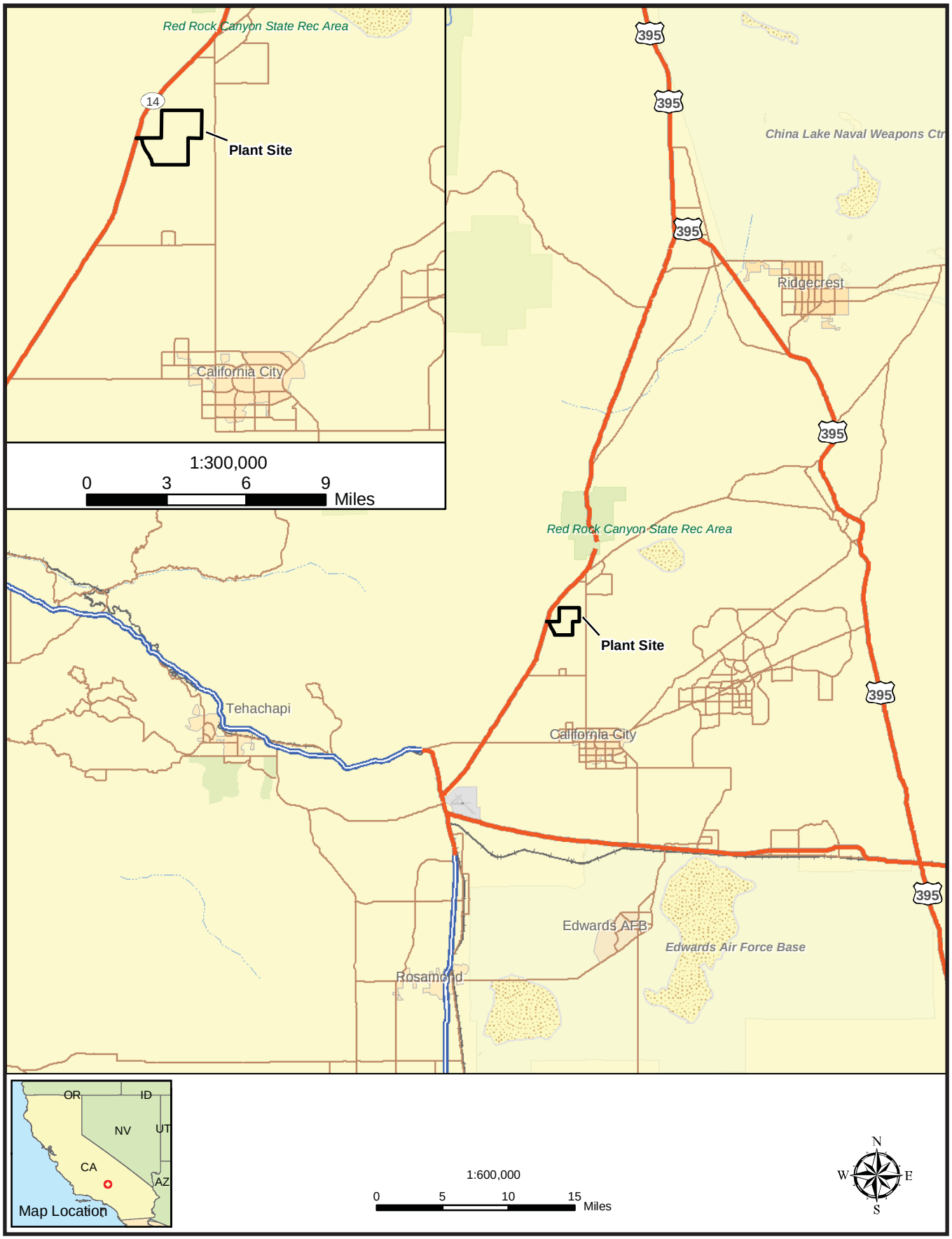
BS 2008i – Beacon Solar, LLC/M. Russell (tn 49439). Beacon Responses to Question Set #2 From Rancho Seco Residents, dated 12/05/2008. Submitted to CEC/Docket Unit on 12/17/08.

DB 2008l - Downey Brand/J. Luckhardt (tn 47885). Responses to Data Requests 50-52, dated 09/02/08. Submitted to CEC/Docket Unit on 09/02/08.

DB 2009r – Downey Brand/S. Rowlands (tn 52116). Applicant Project Design Refinements, dated 6/22/09. Submitted to CEC/Docket Unit on 6/22/09.

PROJECT DESCRIPTION - FIGURE 1

Beacon Solar Energy Project - Regional and Vicinity Map



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AFC Figure 1-1

PROJECT DESCRIPTION - FIGURE 2

Beacon Solar Energy Project - Plant Site Photographs - Existing Conditions

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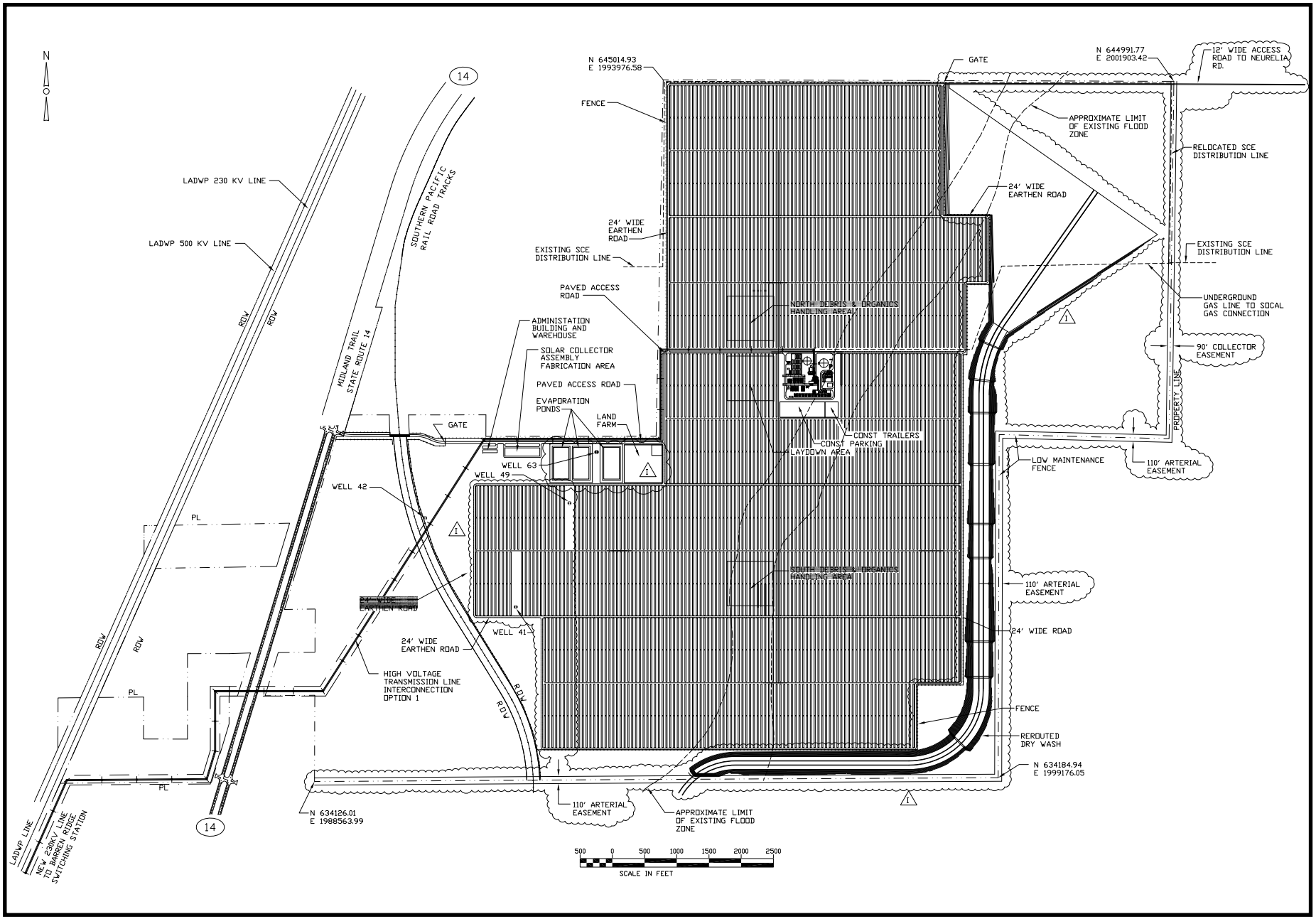
SOURCE: AFC Figure 2-2

PROJECT DESCRIPTION - FIGURE 3

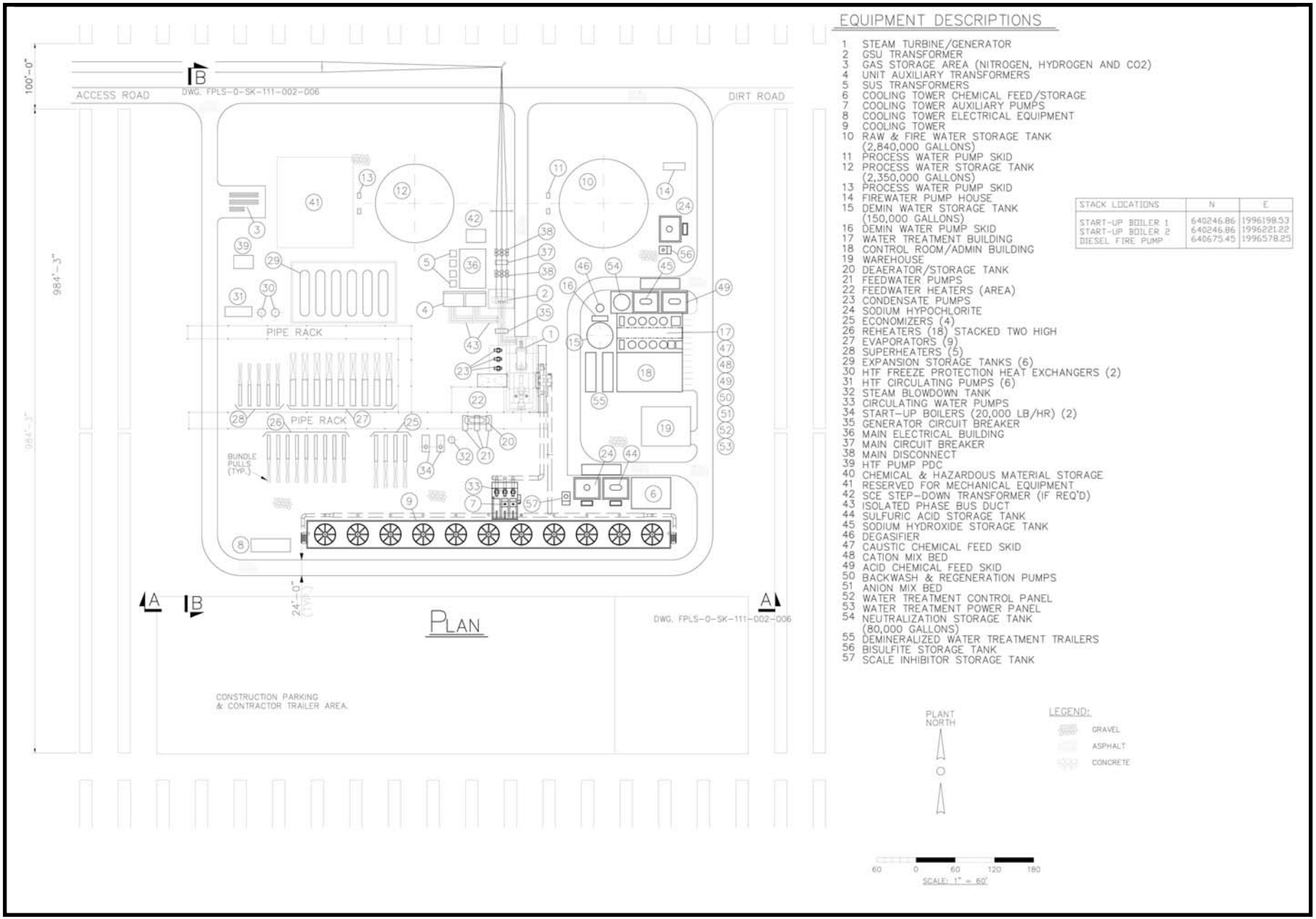
Beacon Solar Energy Project - General Arrangement Site Plan



SOURCE: 2009 Applicant Project Design Refinements

PROJECT DESCRIPTION - FIGURE 4

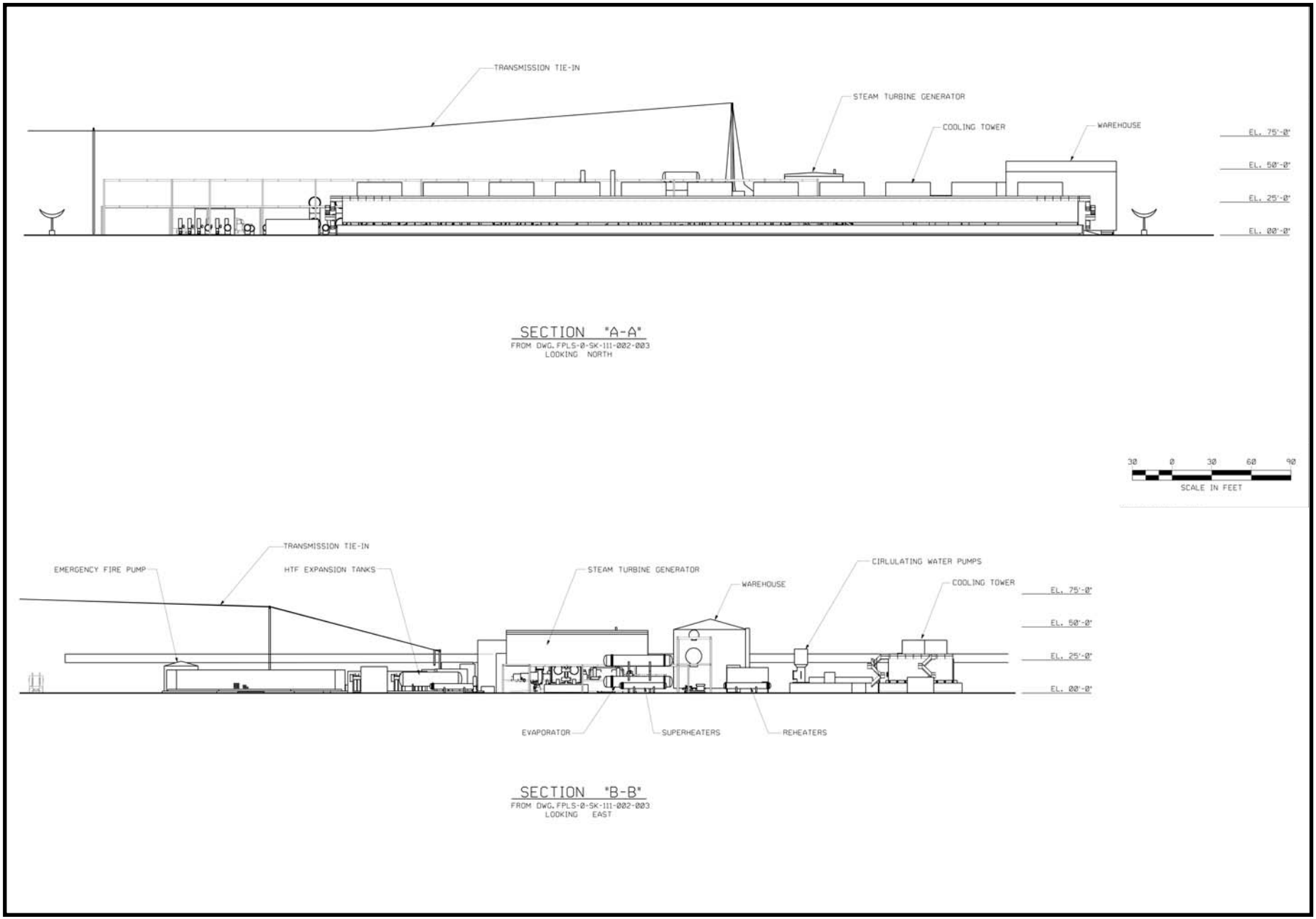
Beacon Solar Energy Project - General Arrangement Power Block Equipment Layout



SOURCE: AFC Figure 2-5

PROJECT DESCRIPTION - FIGURE 5

Beacon Solar Energy Project - General Arrangement Power Block Elevation Views



SOURCE: AFC Figure 2-6