DOE/EA-1797

FINAL ENVIRONMENTAL ASSESSMENT

FOR

DEPARTMENT OF ENERGY LOAN GUARANTEE FOR THE AGUA CALIENTE SOLAR PROJECT IN YUMA COUNTY, ARIZONA

U.S. Department of Energy
Loan Guarantee Program Office
Washington, DC 20585

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ACRONYMS AND ABBREVIATIONS

	Full Phrase
ACC	Arizona Corporation Commission
CEC	Certificate of Environmental Compatibility
CO_2	carbon dioxide
DOE	U.S. Department of Energy
EIA	Energy Information Administration
EPA	U.S. Environmental Protection Agency
EPAct 2005	Energy Policy Act of 2005
MW	megawatt
NO_x	nitrogen oxides
OSHA	Occupational Safety and Health Administration
ppm	parts per million
PV	photovoltaic
SHPO	State Historic Preservation Office
SUP	Special Use Permit
SWPPP	Storm Water Pollution Prevention Plans

EXECUTIVE SUMMARY

Introduction

The U.S. Department of Energy (DOE) is proposing to issue a loan guarantee to Agua Caliente Solar, LLC (Applicant) for the design and construction of the Agua Caliente Solar Project (Project) located in Yuma County, Arizona.

DOE has prepared this Environmental Assessment (EA) to comply with the National Environmental Policy Act (NEPA) (42 USC 4321, et. seq.), the Council on Environmental Quality's regulations for implementing NEPA (40 CFR Parts 1500-1508) and DOE's NEPA regulations (10 CFR Part 1021). The EA examines the potential impacts associated with the proposed action and No Action Alternative to determine whether the proposed action has the potential for significant environmental impacts. If no significant impacts are identified during preparation of this EA, DOE will issue a Finding of No Significant Impact (FONSI). If potentially significant impacts are identified, DOE will prepare an environmental impact statement (EIS). DOE will use the information from the NEPA process to inform its funding decision.

Purpose and Need

The Energy Policy Act of 2005 (EPAct 2005) established a Federal loan guarantee program for eligible energy projects that employ innovative technologies. Title XVII of EPAct 2005 authorizes the Secretary of Energy to make loan guarantees for a variety of types of projects, including those that ''avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases; and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued." The two principal goals of the loan guarantee program are to encourage commercial use in the United States of new or significantly improved energy-related technologies and to achieve substantial environmental benefits by reducing reliance on fossil fuels and reducing greenhouse gas emissions.

Agua Caliente Solar, LLC submitted an application to DOE under the federal loan guarantee program pursuant to the Energy Policy Act to support construction of a 290 megawatt gross output photovoltaic (PV) solar power plant. The Agua Caliente Solar Project would utilize a PV technology using cadmium-telluride solar panels. To date, the largest operating PV power plants within the United States that use the proposed cadmium telluride (CdTe) thin film PV module technology are 21 MWs and 10 MWs in size with 6 months and 2 years of operating experience, respectively. The proposed Agua Caliente Project would be several times larger than any of these projects.

In addition, as a result of the large size of the Project, it will employ new inverter technology to support and improve the reliability of the electric power system. This technology, referred to as "Fault Ride-Through" technology, requires the use of new and innovative solar inverters designed to keep the Project operational during certain fault conditions on the electric grid. Also, the Project will employ new "dynamic voltage regulation" technology in the inverters to support and improve the reliability of the electric power system.

The purpose and need for agency action is to comply with the DOE mandate under the Energy Policy Act by selecting eligible projects that meet the goals of the Act. DOE is using the NEPA process and this EA to assist in determining whether to issue a loan guarantee to the Applicant to support the proposed Project.

Proposed Action and Alternatives

DOE's proposed action is to issue a loan guarantee to the Applicant for design and construction of the Agua Caliente Solar Project, a proposed solar power generating facility that uses PV technology. This Project would generate 290 megawatts gross output of renewable energy that is expected to help meet national, regional, and state renewable energy goals, help offset the production of greenhouse gases, and reduce the dependence on foreign energy.

The Project is located in Yuma County, Arizona approximately 10 miles north of Dateland and about 45 miles west of Gila Bend and 65 miles east of Yuma. **Figure ES-1** shows the general location of the Project. The Project would be located on a portion of a 3,800 acre private agricultural property referred to as the "Whitewing Ranch" (Property) located along Palomas Road (also referred to as Palomas/Hyder Road). The Project site would occupy approximately 2,400 acres of the Property (Site). The remaining acres of the Property would be leased for continued agricultural use. Construction of the Project would begin in the third quarter of 2010 and commercial operation for the entire facility is scheduled for 2014. However, given the modular nature of the PV technology, the Project is expected to become operational in phases, with the first phase in service as early as 4th quarter 2011.

Alternatives that were considered but dismissed are discussed in Section 2. A no action alternative is also evaluated in this EA, which assumes that DOE would not provide a loan guarantee to Agua Caliente Solar to construct the Project. While there is a possibility the Project would be constructed without DOE's loan guarantee, for purposes of NEPA review, the no action alternative assumes that the Project would not be built. Information from this alternative would establish a base line against which the proposed action alternative can be compared.

Summary of Environmental Effects

Based on the analysis of the EA, DOE expects no significant adverse impacts from construction and operation of the Project. Additionally, DOE expects the solar energy generated by the Project to have potential beneficial impacts on global climate change and air quality because it may off-set the need for energy produced by burning fossil fuels.

The No Action Alternative would have no impacts on the resources evaluated in the EA but would not realize the beneficial impacts of bringing additional renewable energy capacity to market.

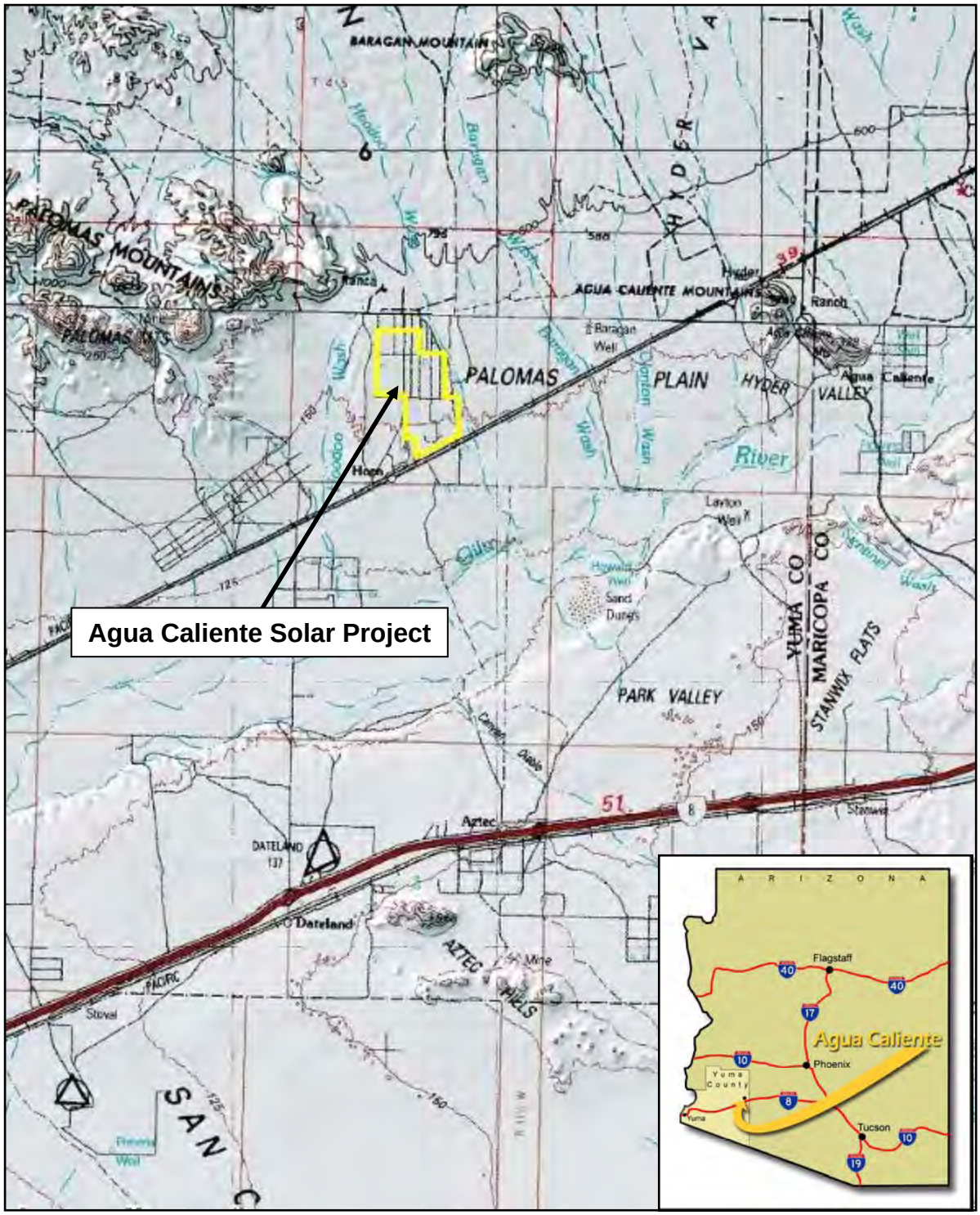


Figure ES-1
AGUA CALIENTE SOLAR PROJECT
Project Location

CHAPTER 1
PURPOSE AND NEED

1.1 Purpose of and Need for Action

DOE's proposed action is to issue a loan guarantee to Agua Caliente Solar, LLC (Applicant) that would be used for the design and construction of the Agua Caliente Solar Project located in Yuma County, Arizona (Project).

The Energy Policy Act of 2005 (EPAct 2005) established a Federal loan guarantee program for eligible energy projects that employ innovative technologies. Title XVII of EPAct 2005 authorizes the Secretary of Energy to make loan guarantees for a variety of types of projects, including those that ''avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases; and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued." The two principal goals of the loan guarantee program are to encourage commercial use in the United States of new or significantly improved energy-related technologies and to achieve substantial environmental benefits by reducing reliance on fossil fuels and reducing greenhouse gases. Rising energy prices and global climate change resulting from elevated greenhouse gases in the atmosphere provide further need for the accelerated commercial use of new and significantly improved energy technologies. The purpose and need for agency action is to comply with DOE's mandate under EPAct 2005 by selecting eligible projects that meet the goals of the Act. DOE is using the National Environmental Policy Act (NEPA) process to assist in determining whether to issue a loan guarantee to the Applicant to support the proposed Project.

Executive Order 13212, dated May 18, 2001, also mandates that agencies act expediently and in a manner consistent with applicable laws to increase the "production and transmission of energy in a safe and environmentally sound manner." The Project has a Power Purchase Agreement (PPA) with a utility in the State of California, and the utility must have an energy portfolio consisting of 33% renewable energy by 2020. These state and federal policies and regulations provide a further purpose and need for the Project.

The proposed Project would utilize a photovoltaic (PV) technology using cadmium telluride (CdTe) solar panels. To date, the largest operating PV power plants within the United States that use the proposed CdTe thin film PV module technology are 21 MWs and 10 MWs in size with 6 months and 2 years of operating experience, respectively. The proposed Project would be 290 MWs. The current combination of decreasing PV module prices, increasing module efficiencies, improved and innovative inverter technology, and regulatory / government incentives is improving the viability of large utility-scale projects using these technologies. However, financing large scale PV projects that would use these state-of-the-art technologies is currently constrained because being innovative means it is less proven and the credit crisis has reduced the financing options that are available for a project this large. Although it is possible that the Project would be built without the loan guarantee, it would take longer to attract financing and would likely be built out more slowly and in phases over time.

Financially supporting the Project would facilitate the deployment of state-of-the art PV technology in large utility-scale commercial projects, potentially making renewable, solar-generated electricity more efficient.

PV panels generate electricity without producing significant carbon emissions. To the extent PV projects displace natural gas and other fossil fuels used to produce electricity, PV installations reduce generation of carbon dioxide (CO_2) and other greenhouse gasses. The Applicant expects the Project to generate 690,298 gross megawatt hours per year (MW-hrs/yr) of output (or 20,708 gigawatt hours of electricity over the 30 year life of the Project). The potential reduction in GHGs related to operation of the Project has been estimated using the eGRID estimate (USEPA 2007) of CO_2 emissions per MWh. Assuming that the Project operates for 30 years and that the capacity of the Project displaces electricity produced by conventional fossil-fueled power plants (both natural gas and coal), the estimated Project-related net reduction of GHGs is 236,898 metric tons of GHG emissions annually or 7,063,236 metric tons of GHG over the 30-year Project life.

Therefore, the Project potentially could contribute to the avoidance and reduction of air pollutants and anthropogenic emissions of greenhouse gases, as required by EPAct 2005.

The proposed Agua Caliente Solar Project would also create between 150 and 450 construction related jobs (numbers would vary depending on the stage of construction) during the duration of the construction period, which is expected to begin by the end of 2010 and continue through 2014. The ongoing operation of the Facility would also require approximately 15 to 20 full time workers.

1.2 Background

The Project has obtained a Special Use Permit (SUP) from Yuma County and a Certificate of Environmental Compatibility (CEC) from the State of Arizona authorizing the development of the Project on this Site. This confirms that the proposed use is consistent with adjacent land uses, is in conformity with the County's zoning and land use plans, and is consistent with the State siting requirements for energy facilities. No party opposed the Project during the processing of the SUP or the CEC and thus issuance of a loan guarantee is unlikely to create controversy.

1.3 Scope of this Environmental Assessment

This EA presents information on the potential impacts associated with guaranteeing a loan to the Applicant and covers the design and construction of the Project. DOE has prepared this EA in accordance with the NEPA, Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500−1508), and DOE NEPA Implementing Procedures (10 CFR 1021). If no significant impacts are identified during preparation of this EA, DOE will issue a Finding of No Significant Impact (FONSI). If potentially significant impacts are identified, DOE will prepare an environmental impact statement (EIS).

This EA: (1) describes the affected environment relevant to potential impacts of the proposed action and No Action Alternative; (2) analyzes potential environmental impacts that could result from the proposed action and No Action Alternative; (3) identifies and characterizes cumulative impacts that could result from the proposed action in relation to other ongoing or reasonably foreseeable activities within the surrounding area; and (4) provides DOE with environmental information for use in decision-making to protect, preserve, and enhance the human environment and natural ecosystems.

1.4 Public Participation

Under NEPA regulations, scoping is not formally required for the preparation of an EA (40 CFR Part 1501). However, Agua Caliente Solar has conducted an extensive public outreach program as part of its project development protocol and associated with its state and local permitting processes. These efforts were designed to distribute information about the Project and solicit input from the public and interested stakeholders. These outreach efforts included interactions with stakeholders via one-on-one briefings, stakeholder meetings, an open house, and formal hearings. In addition, a Project website, Project mailings, media announcements, fact sheets, and a toll-free telephone information line were also used to communicate with interested parties.

Throughout the ongoing outreach process, the Project received support from the local community, Yuma County, and the State. The public outreach efforts that were conducted for the Project are summarized below.

Stakeholder Briefings

The focus of the stakeholder briefings was to provide information about the Project, technology, the need for and benefits of the Project, schedule, and to gain local input. Agua Caliente Solar met individually with elected officials, agency staff, and other interested stakeholders. A list of the entities contacted is included in Chapter 7.

Stakeholder Meeting

Agua Caliente Solar also held a Stakeholder Meeting to coordinate with agency staff, local landowners, and community leaders within the Project area. The meeting was held on December 12, 2008 at the Dateland Elementary School. Over 35 people attended the meeting.

Open House Meeting

The Project team held an Open House on January 22, 2008 at the Dateland Elementary School. The Applicant used several methods to reach out to the public and invite them to the Open House. An invitation to the Open House was mailed to all residents within the Dateland zip code as well as zip codes within 12 miles of the Project site. Additionally, Open House announcements were sent home with students of the Dateland Elementary School and advertisements of the Open House were published in the Yuma County Sun. Over 100 people attended the Open House from the local community and broader Yuma County.

Project Update Outreach

During the Project design phase, both concentrating solar power (CSP) technology and PV technology were considered in order to provide customers with the opportunity to state a preference for one technology over another. CSP was the first technology considered in the design phase, and PV was included at a later date. To ensure the public was fully aware of the updated Project options being considered by the proponent, an additional round of public outreach was conducted during April and May 2009. Stakeholder briefings and a Project status meeting were conducted on April 22. Meetings were held with key stakeholders identified during the initial public process to provide information about the inclusion of PV technology, and to obtain any local input. In addition, a Project Status Update was mailed to the community. PV technology was eventually selected for the Project.

Permit Process Hearings

The Project applied at the State and local level for two key permits: (1) a Certificate of Environmental Compatibility (CEC); and (2) a Special Use Permit (SUP). After these State and local permit applications were filed for the Project, public notice was made and additional public hearings were held by the responsible permitting agencies. These hearings are summarized below:

- Certificate of Environmental Compatibility – Arizona Corporation Commission
  - Arizona Power Plant and Transmission Line Siting Committee Hearings – July 21/22, 2009 in Dateland / Wellton, Arizona
  - Commission Hearing – September 22, 2009 in Phoenix, Arizona
- Special Use Permit – Yuma County
  - Planning and Zoning Commission Hearing – July 27, 2009 in Yuma, Arizona
  - Board of Supervisors Hearing - August 17, 2009 in Yuma County

In addition to the briefings and meetings, the Project team maintains a Project web site (www.AguaCalienteSolarProject.com) that includes details about the Project, maps and graphics, Project schedules, and general Project information and also maintains a toll-free number for interested parties to call for more information. The CEC and SUP permits were obtained on October 7 and September 9, 2009 respectively.

Availability of the Environmental Assessment

DOE distributed the draft EA to the Arizona Department of Environmental Quality and to interested tribes for review and comment for a period of 30 days. DOE also published a Notice of Availability announcing the draft EA and floodplain assessment were open for public comment in the *Yuma Sun* and had the draft EA available on the Loan Programs Office website with commenting instructions. The Final EA is also available on the Loan Programs Office NEPA documents webpage (located at http://www.lgprogram.energy.gov/NEPA_EA.html).

1.5 Document Organization

This EA has been organized into the following sections. A list of acronyms and abbreviations follows the Table of Contents.

Chapter 1, Purpose and Need, describes the purpose of and need for the proposed DOE action, the background of the Loan Guarantee Program, and the scope of the analysis. It also describes the organization of the EA.

Chapter 2, Proposed Action and No Action Alternative, discusses the proposed action, alternatives considered, and the No Action Alternative.

Chapter 3, Affected Environment and Environmental Consequences, describes the existing baseline conditions of the resources that may be affected by implementing the proposed action (including land use, visual resources, air quality, noise, geology and seismicity, water resources, biological resources, cultural resources, socioeconomics and environmental justice, public health and safety, and transportation) and the potential social, economic, and environmental effects associated with the proposed action and No-Action Alternative.

Chapter 4, Cumulative Effects, describes potential impacts to the environment from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions.

Chapter 5, List of Preparers, provides a brief description of credentials for the preparers of the EA.

Chapter 6, List of Agencies Contacted, provides a list of agencies contacted regarding this EA.

Chapter 7, References, describes the sources of information used in preparing the EA.

CHAPTER 2
PROPOSED ACTION AND ALTERNATIVES

This chapter provides information on Agua Caliente Solar Project and describes the proposed action, the alternatives considered and the No Action Alternative.

2.1 Description of Proposed Action

DOE's proposed action is to issue a loan guarantee to the Applicant for the design, construction, and operation of the Project. The Applicant submitted an application to DOE under the Federal loan guarantee program pursuant to Section 1703 of the EPAct 2005.

2.1.1 The Proposed Project and Site

The proposed project that may receive DOE financial assistance involves construction of the Project. The Project would generate approximately 290 MWs of renewable energy through the use of PV technology. The Project would be located in a remote area in eastern Yuma County (Figure ES-1). The Project has obtained a Special Use Permit from Yuma County and a Certificate of Environmental Compatibility from the State of Arizona authorizing the development of the Project on the Site. These permits confirm that the proposed use is consistent with adjacent land uses, is in conformity with the County's zoning and land use plans, and is consistent with the State siting requirements for energy facilities.

The Project would occupy approximately 2,400 acres. Equipment and facilities have been arranged for optimum use of the Site as well as to ensure efficient operability and maintainability. The overall Site plan for the Project is depicted on **Figure 2-1** and indicates the location and size of the proposed equipment and improvements, all located within property owned by the Applicant, including the solar module field, access roads, the Project substation, the Q43 switchyard, and the short transmission line (Gen-Tie line) interconnecting the Project substation to the adjacent Q43 switchyard. **Figure 2-2** is an artist's rendering showing the Project and all related components.

Most of the 2,400-acre Site would be disturbed by construction of the Project. Temporary construction lay down, construction trailers and parking areas would be provided within the Site.

Technology Description

The proposed Project consists of a utility-scale solar photovoltaic facility utilizing cadmium telluride solar panels (PV modules), which have been commercially proven on a smaller scale. The Project would be one of the largest solar projects of any technology in the world based on megawatts of alternating current (MWac) capacity. The PV modules would be set on fixed tilt PV mounting structures, as described below.

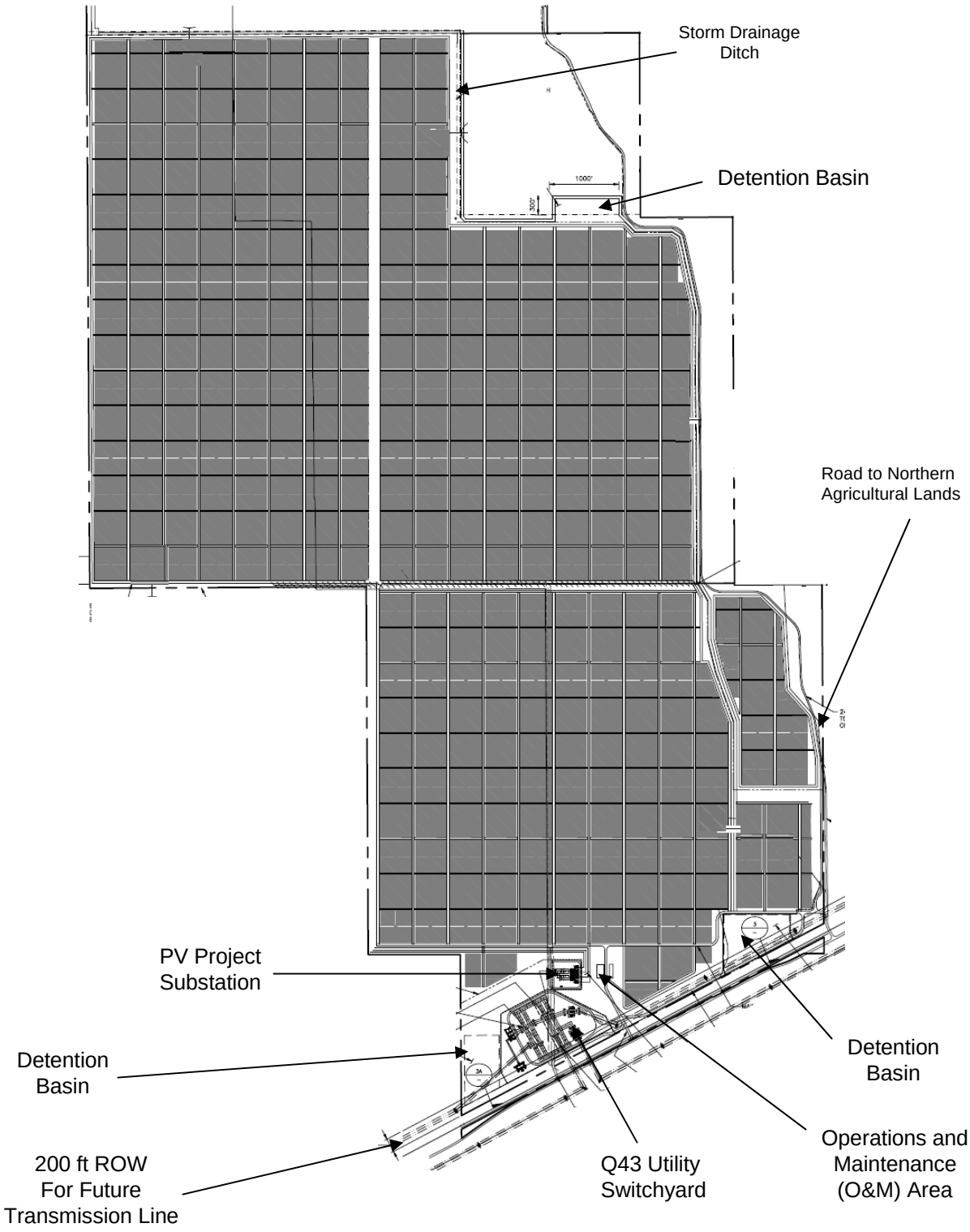


Figure 2-1

General Arrangement of Agua Caliente PV Project

Agua Caliente
SOLAR PROJECT

Figure 2-2

Artist's Rendering
of
AGUA CALIENTE SOLAR PROJECT

The PV modules are non-reflective and convert sunshine into direct current (DC) electricity at a predicted conversion efficiency up to 11 percent. The DC output of multiple rows of PV modules is collected through one or more combiner boxes and then directed to one of several inverters located throughout the solar field. Each inverter converts the DC power to alternating current (AC) power, and the AC power then flows to a transformer where it is stepped up to collection level voltage. Multiple transformers are connected in parallel in a daisy chain configuration to the Project substation, where the power is delivered to the grid at the Q43 switchyard.

All of the electricity generated by the Project is generated through the conversion of solar energy to electricity by the PV modules, which qualify as renewable energy resources under state and federal Renewable Energy Standards. The PV modules would not directly consume fossil fuels of any type. The Project may require some electricity from the grid to keep transformers warm during non-daylight hours, operate the backup firewater pump, and provide service to the operations and maintenance (O&M) building.

The major Project equipment includes the following:

- PV modules with cadmium telluride solar panels;
- Fixed tilt mounting structures;
- DC to AC inverters, rated between 500 kW and 3,000 kW;
- Three-phase, pad-mounted medium voltage transformers, or similar; and step-up transformer.

The design calls for fixed tilt PV modules, inverters, and transformers to be combined into approximately 1MW, or larger, blocks that are repeated to reach the full contract capacity. The inverter and transformer manufacturers and capacities would be selected based on cost, efficiency, reliability, and market availability of these units.

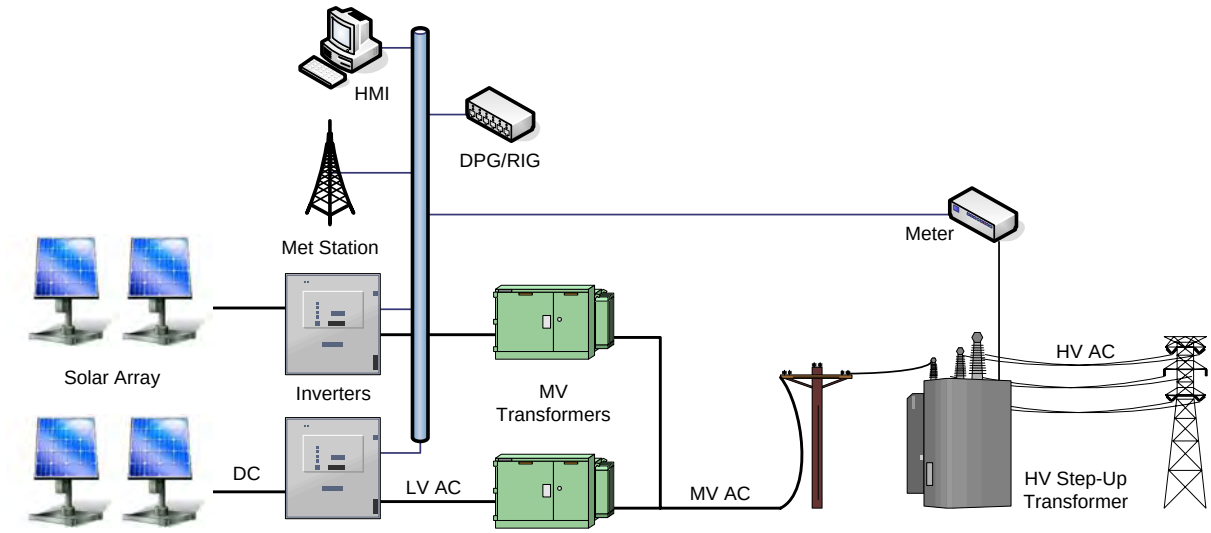
The PV panels would be mounted on fixed-tilt structures. Using this mounting system, the PV modules would be mounted onto steel frame structures, approximately 6 feet off the ground, facing south and arranged on an east-west axis, angled towards the sun. The angle of the tilt would be optimized during the design stage to optimize energy delivery and cost of energy. Additionally, the southerly-facing surface of the panel arrays may be slightly rotated to the southwest to maximize power generation during peak afternoon periods. Support columns of the structure are expected to be driven into the ground to 3 to 4 feet to provide structural support for the arrays of PV modules.

The concrete electrical equipment pads that support the inverters and other electrical equipment are approximately 15 feet by 60 feet; however, these dimensions would vary depending upon the number of inverters and other equipment per pad. The electrical equipment enclosures are approximately 12 feet high. The enclosures would be painted a light, non-reflective color to avoid reflection and glare.

The wiring from the solar panels delivers the DC power along underground trenches and above ground conduit to the inverters located on the electrical equipment pads. The inverters convert

the DC power to AC which is then stepped up to approximately 34.5-kV through a transformer. This power is delivered along an overhead collection system to the Project substation; there, the power is stepped up to 500 kV for interconnection to the electrical grid.

The following is a diagram of the Generation Process:



DC – Direct Current
AC – Alternating Current
HMI – Human-Machine Interface
LV – Low Voltage
MV – Mid Voltage
HV- High Voltage
Met Station – Meteorological Station
DPG/RIG – Data Processing Gateway/Remote Intelligent Gateway

The Project would have a Supervisory Control and Data Acquisition (SCADA) system that would allow for the remote monitoring and control of inverters and other Project components. The SCADA system would be able to monitor Project output and availability, and to run diagnostics on the equipment.

The Project would have one or more meteorological monitoring stations with a height of approximately 10 feet to track solar insolation (radiation intensity), temperature, wind direction and speed and other parameters.

Electrical Interconnection

The DC output of multiple rows of PV modules is collected through one or more combiner boxes and directed to an inverter. The inverter converts the DC power to AC power, which flows to a transformer where it is stepped up to collection level voltage. Multiple transformers are connected in parallel through electrical switchgear in a daisy chain configuration to the Project substation, where the power is stepped up to 500 kV and delivered to the grid via interconnection with the new Q43 switchyard.

The Project interconnection with the high voltage transmission system would be through the existing Palo Verde - North Gila #1 500kV transmission line located along the southern Project boundary. A very short (single span) 500 kV Gen-Tie line measuring approximately 250 feet

would be built from the Project substation to the new Q43 switchyard being built by a local utility, Arizona Public Service. The Q43 switchyard would occupy approximately 30 acres of the Site.

During non-daylight hours, the Project would require small amounts of electricity from an external source for the O&M building, to keep transformers warm during non-daylight hours, and for plant lighting and security. This station service power is estimated 5,840 MW-hrs of electricity per year and would be provided by Arizona Public Service. Power from the distribution service would be stepped down to an appropriate voltage to support plant auxiliaries and would be connected to the station service power switchgear.

Water Use / Sources

The Project would utilize 150 acre-feet of water per year during construction of the facility for dust control. Less than 20 acre-feet would be consumed annually for operation of the Project, including for panel washes and domestic use. Water would be provided from existing on-site wells that had previously supported the agriculture on the Site.

Stormwater Drainage / Erosion Control

The Project is located on property currently used for irrigated agricultural production. The Site is made up of a series of laser leveled fields that are separated by roads and ditches. Currently, the fields have elevation drops between each of the individual fields (across the roads and ditches) of between zero and three feet. On the whole, the elevation drops represent a general fall in elevation from the northwest corner of the Site to the south east of the Site of about 0.5%.

The current topography is suitable for the placement of PV panels with little site preparation or improvements required. Most of the Site would be drained by sheet flow (direct overland flow of water) to on- and off-site drainages. A stormwater collection system would be implemented to meet the criteria outlined in the “Public Works Standards for Yuma County, Volume III, Storm Drainage Facilities”, and the “Yuma County Ordinance Regulation Stormwater Quality Management” and the requirements of the stormwater regulations administered by Arizona Department of Environmental Quality (ADEQ). These include best management practices (BMPs) to minimize erosion and sediment run-off.

Maintenance roads would be maintained in an east west and north south direction within the solar field. Stormwater that does not infiltrate would be directed, via the collection ditch on the east side of the Site, into a new detention pond located in the southeast area of the Site.

Fire Protection

The Project’s fire protection water system would be supplied from a dedicated raw water storage tank, holding a minimum of 2-hours of full flow runtime, located on the Project Site. One electric and one diesel-fueled backup firewater pump would be installed to deliver water to the fire protection water-piping network. Fire protection pump flowrates would be in accordance with applicable standards. A smaller electric motor-driven jockey pump would maintain pressure in the piping network. If the jockey pump is unable to maintain a set operating pressure in the piping network, a main fire protection pump would start automatically. All fire protection system pumps must be shut off manually.

The piping network would be configured in a loop so that a piping failure could be isolated with shutoff valves without interrupting the supply of water to a majority of the loop. Portable fire extinguishers of appropriate sizes and types would be located throughout the Site.

Site Security / Fencing

The Project solar field and support facilities perimeter would be secured with a 6-7-foot tall, chain link metal-fabric security fence with 1-foot barbed wire or razor wire on top. Controlled access gates would be located at the Site entrance. In addition video and thermal imaging surveillance would be utilized as part of the site security.

Spill Prevention / Containment

A spill prevention control and countermeasure plan (SPCC) would be prepared to meet the requirements of the regulations administered by ADEQ. **Appendix A** contains a list of the materials that could be present on Site. The SPCC Plan would include measures for spill containment and cleanup in the event of an accidental release.

Health and Safety Program

Separate health and safety programs would be developed and implemented for construction and operation. The construction contractor would be responsible for the construction phase program and the project operator would be responsible for the operations program. Both programs would meet all applicable OSHA and other regulatory requirements.

Construction

Project construction is expected to start as early as October 2010 and commercial operation for the entire facility is scheduled for 2014. However, given the modular nature of the PV technology, the Project is expected to become operational in phases, with the first phase in service between mid 2011 and mid 2012 (dependent on the Q43 switchyard construction schedule). The monthly construction labor force requirements for the Project are expected to be between 160 and 450 workers for the duration of the construction period.

Construction would generally occur between 5 a.m. and 7 p.m., Monday through Friday. Additional hours may be necessary to make up schedule deficiencies, or to complete critical construction activities. For instance, during hot weather, it may be necessary to start work earlier to avoid pouring concrete during high ambient temperatures.

The construction phases are expected to be as follows:

- **Clearing and Grading**—Vegetation would be removed during the course of the completion of farming on the individual fields on the Site. The Site would then be cleared, grubbed in graded areas, and disc rolled in the solar field. Dust suppressants would be applied as necessary to minimize dust and wind erosion.
- **Parking and Laydown**—Parking areas for construction workers and laydown areas for construction materials would be prepared inside the solar field area. Detailed information

regarding the location of the laydown and parking areas within the solar field would be developed after a contractor is hired to construct the facility.

- **Access Road**—Construction access road beds would typically be 20 feet wide and surfaced with gravel. Most construction staff and workers would come to the jobsite daily.
- **Module Installation**— The solar modules would be assembled and erected onsite.
- **Balance of Plant**—With the solar modules in place, the remaining field work would be the O&M building, the Project substation and electrical wiring and equipment, and smaller component installations.
- **Testing and Commissioning**—Testing of subsystems would be done as they are completed. Modules would be tested once all supporting subsystems are installed and tested.
- **Site Stabilization**—Disturbed areas would be stabilized during construction to minimize wind and water erosion and fugitive dust by watering and/or use of dust palliatives. Permanent roads would be either paved or graveled.
- **Demobilization**—All temporary fabrication and construction facilities would be removed from the site once construction is complete.

The Project Engineering, Procurement and Construction contractor (EPC Contractor) would mobilize and develop temporary construction facilities and laydown areas within the Project Site. Temporary construction facilities would include:

- Full-length trailer offices or equivalent
- Chemical toilets
- Parking for construction vehicles
- Tool sheds/containers
- Parking for construction equipment
- Construction material laydown area
- Solar field equipment laydown area
- Bulk material storage

Construction materials such as concrete, pipe, wire and cable, fuels, reinforcing steel, and small tools and consumables would be delivered to the Site by truck. Initial grading work would include the use of excavators, graders, dump trucks, and end loaders, in addition to support pickups and water trucks.

Operations and Maintenance (O&M)

O&M activities associated with a PV power plant are minimal. The Project would operate during daylight hours only and would require 15-20 full-time personnel for operation, maintenance, and security.

The operations workforce would be present on-site 24 hours per day. Typically, the operators would work 10-hour days. Plant management and administrative staff would typically work 8-hour days, Monday through Friday. However, weekend and night shifts may be required depending on maintenance requirements. Security and some maintenance staff would be on-site on a 24-hour

basis. At times when non-routine maintenance or major repairs are in progress, the maintenance force may work longer hours and contract labor may be utilized as necessary.

Long-term maintenance schedules would be developed to include periodic maintenance and equipment replacement in accordance with manufacturer recommendations. PV panels are warranted for 25 years as a minimum and are expected to have a life of 30 or more years, with a degradation of electrical output of 0.8 percent per year. Moving parts, such as pump motors, motorized circuit breakers and disconnects, and inverter ventilation equipment, would be serviced on a regular basis, and unscheduled maintenance would be conducted as necessary.

No heavy equipment would be used during normal operation. O&M vehicles would include trucks, forklifts, and loaders for routine and unscheduled maintenance, and water trucks for solar panel washing. Large heavy-haul transport equipment may be brought to the Site infrequently for equipment repair or replacement.

The main step up transformers in the plant substation would include secondary containment in accordance with the SPCC plan. The transformers in the solar field are small and do not require secondary containment.

The primary waste generated at the facility during operations would be non-hazardous solid waste. However, varying quantities of liquid non-hazardous waste and solid and liquid hazardous waste would also be generated. As mentioned previously, Appendix A contains a list of the materials that would be used and generated during operations.

Limited quantities of hazardous materials would be used and stored on-site for operation and maintenance that may require handling as hazardous material. These materials would include lubricants, solvents, janitorial supplies, office supplies, laboratory supplies, paint, degreasers, herbicides, pesticides, gasoline, hydraulic fluid, propane, and welding rods. These materials would generally be used and stored in small quantities. Those that would be used / stored in larger quantities are identified in **Appendix A**. In addition to these materials that would be used during operations, certain other materials such as air conditioning fluids containing chlorofluorocarbons (CFCs), fire suppressants containing sulfur hexafluoride (SF_6), and the panels containing cadmium telluride would also be on-site but they would be encapsulated within products and equipment and not expected to be released to the environment under normal circumstances.

Any hazardous materials used for the Project would be stored in the O&M building. Flammable materials, such as paints and solvents, would be stored in flammable material storage cabinets with built-in containment sumps. The remainder of the materials would be stored on shelves, as appropriate. Due to the small quantities involved, the controlled environment, and the concrete floor of the O&M building, a spill would be able to be cleaned up without significant environmental consequences.

PV Panel Re-Cycling

First Solar will be the supplier of the PV panels used for this Project. First Solar has established the industry's first comprehensive, prefunded PV module collection and recycling program. The program is designed to maximize the recovery of valuable materials for use in new modules or other new products and minimize the environmental impacts associated with PV system production. Approximately 90% of each collected First Solar PV Module is recycled into new products, including new First Solar modules.

Anyone in possession of a First Solar PV Module can participate in the recycling program. First Solar provides packing materials, transportation, and recycling services at no additional cost. The Agua Caliente Project would be a participant in this program.

2.1.2 Permits and Authorizations

The permits and authorizations listed below must be acquired prior to the initiation of construction activities for the Project. The two most significant approvals – the Certificate of Environmental Compatibility from the Arizona Corporation Commission and the Special Use Permit from Yuma County – have been obtained for the Project.

The State and Yuma County evaluated all relevant issues during the process of obtaining the CEC and SUP, and all issues raised were resolved in the permitting process. The Arizona Corporation Commission and Yuma County examined the potential impacts of the Project on the environment and land use, placed certain conditions on the Project to minimize potential impacts, as described fully in **Appendix B**, and approved the CEC and SUP. When approving the CEC, the Arizona Corporation Commission found that the "conditions placed on the CEC as modified by the Commission resolve matters concerning the need for the Project and its impact on the environment and ecology of the state raised during the course of proceedings." Likewise, Yuma County found the Project to be consistent with current zoning and planned land uses for the area.

No negative public comment or opposition was received during the processing of the CEC and SUP permits.

Some of the other required permits and approvals are in process and others would be obtained later as shown in the table below.

PERMIT / APPROVAL	ISSUING AGENCY	STATUS
Certificate of Environmental Compatibility (CEC) - State Siting Permit	Arizona Corporation Commission	Approved October 2009
Special Use Permit - Land Use / Zoning Approval	Yuma County Development Services - Planning & Zoning Division	Approved September 2009
Air Quality Permit - General Permit	Arizona Department of Environmental Quality (ADEQ)	Would be obtained in 2011
Stormwater Permits - For construction and operation	ADEQ	Approved June 2010
Grading and Drainage Permit	Yuma County Engineering	Approved June 2010
Floodplain Use Permit	Yuma County Engineering	Approved June 2010
Permit for temporary construction facilities	Yuma County Planning & Zoning	Approved September 2010
Septic Permit	Yuma County Health Department	Approved June 2010
Building Permits	Yuma County Engineering	Initial submittals made in August 2010
Encroachment Permit (to Build in Roadway)	Yuma County Public Works Department	Filed April 2010

2.1.3 Applicant-Committed Minimization Measures

The CEC and SUP included environmental conditions designed to further lessen impacts to the environment. These conditions are included in Appendix B and are incorporated into the Project description. The Applicant has committed to these measures and procedures to minimize or avoid environmental impacts if the Project is carried forward.

2.2 Alternatives Considered But Eliminated

Site Alternatives

The Applicant conducted a detailed site selection process that considered various alternative sites and resulted in the selection of the Site. The site evaluation process utilized a multi-step process designed to systematically narrow down the southwestern region to potential sites where a project could be permitted.

Key factors considered for siting and selection were:

- A high degree of direct solar insolation
- Transmission access with minimal transmission upgrades required for interconnection
- Direct transmission access to the customers
- Land use and property ownership

- Available, high quality water
- Environmental compatibility through previously disturbed lands and avoidance of environmental impacts

Each potential siting area was further evaluated to ensure that a solar project would be compatible with the environment and any environmental impacts could be minimized. Several environmental siting criteria were considered, including whether the location would involve:

- Specially Designated Lands (federal, state, local)
- Designated State Parks
- Designated State Wildlife Areas/ Refuges, Game Management Areas
- Incorporated and Unincorporated Municipalities
- Existing / Planned Residential Areas
- County Parks and Recreational Areas
- Scenic Areas (including scenic travel routes)
- Critical Habitats (for federal/state listed sensitive species)
- Areas with slope over 2 percent
- Floodplains

After the siting areas were narrowed to viable parcels, property transactions were advanced with landowners willing to sell their property. In addition to the proposed Property, the Applicant advanced negotiations with other landowners in Arizona. Negotiations for all other sites failed either because other developers gained control of the property or because permitting and construction delays restricted the availability of transmission facilities needed to deliver power to utility customers.

The result of this intensive siting effort was the selection of the Property and Site for development.

There are no unresolved conflicts concerning alternative uses of available resources associated with the Project Site that would suggest the need for other alternative sites.

Alternative Project Size

Smaller project sizes were considered for the Site, but they were determined not to be economically feasible. The cost of the transmission facilities for a 500kV interconnection and the Property (which was only offered as a single parcel) are fixed costs and not correlated to project size. Therefore, when these fixed capital costs were applied to the reduced annual production (MWh) from a smaller project size, the smaller project was deemed to not be economically feasible.

2.3 No Action Alternative

Under the No Action Alternative, DOE would not issue a loan guarantee for the proposed Project. If DOE does not issue a loan guarantee, the Applicant would have greater difficulty obtaining financing for the Project, which may result in delays, construction in smaller phases over a longer time-period, or the Project not being built. Although the Applicant may still pursue the Project without the loan guarantee, for purposes of this NEPA analysis, it is assumed that the Project would not be built if it does not receive a loan guarantee from DOE. If the Project is not built, the environmental effects discussed below would not occur. The decision for DOE consideration covered by this NEPA review is whether to approve the loan guarantee for the proposed action.

As detailed above, alternative locations for the proposed action were explored and eliminated because they did not meet the siting criteria of the Project. Therefore, other than no action, there is no alternative to providing a loan to the Applicant. The proposed action and No Action Alternative are considered in this NEPA review.

CHAPTER 3
AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

3.1 Introduction

This chapter describes the existing social, economic, and environmental conditions of the Project area and the environmental effects expected to result from the proposed action and the No Action Alternative described in Chapter 2, Proposed Action and Alternatives.

The following environmental resources are not affected by the Project; therefore, they are not analyzed further in the EA.

- Farmlands - The Federal Farmland Protection Policy Act (FPPA) requires federal agencies to identify and take into account the impacts of their actions on prime or unique farmland. The Agua Caliente Solar Project site does not contain prime or unique farmlands.

- Waters of the United States, including adjacent wetlands - Executive Order 11990, *Protection of Wetlands* (May 24, 1977), directs federal agencies to avoid, to the extent possible, adverse impacts associated with the destruction or modification of wetlands. Under DOE policy, a wetlands assessment is required for any action involving wetlands (10 CFR 1022). The Site has previously been leveled and does not contain drainages, wetlands, or jurisdictional waters of the US. It also does not contain isolated wetlands. See **Figures 3-9a and 3-9b** for the National Wetlands Inventory (NWI) map and the current topography for this area.

All other resources and the environmental effects that would be realized by implementation of the Project are described in the following sections.

3.2 Land Use

3.2.1 Regulatory Framework

The Agua Caliente Solar Project is in an unincorporated area within eastern Yuma County. There are no incorporated municipal jurisdictions in the area. The Yuma County 2010 Comprehensive Plan (Yuma County 2001 and updated 2006) establishes the long range vision for the coordinated development of the County and provides guidelines for future land use and development. The eastern portion of Yuma County is referred to as the Dateland / East County Planning Area. This Planning Area is the largest of the four planning areas in Yuma County, and the existing communities in the planning area are characterized as small, remote and rural. The majority of land within this planning area is under BLM jurisdiction and the private and State land here is predominately in agricultural production or open desert. The County recently (February 2008) updated the portion of the County Plan that is the background study for this area.

One of the visions for the Dateland / East County Planning Area included in the 2010 County Plan is the *"Promotion and expansion of commercial and industrial activities."* This goal is specific to the Dateland / East County Planning Area and the proposed Project would help meet this goal.

In addition to the goals and objectives defined for the various planning areas and zoning districts (as described above for this specific planning area), the Yuma County Comprehensive Plan also includes other long term Goals, Objectives and Policies that are relevant to this Project. The following are some potentially relevant goals, objectives and policies that further demonstrate the Project's consistency with the Comprehensive Plan.

- **Goal:** Promote Renewable & Sustainable Energy Resources
- **Objective:** Promote the use of renewable energy sources and conservation of fossil fuels.
- **Objective:** Develop and promote the use of solar power.
- **Policy:** Yuma County will implement tax incentives mandated by statute for solar and renewable energy manufacturers.
- **Policy:** Yuma County will educate the public to the benefits and applications of solar energy in homes and businesses.
- **Policy:** Yuma County will promote the development of Solar Enterprise Zones, Solar Industrial Parks or other programs as a means of retaining and attracting businesses.

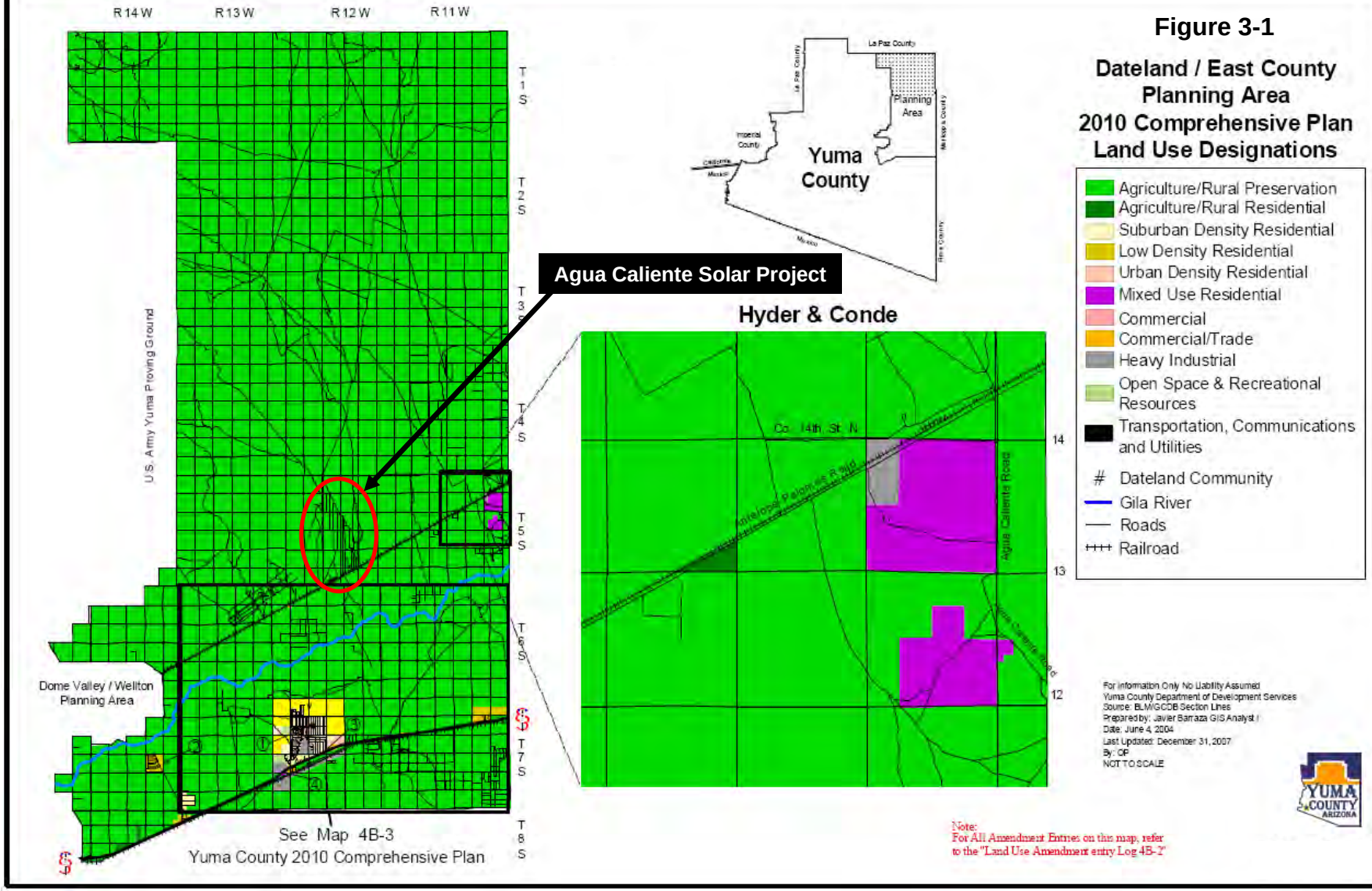
The Site and surrounding area are designated as Agriculture / Rural Preservation land use within the plan as shown on **Figure 3-1** (Yuma County Comprehensive Plan Land Use Map, 2006). The purpose of this land use element is resource preservation with emphasis on protecting and preserving agricultural related resources and continued agricultural use. The Site is zoned Rural Area (RA)-40 by Yuma County. This zoning allows solar facilities as a special use. Section 402.01 of the Yuma County Zoning Ordinance outlines considerations or factors of primary concern when granting a special use permit (SUP) that are required to be satisfied in reaching a conclusion for a SUP. Agua Caliente Solar filed an application for a SUP on May 12, 2009 and the Yuma County Board of Supervisors approved the SUP on September 9, 2009.

3.2.2 Affected Environment

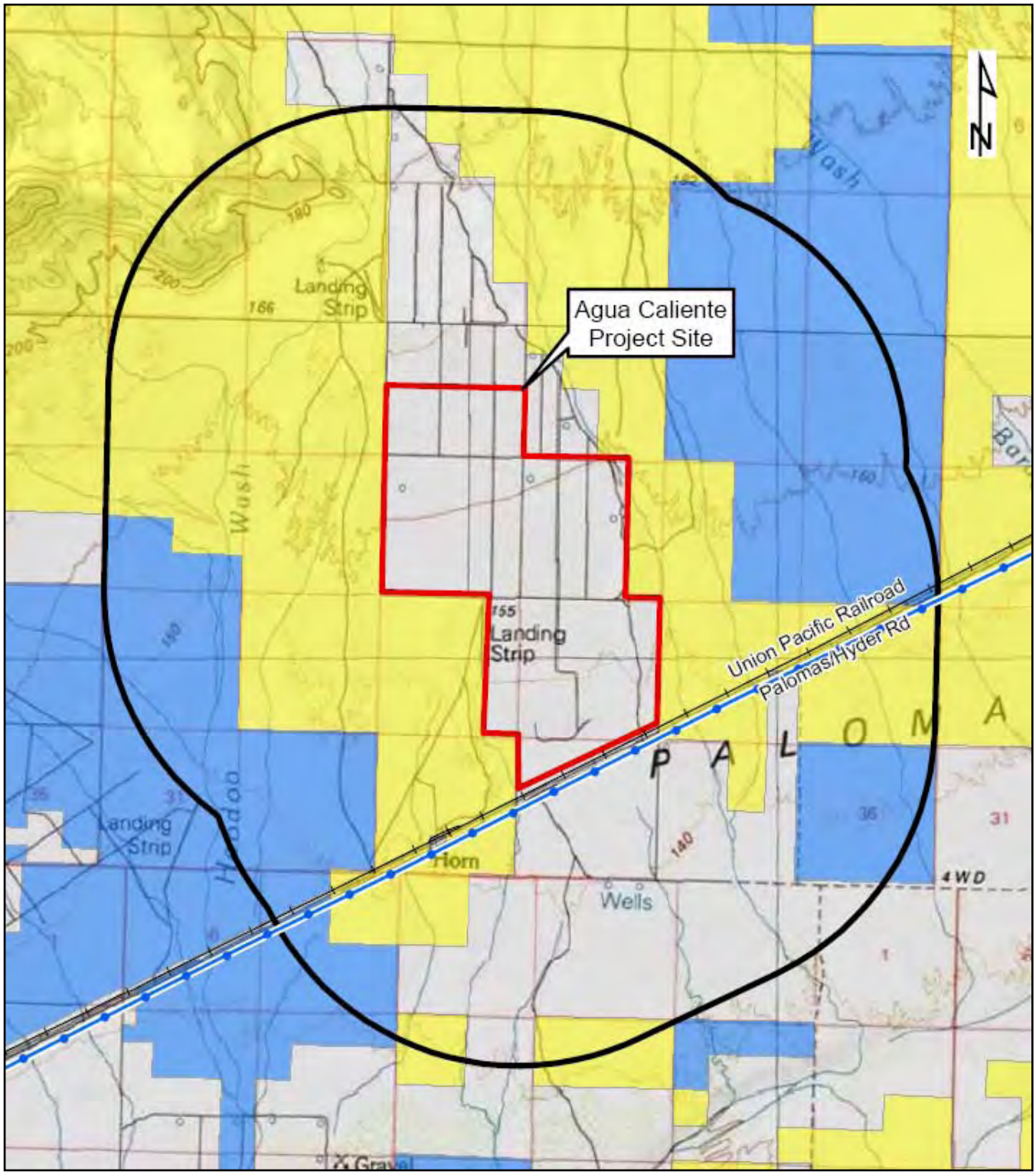
The Project is located on private land in a remote portion of eastern Yuma County. Nearby lands include other private lands as well as federal lands managed by the Bureau of Land Management (BLM) and State lands. **Figure 3-2** shows the land ownership within a 2-mile vicinity of the Project.

Figure 3-1

Dateland / East County Planning Area 2010 Comprehensive Plan Land Use Designations



Note:
For All Amendment Entries on this map, refer to the "Land Use Amendment entry Log 4B-2"



Agua Caliente Solar Project

Figure 3-2

Land Ownership
In Vicinity of Project

The existing land use on the Site is agricultural. The Site has been historically farmed for many decades, and all of the Site has been previously disturbed. Other nearby lands within the area are either vacant desert lands or agricultural lands, both inactive and active. Most of the vacant desert lands are managed by the BLM. Many of the State lands are leased for agriculture and some are undeveloped. There are very few residences in the area. The nearest residence is approximately 1.5 miles from the Project boundary.

The southern Project boundary parallels the only local road in the area (Palomas / Hyder Road) and an adjacent railroad that is currently not in use. Parallel to the road and railroad is the existing Palo Verde -North Gila #1 500kV transmission line owned by Arizona Public Service (APS), San Diego Gas & Electric (SDG&E) and the Imperial Irrigation District (IID). A second 500kV transmission line known as the Palo Verde – North Gila #2 transmission line has been approved and will be built generally parallel and north of the existing Palo Verde – North Gila #1 line and north of the railroad. This line is not connected to the Project in any way and is discussed in Chapter 4 – Cumulative Effects. The southern portion of the Project site plan is designed to accommodate the planned construction and operation of this approved Palo Verde – North Gila #2 500 kV line. **Figure 3-3** is an aerial photo showing the existing land uses in the area.

The BLM has recently completed the Resource Management Plan (RMP) for the Yuma Field Office. This RMP provides the management direction for the BLM lands in the vicinity of the Site. The prescribed recreation setting and recreation classification under the BLM's Recreation Opportunity Spectrum (ROS) for the BLM lands that are immediately adjacent to the Site is Rural Developed, which acknowledges the location of these lands as interspersed with agricultural and other development. The BLM has designated these lands as a Dispersed Use Recreation Management Zone and plans to manage these lands for such dispersed recreational uses such as hunting, camping, Off-Highway Vehicle (OHV) riding, hiking, wildlife and wildflower viewing.

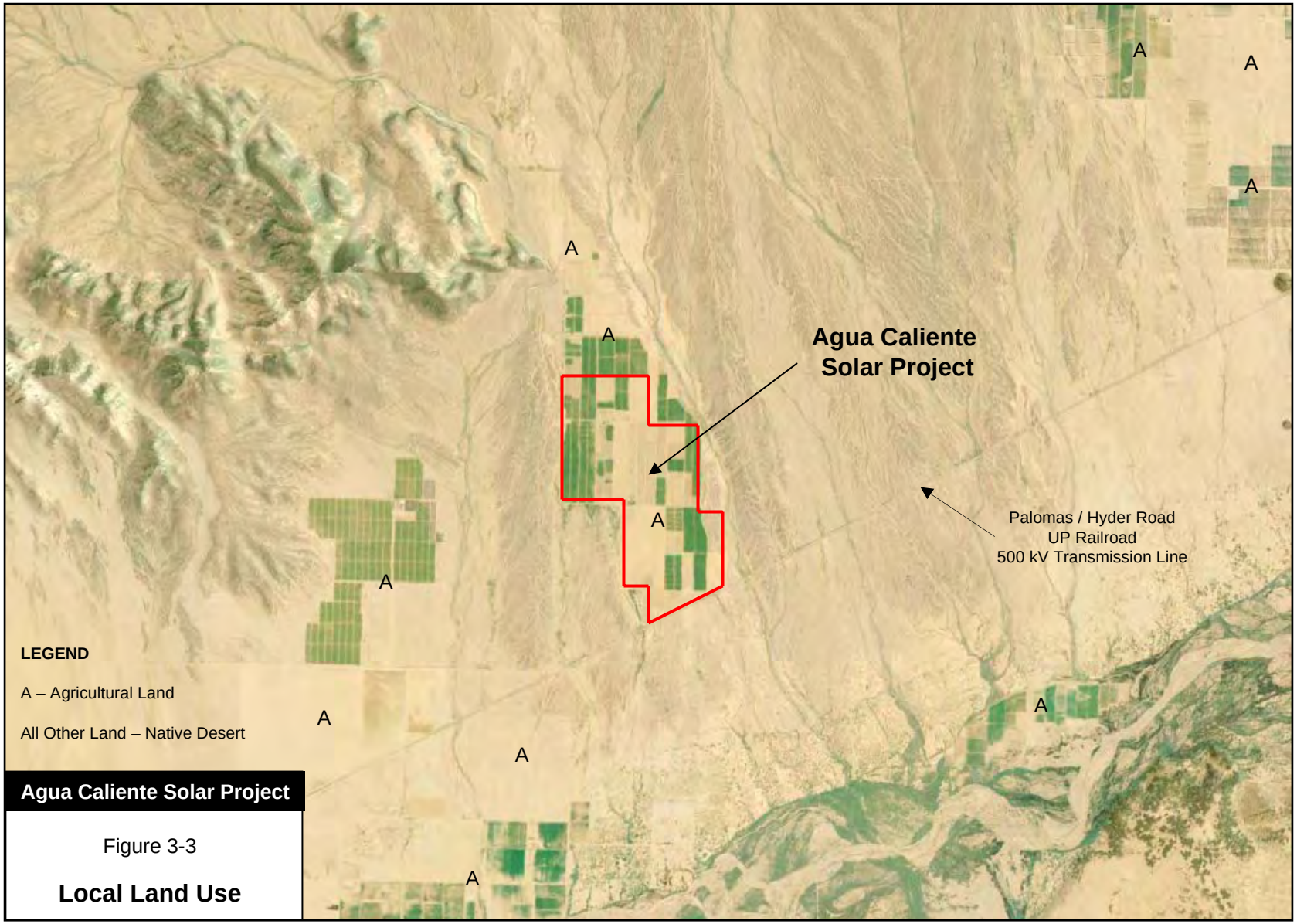
The BLM has also designated the areas surrounding the Site as Limited for OHV use. Limited OHV Management Areas are where OHV travel is limited at certain times, in certain areas, and/or to certain vehicular use.

Regional recreation information for the surrounding areas was gathered from Yuma County and the BLM. Currently, there are no existing or planned designated recreational facilities or areas in the immediate vicinity of the Site.

3.2.3 Environmental Effects

3.2.3.1 Proposed Action

Development of the Project would result in a change of land use on the Site from irrigated agriculture to the industrial use associated with the Project. Agriculture and the associated irrigation infrastructure would be removed from the site. If the Project is constructed, the majority of the Site would be covered by solar panels with small areas used for the O&M area, the substation, and site drainage control features. This land use conversion would not be irreversible as the Site could be returned to irrigated agriculture after the Project was removed.



Agua Caliente Solar Project

Figure 3-3

Local Land Use

The proposed action would be consistent with the existing RA-40 zoning and is allowed as a special use. Yuma County approved the SUP for the Project in September 2009, demonstrating that the local agency finds that the Project is acceptable and does not present a land use conflict. When approving the SUP, Yuma County found that the Project was compatible with local zoning and planned land uses. In addition, the Arizona Corporation Commission, who has jurisdiction over the siting and compatibility of power generation and transmission projects within the State, approved the CEC for the Project [Case #145, CEC docketed October 7, 2009] indicating that the State also finds the Project to be compatible with the environment and local uses.

There would be no significant adverse impacts on other land uses in the area as a result of development and operation of the Project. There are no nearby residential areas, existing communities, or other uses. Continuation of the primary local land use – agriculture –on the lands adjacent to or near the Project would not be affected. The northern portion (approximately 1,400 acres) of the Whitewing Ranch north of the Site where the Project is located would continue in irrigated agriculture. All adjacent BLM, State, and private lands would continue under their current uses and management.

3.2.3.2 No Action Alternative

If no construction would occur, there would be no change in land use on the Site.

3.3 Visual Resources

3.3.1 Affected Environment

The Project is located in the Basin and Range Lowlands Province, an area characterized by a broad alluvial basin created by the Gila River that is bounded by mountainous terrain. The alluvial plain consists of a broad panorama of sloping, flat terrain that is dominated by agricultural activities.

The Project is located on private land in the eastern portion of Yuma County, Arizona where the landscape setting is rural, consisting primarily of agriculture with few interspersed residences and undeveloped desert lands. A railroad, the Palomas / Hyder Road, and an existing 500 kV transmission line are located at the southern boundary of the Project. The considerable amount of undeveloped land in the area consists of sparsely vegetated, flat or gently sloping terrain, which is characteristic of the desert shrub vegetation found in Yuma County. The Project is located on and is bounded on the north by active agricultural land and on the east and west by undeveloped desert land.

The potential viewers of the Project would primarily be individuals traveling on Palomas / Hyder Road on the south side of the Project. A railroad berm separates Palomas / Hyder Road and the Site. The railroad berm currently limits views of the Site and of the Project components from the road. The Site is approximately 10 miles north of Interstate 8 and would not be visible from that distance.

The affected viewshed has been highly modified from its natural state primarily by agricultural activities, and is characterized by a rural/agricultural landscape setting. Existing visual modification to the area consists of agriculture, roads, railroad, utilities, and rural residential uses. The rural/agricultural setting is common throughout the viewshed.

There are no scenic/visual resource management requirements by Yuma County. The BLM manages visual resources on the adjacent BLM lands using their Visual Resource Management (VRM) system. The BLM has classified the lands adjacent to the Project Site as VRM Class III which allows for the development of projects that would create noticeable changes to the landscape. There are no special areas that require protection of scenic resources at or near the Project Site. The public has not expressed concern regarding Project visibility.

3.3.2 Environmental Effects

3.3.2.1 Proposed Action

Nearly all of the Project Site would be developed with PV solar panels and there would be a short Gen-Tie line to connect the Project with the new Q43 switchyard being constructed by a local utility at the southern portion of the Site. Effects to visual resources from the development of the Project would result in changed views from viewpoints in the immediate vicinity. The proposed Project and associated Gen-Tie line would introduce new elements into the landscape, and would affect the existing form, line, color, and texture which characterize the existing landscape.

The most visible components of the Project from all viewpoints would be the Gen-Tie line and related structures at 100 feet tall. They would be the tallest structures on the Site and would be obvious to viewers in the immediate area. They would be located near the existing and proposed 500 kV lines that have even taller structures. The solar field would cover a large area but the panel arrays would be relatively low on the landscape (approximately 6 feet) and parallel (consistent) with its line and form. Likewise, the met towers would also be short (approximately 10 feet) and not readily visible from locations off-site.

The Project would be artificially lighted at night as necessary to enhance the safety of Project personnel. Night-lighting would be designed to meet the requirements of Yuma County.

Analysis of the potential visual impact was conducted from Key Observation Points (KOPs) that are representative of the visual conditions around the Site. KOPs are locations from which the visual analysis is focused and are generally selected to be representative of the most critical or common locations from which the Project would be seen. KOPs were selected in an effort to evaluate existing landscapes and potential impacts on visual resources with various levels of sensitivity, in different landscape types and terrain, and from various vantage points from which a significant number of people might be able to view the Project.

The types and degree of visual changes that would be caused by the Project are shown in computer-generated photographic simulations on photographs taken from the KOPs. The KOPs that were used to illustrate potentially sensitive viewpoints in the vicinity of the Project are

depicted on **Figure 3-4.** These KOPs include representations of views from the closest residences and views from Palomas / Hyder Road, the primary transportation corridor in the area.

Figures 3-5 through 3-7 show the existing conditions and photographic simulations of the Project for each of the KOPs. The visual impact depicted on each simulation is discussed below.

KOP A (**Figure 3-5)** shows the view looking east from a farm residence located west of the Site. This location provides a view of the proposed Project from a distance of about 2.5 miles. Existing land use in this view is dominated by farm lands in the foreground and open desert in the background. As depicted on the simulation, the proposed Project would not be very visible from this location because of the slight rise in the terrain between this point and the Project. Portions of the Project can be faintly seen on the right portion of the horizon.

KOP B (**Figure 3-6)** shows the view looking northeast from the nearest residence located near Palomas / Hyder Road about 1.5 miles from the Project boundary. Like KOP A, existing land use in this view is dominated by farm lands in the foreground and open desert in the background between this point and the Project Site. Also like KOP A, there is a slight rise in the terrain between this point and the Project. The Project is faintly visible on the horizon. The solar field would not be visible from this location because of the intervening topography and vegetation.

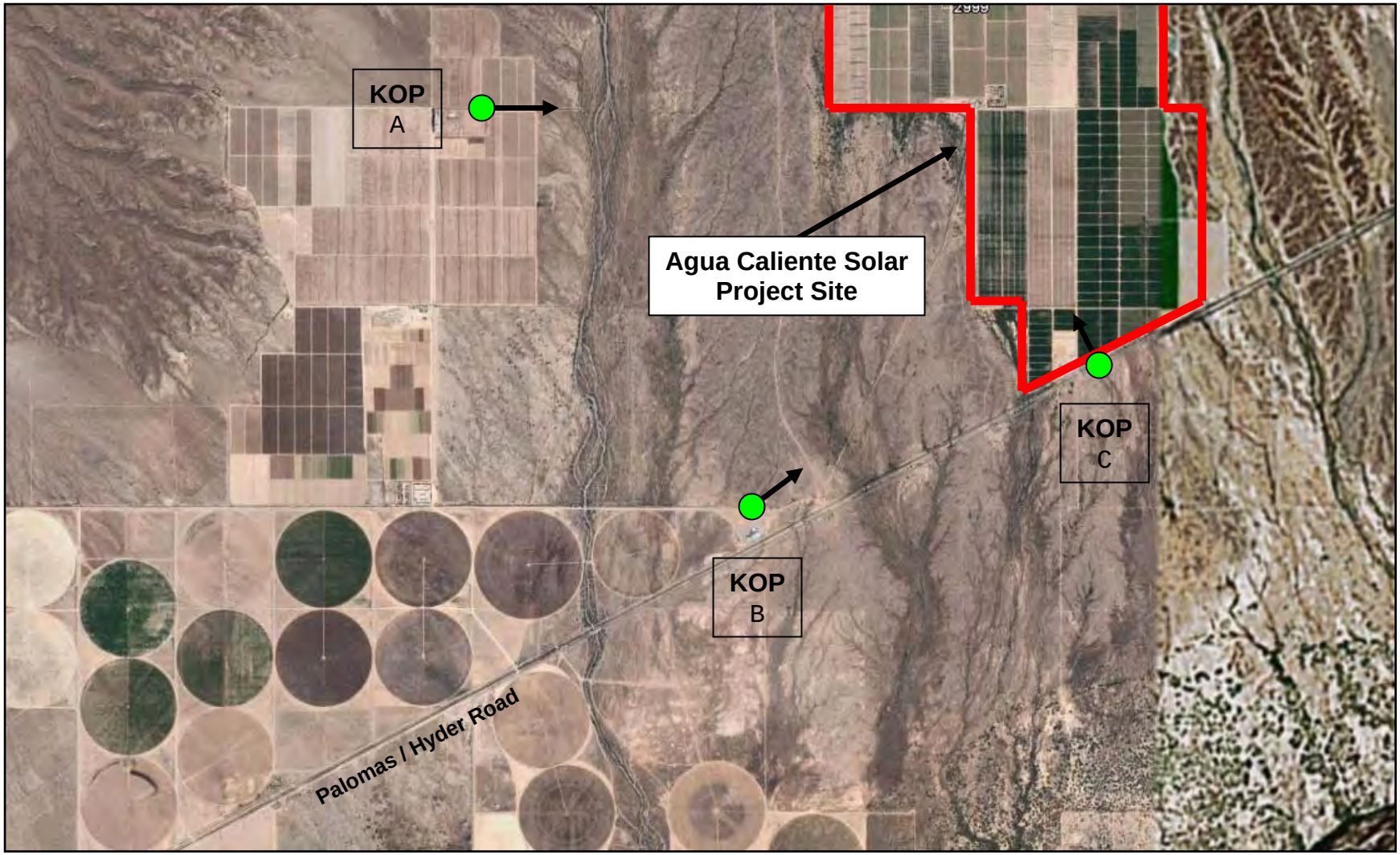
KOP C (**Figure 3-7**) is a view from a location looking north / northwest from Palomas / Hyder Road at the southern border of the Project near the Project Site entrance. Existing land use in the view from this location is dominated by the Union Pacific Railroad (UPRR) track which can be seen between this point and the Project Site and overhead utility lines (lower voltage distribution lines) are visible. The UPRR track screens a significant portion of the Site from this location. As depicted on the simulation, the Gen-Tie line structures and parts of the Q43 switchyard would be visible in the left and central parts of this view. Also, the tops of some of the panels in the solar field could be seen just above the UPRR track. Even from this close to the Project, little would be seen by people traveling on Palomas / Hyder Road.

From the BLM land between these residences and the Site, the Project would be visible from some of the highest points. Based on the BLM's Resource Management Plan that provides land management direction for these lands, this BLM land currently receives very limited use and views from this area are not protected.

As reflected in the above discussion, the proposed action would have no significant adverse impact on visual resources.

3.3.2.2 No Action Alternative

If no construction would occur, there would be no change in the visual setting and no impact on visual resources.



Agua Caliente
SOLAR PROJECT

Figure 3-4

Location of Key Observation Points

EXISTING

PROPOSED

Visual Simulation of Agua Caliente Solar Project
Viewpoint A – From Neighboring Property Looking East

Figure 3-5

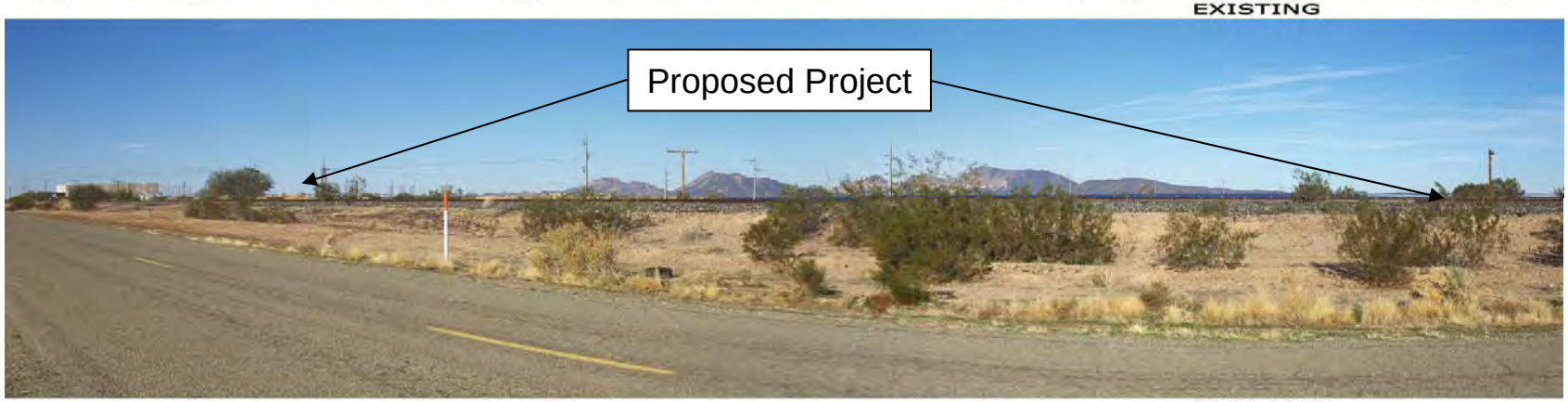
EXISTING

PROPOSED

Visual Simulation of Agua Caliente Solar Project
Viewpoint B – From Neighboring Property Looking Northeast

Figure 3-6

EXISTING



PROPOSED

Visual Simulation of Agua Caliente Solar Project
Viewpoint C – Palomas / Hyder Road Looking Northwest

Figure 3-7

3.4 Air Quality

3.4.1 Regulatory Background

The Clean Air Act establishes the principal framework for national, state, and local efforts to protect air quality in the United States (42 U.S.C. §§7401−7642). Under the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has set standards known as National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants considered to be key indicators of air quality, as follows: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2) lead (Pb), and two categories of particulate matter, including particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}) and particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$). These standards are codified in 40 CFR 50.

A NAAQS is comprised of two parts – an allowable concentration of a criteria pollutant, and an averaging time over which the concentration is to be measured. Averaging times are based on whether the damage caused by the pollutant is more likely to occur during exposure to a high concentration for a short time or to a relatively lower average concentration over a longer period. For some pollutants, there is more than one air quality standard, reflecting both short-term and long-term effects. Primary NAAQS define levels of air quality with an adequate margin of safety that sets limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary NAAQS define levels of air quality judged necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. **Table 3-1** lists the prevailing primary and secondary NAAQS for the criteria pollutants.

Areas in the United States are categorized as nonattainment, attainment, or unclassifiable areas, as defined in Title I, Part A, Section 107 of the Clean Air Act 107(d)(1)(A):

> (i) Nonattainment, any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant,
>
> (ii) Attainment, any area (other than an area identified in clause (i)) that meets the national primary or secondary ambient air quality standard for the pollutant, or
>
> (iii) Unclassifiable, any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

The USEPA is responsible for ensuring that air quality standards are met or attained in cooperation with state, tribal, and local governments through national strategies to control pollutant emissions from automobiles, factories, and other sources. USEPA has delegated this authority to the State of Arizona, and Arizona is responsible for protecting Arizona's air quality. The ADEQ Air Quality Division is the state body responsible for the administration of air quality regulations, which are found in the Arizona Revised Statutes Title 49, Chapter 3, Sections 401-

493, codified in the Arizona Administrative Code Title 18, Article 2, and unless otherwise noted therein, are stated to be in accordance with federal standards (R18-2-216). That is, Arizona State Ambient Air Quality Standards (AAQS) are interpreted to be in accordance with NAAQS.

Table 3-1 National Ambient Air Quality Standards[a]

Pollutant	Primary Standards		Secondary Standards	
	Level	Averaging Time	Level	Averaging Time
CO	9 ppm (10 µg/m³)	8-hour(1)	None	
	35 ppm (40 µg/m³)	1-hour(1)	None	
Lead	0.15 µg/m³ (0.15 µg/m³)(2)	Rolling 3-month Average	Same as Primary	
	1.5 µg/m³ (1.5 µg/m³)	Quarterly Average	Same as Primary	
NO_2	0.053 ppm (100 µg/m³)(3)	Annual (Arithmetic Mean)	Same as Primary	
	0.1 ppm (188 µg/m³)	1-Hour(4)	Same as Primary	
PM_{10}	150 µg/m³ (150 µg/m³)	24-hour(5)	Same as Primary	
$PM_{2.5}$	15 µg/m³ (15 µg/m³)	Annual (Arithmetic Mean)(6)	Same as Primary	
	35 µg/m³ (35 µg/m³)	24-hour(7)	Same as Primary	
Ozone[b]	0.075 ppm (147 µg/m³)	8-hour (2008 std) (8)	Same as Primary	
	0.08 ppm (156.8 µg/m³)	8-hour (1997 std) (9)	Same as Primary	
	0.12 ppm (235.2 µg/m³)	1-hour (Applies only in limited areas) (10)	Same as Primary	
SO_2[c]	0.03 ppm (78.3 µg/m³)	Annual (Arithmetic Mean)	0.5 ppm (1300 µg/m3)	3-hour(1)
	0.14 ppm (365.4 µg/m³)	24-hour(1)		

a. Source: http://www.epa.gov/air/criteria.html, June 1, 2010

b. The Arizona 8-hour O_3 primary and secondary standards are listed in the Arizona Administrative Code (R-18-203B) as 0.08 ppm.

c. On June 2, 2010 EPA issued a final rule on the SO2 NAAQS. EPA revised the primary SO2 NAAQS and established a new 1-hour SO2 standard at a level of 75 parts per billion (ppb). The form of this standard is the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations. EPA is also revoking the two existing primary standards of 140 ppb evaluated over 24 hours, and 30 ppb evaluated over an entire year. EPA is not revising the 3-hour secondary SO2 NAAQS of 0.5 ppm (500 ppb). This final rule will become effective on 60 days after date of publication of this final rule in the Federal Register.

(1) Not to be exceeded more than once per year.

(2) Final rule signed October 15, 2008.

(3) The official level of the annual NO2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard

(4) To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective April 12, 2010).

(5) Not to be exceeded more than once per year on average over 3 years.
(6) To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m3.
(7) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m3 (effective December 17, 2006).
(8) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008)
(9) (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
(c) EPA is in the process of reconsidering these standards (set in March 2008).
(10) (a) EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding").
(b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is < 1.

3.4.2 Affected Environment

This section presents general air quality information followed by a discussion of greenhouse gases.

3.4.2.1 Regional Climatology / Air Quality

Climatology

The Project would be located in Yuma County between Wellton and Gila Bend, Arizona. The general area is predominantly arid desert characterized by very hot temperatures, large daily temperature range, and sparse precipitation. The mean annual temperature is 70°F with monthly average maximum temperatures ranging from 68 to 106°F and average monthly minimum temperatures from 35 to 76°F. Average annual precipitation is only four inches. Most of the precipitation occurs during the winter from December through March and during the "monsoonal" months of July through September. Winds at the Project Site would be typical for the desert areas of Arizona with monthly average winds speeds that are fairly constant throughout the year at 7 to 9 miles per hour. The predominant winds are from the west except for the months of November through January when the prevailing winds are from the north (Western Regional Climatic Center, 2009a).

Baseline Air Quality

The Project area is in a portion of Yuma County currently listed as in attainment for all criteria pollutants. The nearest nonattainment area to the Project is a PM_{10} moderate nonattainment area 55 miles to the west.

The Clean Air Act also establishes Class I and Class II airsheds to evaluate if emissions would result in air quality impacts in attainment areas. Class I airsheds are specifically designated natural areas that include national parks, wilderness areas, and other protected federal areas that

meet specifications defined in the Clean Air Act. Class II airsheds typically include natural areas not designated as Class I, and urban areas. The closest Class I airshed, the Superstition Wilderness, is about 130 miles east of the Project.

Federal land management agencies consider a source more than approximately 30 miles from a Class I area to have negligible impacts in relation to air quality related values, such as visibility and acidic deposition, if total annual sulfur dioxide, oxides of nitrogen, PM_{10}, and sulfuric acid emissions (expressed in tons per year) divided by the distance (expressed in kilometers) between the source and the Class I area (that is, tons per year per kilometer) is 10 or less.

Prevention of Significant Deterioration (PSD) standards, established by the Clean Air Act, and incremental impact evaluation are often used to identify near-field and far-field ambient air quality impacts for major sources or major modifications in an attainment area. Near-field ambient air quality is typically evaluated within 10 kilometers (approximately 6 miles) of a project. Distance limitations have not been set for far-field ambient air quality evaluations. Impacts to far-field ambient air quality are typically evaluated for areas where there is a special interest in protecting Class I pristine air quality and scenic values.

Maximum and annual 2007 ambient air quality data for USEPA monitoring stations closest to the Site are included in **Table 3-2** below for the respective pollutants. This table also presents the NAAQS that prevail for each criteria air pollutant.

This air quality summary considers each of the above pollutants, except for lead (which would not be potentially emitted from this Project). ADEQ also regulates hazardous air pollutants (HAPs) (R18-2-1102, which incorporates by reference Federal regulations codified in 40 CFR 61).

Air emissions are currently generated on the Site associated with the ongoing agricultural activities. These include fugitive emissions from periodic tillings and farm traffic on the internal road system, emissions from farm equipment and trucks, and emissions from gas-fired pumps.

3.4.2.2 Greenhouse Gases and Climate Change

Greenhouse gases are gases in the Earth's atmosphere that are opaque to short-wave incoming solar radiation, but absorb long-wave infrared radiation re-emitted from the Earth's surface warmed by the incoming solar radiation. In simple terms, greenhouse gases are chemical compounds in the Earth's atmosphere that trap heat. Greenhouse gases allow sunlight to enter the atmosphere freely, but limit the amount of infrared radiation (heat) that bounces back into space after striking the Earth's surface. Most studies indicate that the Earth's climate has warmed over the past century due to increased emissions of greenhouse gases, and that human activities affecting emissions to the atmosphere are likely an important contributing factor.

Table 3-2
Estimated Air Quality in the Regional Area of the Project

Pollutant	Averaging Period	Maximum	NAAQS	EPA Station ID	City	County
CO	1-Hour	0.7 ppm	35 ppm	40134011	26453 W. Mc85	Maricopa Co
CO	8-Hour	0.5 ppm	9 ppm	40134011	26453 W. Mc85	Maricopa Co
NO_2	Annual	0.009 ppm	0.053 ppm	40134011	26453 W. Mc85	Maricopa Co
PM_{10}	24-Hour	50 µg/m^3	150 µg/m	40190001	Ajo	Pima Co
$PM_{2.5}$	24-Hour	23 µg/m^3	35 µg/m	40270004	Yuma	Yuma Co
$PM_{2.5}$	Annual	10 µg/m^3	15 µg/m	40270004	Yuma	Yuma Co
SO_2	3-Hour	0.007 ppm	0.50 ppm	40133002	Phoenix	Maricopa Co
SO_2	24-Hour	0.004 ppm	0.14 ppm	40133002	Phoenix	Maricopa Co
SO_2	Annual	0.002 ppm	0.03 ppm	40133002	Phoenix	Maricopa Co
O_3	8-Hour	0.068 ppm	0.075/0.08 ppm	40134011	26453 W. Mc85	Maricopa Co

Source: EPA Air Data, Monitor Values Report - Criteria Air Pollutants, http://www.epa.gov/oar/data/monvals.html?st~AZ~Arizona, Accessed April 2009

Gases exhibiting greenhouse properties come from both natural and human sources. Water vapor ($H_2O_{(g)}$), carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) are examples of greenhouse gases that have both natural and manmade sources, while other greenhouse gases such as chlorofluorocarbons are exclusively manmade. In the United States, greenhouse gas emissions come mostly from energy use. Such emissions result from combustion of fossil fuels used for electricity generation, transportation, industry, heating, and other needs. Energy-related carbon dioxide emissions represent 82 percent of total manmade greenhouse gas emissions in the United States (US Energy Information Administration 2009).

Computer-based modeling suggests that rising greenhouse gas concentrations generally produce an increase in the average temperature of the Earth, which may produce changes in sea levels, rainfall patterns, and intensity and frequency of extreme weather events. Collectively, these effects are referred to as “climate change” (National Energy Information Center 2008). The Intergovernmental Panel on Climate Change (IPCC), in its Fourth Assessment Report, stated that warming of the earth’s climate system is unequivocal, and that warming is very likely due to anthropogenic greenhouse gas concentrations (Intergovernmental Panel on Climate Change 2007).

The Site currently generates some greenhouse gases associated with the existing agricultural use. Since current site activities are exclusively irrigated agriculture, these emissions are associated with tractors and other agricultural equipment and other small combustion sources.

3.4.3 Environmental Effects

3.4.3.1 Proposed Action

Construction

Short-term impacts to air quality would occur during construction of the Project from construction equipment emissions, increases in local traffic, and the potential increase of fugitive dust when the Site is disturbed. Use of construction equipment (i.e., gasoline and diesel powered construction equipment, as well as delivery vehicles, employee vehicles, etc.) would emit particulate matter (PM_{10} and $PM_{2.5}$) carbon monoxide (CO), volatile organic compounds (VOC), sulfur oxides (SO_x), and nitrogen oxides (NO_x). Use of mobile equipment and earthwork activities would result in fugitive dust emissions.

The Site covers 2,400 acres and is scheduled to be built out over a 48-month period. Construction of the proposed Project would involve removal of existing ranch buildings, on-site access road construction, grading, earthmoving, building construction, pile driving, assembly, and erection of equipment and Q43 switchyard facilities. These activities would be staggered, such that different activities are occurring on different areas of the Site at any given time. It is expected that the construction activities would result in periodic peak and lull periods of emissions based on the staggering of activities and associated ground disturbance and equipment use over time. Because of the duration of the construction period, it is estimated that an average of 50 acres of the Site would be undergoing active construction during a monthly period.

The source categories contributing to construction emissions include non-road engine exhaust (i.e., on-site construction equipment), construction-related fugitive dust, and mobile sources both on-site and off-site.

On-Site Construction Equipment Emissions

Table 3-3 below provides the expected annual emissions from construction equipment on-site. More detail on these emission calculations is provided in **Appendix C**.

Table 3-3
ANNUAL EMISSIONS FROM CONSTRUCTION EQUIPMENT (tons)

	VOC	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	CO_2
Annual	2.65	37.32	13.67	1.22	1.27	0.30	1476.08
Total (4 years)	10.60	149.28	54.68	4.88	5.08	1.20	5904.32

Construction-Related Fugitive Dust

Fugitive dust is the most significant contributor to particulate emissions (PM_{10}) in arid environments. Fugitive dust would be generated from site disturbance associated with construction activities. Fugitive dust emissions would be lessened by the application of control measures that would be utilized by the Project and that are required by Yuma County. These

would include periodic watering of exposed surfaces, limited speed limits for vehicles on-site, and the potential use of dust palliatives.

Using a 50 acre construction area for each month, a total suspended particulate (TSP) construction emission factor of 1.2 ton/acre-month (AP-42 Chapter 13.2.3 Heavy Construction Operations), a control efficiency of 70 percent, and a PM_{10}/TSP ratio of 0.306 (developed from data in AP-42 Chapter 13.2.2 Unpaved Roads), emissions of PM_{10} from fugitive dust generated by construction activities such as grading are estimated to be 66 ton/yr.

The nearest residence is 1.5 miles from the Project's boundary. The construction activity would take place inside the Project's boundary, and these emissions should be well dispersed by the time they are outside the Project's boundary. In addition, construction activity would be distributed throughout the Project Site over time. This would limit concentrations and durations of emissions at any localized point in the vicinity of the Project.

Construction Mobile Sources

Air emissions from mobile sources would be generated from workers commuting to and from the Project site during construction. Commuter and delivery vehicles would generate tailpipe emissions of VOC, NO_x, PM, CO, and CO_2 in similar quantities to other vehicles in the area travelling local roads and working on local agricultural operations. The CO_2 emissions from this operational traffic would create corresponding GHG emissions.

EPA's MOBILE6 vehicle emissions model was used to generate emission factors for various types of on-road motor vehicles (in pounds per vehicle mile traveled (lb/VMT)). Output data from the model for light-duty gasoline vehicle (passenger cars) and light-duty gasoline truck (pick-up trucks) data were used to calculate the emissions for employee commuter and delivery traffic.

The model further classifies emission factors by type of road traveled. For the Agua Caliente Project, all commuter vehicle routes were conservatively assumed to be on local roads. The longest one-way distance that commuter traveled were estimated to be 65 miles one way (from the nearest large communities of Gila Bend or Yuma). Also, to be further conservative and to cover both workers and deliveries, it was assumed that 400 round trips were generated each day.

The MOBILE6 emission factors for employee commuter and delivery traffic were applied to the estimated VMT to quantify the CO_2 and criteria pollutant emissions from on-road mobile sources. **Table 3-4** summarizes the emissions from on-road mobile sources, including commuter and delivery traffic.

Table 3-4 On-Road Mobile Source Annual Emissions from Construction Personnel Commuter Travel	
	Annual Emission Rate
Pollutant	**Tons / yr**
VOC	15.54
CO	214.7
NO_X	13.21
$PM_{10, 2.5}$	0.237
SO_2	0.175
CO_2	9,450

As indicated above, in addition to CO_2 emissions, the vehicles associated with the construction of the Project would emit low amounts of air pollutants, including carbon monoxide (CO), oxides of nitrogen (NO_x), volatile organic compounds (VOC), sulfur dioxide (SO_2), and particulate matter (PM_{10} and $PM_{2.5}$). According to the most recently available EPA emissions data (EPA AirData at www.epa.gov/air/data), in 2002, highway vehicles in Arizona generated the following pollutants in tons per year: 836,124 of CO; 159,756 of NO_x; 4,022 of PM_{10}; 2,951 of $PM_{2.5}$; 2,875 of SO_2; and 85,184 of VOC. The quantity of these pollutants generated by the number of vehicles utilized for operation of the Agua Caliente Project compared to the approximately 4.8 million vehicles registered in Arizona in 2009 would make a minor contribution to these overall totals.

Total Construction Emissions

Based on the calculations outlined above, the total emissions that are expected to result from the construction of the Project are summarized in **Table 3-5** below

Table 3-5 Total Construction Emissions		
	Annual Emissions	**Total Emissions**
Pollutant	**Tons / yr**	**(Tons / 4-yr period)**
VOC	18.19	72.76
CO	252.0	1,008.1
NO_X	26.9	107.5
$PM_{10, 2.5}$	68.7	274.9
SO_2	0.5	1.9
CO_2	10,926	43,704

Operations

Point-Source Emissions

As a solar project using PV technology, the only operational air pollution emission point source would be the emergency fire pump engine. There is no emitting equipment associated with the

O&M building and transformers, and the other electrical equipment does not generate air emissions.

The emergency fire pump engine would be a 300 horsepower (HP) diesel engine fitted with a 20-foot exhaust stack. The hourly emission rates for this engine are listed below:

- NO_x 1.88 lbs/hr
- CO 1.72 lbs/hr
- VOC 0.10 lbs/hr
- SO_2 0.0033 lbs/hr
- PM_{10} 0.10 lbs/hr
- CO2 391.15 lbs/hr

It would only be run for a very small number of hours each year when it is tested weekly to ensure that it is operating properly and would be available in case of emergency. The actual test time is likely about 15 minutes each week but for purposes of estimating emissions one hour per week was used. Estimated emissions of criteria pollutants and carbon dioxide from this source are shown in **Table 3-6**.

Table 3-6
Annual Emissions for Emergency Fire Pump

Pollutant	***Annual Emission Rates (ton/yr)***
CO	0.045
NO_x	0.049
SO_x	0.0001
VOC	0.003
PM_{10}	0.003
$PM_{2.5}$	0.003
CO_2	10.17

Emissions from this source would be covered under a general permit from ADEQ and would operate in compliance with State of Arizona and federal air quality rules. Coverage under a general permit applies to engines with a capacity (in horsepower) less than 3,000 HP and having an exhaust stack more than 14 feet above ground. An application would be filed with ADEQ and processed prior to operation of the engine.

A general permit is a pre-approved permit and certificate that covers a specific class of common sources. By the issuance of a general permit, ADEQ indicates that it approves the activities authorized by the general permit, provided that the owner or operator of the source registers with ADEQ and meets the requirements of the general permit. Sources may apply for coverage under the general permit instead of obtaining individual permits. If the sources meet the criteria for coverage under the general permit, an Authorization to Operate (ATO) is issued for each major piece of equipment covered under the permit. The ATO allows for tracking of permitted equipment and assists inspectors in verifying coverage while conducting inspections.

Non-Point Source Emissions

In addition, air emissions would be generated from non-point mobile sources during operation. These would be associated with the travel of the 15 to 20 full time operational personnel to and from the site, movement on-site for O&M activities, and the periodic delivery of material and supplies. These vehicles would generate tailpipe emissions of VOC, NO_x, PM, CO, and CO_2 in similar quantities to other vehicles in the area travelling local roads and working on local agricultural operations. The CO_2 emissions from this operational traffic would create corresponding GHG emissions.

As with construction vehicle traffic described above, EPA's MOBILE6 vehicle emissions model was used to generate the emission estimates for employee commuter and delivery traffic. The longest one-way distance that operational commuter and delivery vehicles traveled was estimated to be 65 miles one way (from the nearest large communities of Gila Bend or Yuma). Also, to be conservative, it was assumed that 25 round trips were generated each day.

The MOBILE6 emission factors for employee commuter and delivery traffic were applied to the estimated VMT to quantify the CO_2 and air pollutant emissions from on-road mobile sources during operations and **Table 3-7** summarizes these emissions.

Table 3-7
On-Road Mobile Source Annual Emissions from Operational Commuter Travel and Light Duty Delivery Vehicles

Pollutant	Annual Emission Rate Tons / yr
VOC	0.97
CO	13.4
NO_X	0.83
$PM_{10, 2.5}$	0.015
SO_2	0.011
CO_2	591

As indicated above, the quantity of these pollutants generated by the traffic associated with operation of the Agua Caliente Project would make a minor contribution to Arizona's total emissions from vehicles.

The unpaved roads on the site between rows of solar panels would be periodically used for maintenance including panel-washing events which could occur up to twice a year. Approved dust palliatives may be applied where needed on these roads and under the panels to minimize fugitive dust emissions. Assuming 10 vehicle miles travelled (VMT) for every hour over a 24-hour period, a fugitive PM_{10} control efficiency of 70 percent, and using an AP-42 emission factor

(Chapter 13.2.2, Equation 1b), the estimated emissions of PM_{10} from operational traffic would be 13 ton/yr.

Total Operational Emissions

Table 3-8 below summarizes the total air emissions estimated to be generated from operation of the Project.

Table 3-8
Total Operational Emissions

Pollutant	Annual Emissions Tons / yr	Total Emissions (Tons / 30-yr period)
VOC	1.0	29.2
CO	13.4	403.4
NO_X	0.9	26.4
$PM_{10, 2.5}$	0.02	0.6
SO_2	0.01	0.3
CO_2	601.2	18,035.1

As indicated in the table, this Project would have very low emissions, and the emissions are well below the thresholds that trigger PSD review. Therefore, a detailed air quality impacts analysis was not necessary to demonstrate compliance with NAAQS and PSD increments. The Project emissions are far below the PSD threshold, and this ensures that the Project would not cause or significantly contribute to an exceedance of any NAAQS.

Greenhouse Gases and Global Climate Change

In its Fourth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) stated that warming of Earth's climate system is unequivocal, and that warming is very likely due to anthropogenic greenhouse gas concentrations (IPCC 2007). DOE is not aware of any methods to correlate exclusively the carbon dioxide emissions resulting from the proposed Project to any specific impact to global warming; however, studies such as the IPCC report support the premise that carbon dioxide emissions from the Project, together with global greenhouse gas emissions, would likely result in a cumulative impact to global warming. Although the Project would likely contribute incrementally to greenhouse gas emissions and climate change, greenhouse gas emissions from the Project would be minimal and limited to increases in carbon dioxide, resulting from slight increases in vehicular travel and temporary construction emissions.

Further, the Project may help local utilities fulfill mandatory state renewable energy requirements. The Project would also produce enough electricity to account for a year's growth in Arizona's demand for electricity with far fewer greenhouse gas emissions than an equivalent capacity fossil-fuel fired generator.

PV panels generate electricity without producing significant carbon emissions. The number of hours this 290 MW facility is expected to generate electricity each year would yield 690,298 gross megawatt hours per year (MW-hrs/yr) of output or 20,708 gigawatt hours of electricity over the 30

year life of the Project. By potentially displacing natural gas and other fossil fuels used to produce electricity, PV installations reduce generation of CO_2 and other greenhouse gasses.

The Project itself would have direct greenhouse gas emissions from the emergency fire pump diesel engine and vehicles used for operations and maintenance activities on Site. The Project would also have indirect greenhouse gas emissions related to its use of energy from the grid (using conventional fuel sources) to operate its fire pump, transformers and O&M building. It would consume an estimated 5,840 MW-hrs of electricity per year.

There would also be greenhouse gases emitted as a result of construction and transportation activities related to the facility. The GHG emissions generated by construction activities would be short-term (over the construction period of up to four years). Annual CO_2 emissions related to construction are projected to be 10,926 tons/yr with the total being 43,704 tons over the four year period. There would also be small amounts of GHG emissions generated by operational activities. Annual CO_2 emissions related to operation would be about 601.2 tons/yr with a total of 18,035 tons over the 30-year life of the Project.

The GHG emissions decrease that would result from the expected 30-year operation of this proposed renewable energy project has been estimated using the eGRID estimate (USEPA 2007) of CO_2 emissions per MWh. Assuming that the capacity of the Project displaces electricity produced by conventional fossil-fueled power plants, the potential estimated Project-related reduction is 239,525 metric tons of GHG emissions annually or an estimated total displacement of 7,185,762 metric tons of GHG over 30-year Project life. The Project's use of energy would correspond to approximately 2,026 metric tons per year of carbon-dioxide-equivalent emissions. When this and the estimated GHG emissions from operations are deducted from the reductions estimated from the Project's displacement of fossil fuel generation, it would result in a potential net reduction of 236,898 metric tons of GHG emissions annually during operations. Over its 30-year Project life, the Project would displace approximately 7,063,236 metric tons of GHG (30 years of the annual net reduction minus the GHG generated during construction). This could help to reduce overall greenhouse gas emissions and would also be consistent with state and federal policies and regulations to promote greater reliance on renewable energy.

Conformity Review

Section 176(c) of the Clean Air Act requires that federal actions conform to the appropriate State Implementation Plan (SIP). A SIP is a plan developed at the state level that provides for the implementation, maintenance, and enforcement of NAAQS and is enforceable by the USEPA. The final rule for "Determining Conformity of Federal Actions to State or Federal Implementation Plans" was promulgated by the USEPA on November 30, 1993 (58 Federal Register 63214) and took effect on January 31, 1994 (40 CFR Parts 6, 51, and 93).

This "General Conformity" rule established the conformity criteria and procedures necessary to ensure that federal actions conform to the SIP and meet the provisions of the Clean Air Act. In general, this rule ensures that all criteria air pollutant emissions and VOCs are specifically identified and accounted for in the SIP's attainment or maintenance demonstration and conform

to a SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards. The State of Arizona adopted the General Conformity rule in Arizona Revised Statutes 49-48-408, and codified the rule in Arizona Administrative Code R18- 2-1438. If the action were undertaken in a federally classified nonattainment or maintenance area[1], the provisions of the final rule for conformity would apply.

The proposed Project Site is within an attainment area for all criteria air pollutants so the provisions of the rule do not apply.

3.4.3.2 No Action Alternative

If no construction would occur, there would be no new emissions or changes in air quality over baseline conditions described in Section 3.4.1. However, not constructing the Project would decrease the potential for replacing energy sources that burn fossil fuels and emit greenhouse gases with renewable solar power.

3.5 Noise

3.5.1 Affected Environment

A-weighted (dBA) correction factors are employed for measuring sound levels in ordinary environments. The A-weighted scale is used in most common sound level (noise) ordinances and standards. The Project is located in a very remote area of Yuma County. Yuma County does not have an applicable noise ordinance for this area.

The ambient noise in the vicinity of the Project is typical of rural areas where agricultural activities are the most common use. Typical sound levels in rural areas range from 40 dB to 50 dB. These are daytime averages and can be higher or lower depending on the presence and proximity of significant rural noise sources such as farm equipment.

The most common noise source in the area is from agricultural equipment. The most significant source of local noise in the area was previously generated by use of the railroad located at the southern boundary of the Project. This railroad is currently not operating.

The nearest potential noise receptor (residence) is approximately 1.5 miles from the Project boundary and 2.25 miles away from the Project's O&M / Q43 switchyard area.

[1] A maintenance area is an area that a state has redesignated from nonattainment to attainment. The state thereby submits to the EPA a plan for maintaining NAAQS in the maintenance area as a revision to the SIP. The maintenance plan must show that the NAAQS will be maintained for at least 10 years after redesignation and also include contingency measures to address any violation of the NAAQS.

3.5.2 Environmental Effects

3.5.2.1 Proposed Action

The potential noise impacts generated from the Project during construction and operation are described below.

Construction

Noise generated during the construction phase of the Project would result from the operation of construction equipment and vehicles. Typical noise levels for construction equipment at a distance of 15 meters (45 feet) are provided below (Crocker 1982). These values assume the equipment is operating at full power.

Typical Construction Noise Levels	
Equipment Category	**Noise Level at 45 ft (dBA)**
Dump Truck	88
Portable Rock Drill	88
Concrete Mixer Truck	85
Pneumatic tool	85
Grader	85
Front-End Loader	84
Mobile Crane	83
Excavator	82
Backhoe	81
Dozer	78
Generator	78

In addition to the equipment listed in this table, other types of equipment would also be used on Site. These include the pile-driver that would be used to establish the pier or I-beam foundations for the solar panel tables. This equipment also generates noise in the 80-90 dBA range similar to the other listed equipment.

The typical noise 45 feet from a construction site would be 85 dBA because the construction equipment can be spread throughout a construction site and may not be operating concurrently. This value and the data presented above indicate that there would be a temporary increase in ambient noise that would be limited to the construction phase of the project.

The propagation of noise depends on many factors including atmospheric conditions, ground cover, and the presence of any natural or man-made barriers. As a general rule, noise decreases by approximately 6 dBA with every doubling of the distance from the source (Bell 1982). Therefore, noise levels at various distances from the construction site can be predicted and are shown below.

Predicted Noise Near Construction Activities	
Distance from construction site in feet	**Predicted Noise Level (dBA)**
45	85
90	79
180	73
360	67
720	61
1440 (approximately 0.25 miles)	55

Construction noise generated by the Project would be intermittent in nature and would be temporary as the construction period is estimated to be thirty-six (36) to forty-eight (48) months. The nearest noise receptor (residence) is 1.5 miles away from the Project boundary. At this distance, the construction noise from the Project would be imperceptible and at or near the background levels in the area as indicated by the table above showing noise levels reaching background levels at a distance of 0.25 miles. Likewise, noise levels would be relatively low on the BLM lands adjacent to the site on the west that receives some limited public use. The BLM road used to access these lands is located approximately 0.25 to 1.0 miles away from the Project boundary. The actual noise level at distance would vary with wind direction and velocity.

It is expected that most construction would occur during daylight hours. Some deliveries and continuous construction activities such as foundation pours or peak construction work forces would be required during non-daylight hours.

In addition, there would be noise generated by the additional vehicles on the roadways used by the 150 to 400 construction workers accessing the site. The noise generated by this traffic would be the same as the noise generated by the existing traffic on the same roads. However, this noise would occur more frequently at any given point along these roads for the duration of the up to 4-year construction period while the traffic volumes would be higher.

Operations

As a solar energy project, this Project would operate during daytime hours when the sun is available to make power. Therefore, except for minimal noise that could be generated by nightly minor maintenance activities, the Project would not affect night time sound levels.

The PV technology does not have any significant noise-generating equipment. The primary noise sources associated with PV operation would be the transformers at the Project substation.

The impact from the Project on the sound levels in the area would be minimal. Adjacent BLM and nearby State lands provide a buffer between the Site and the noise receptors (residences), with the nearest approximately 2.25 miles away from the O&M / switchyard area, the primary source of potential operational noise. Noise levels from the Project would be less than background noise levels at the nearest receptors.

3.5.2.2 No Action Alternative

If no construction would occur, there would be no impact on noise levels in the Project area. The existing agricultural related noise would continue.

3.6 Geology and Soils

3.6.1 Affected Environment

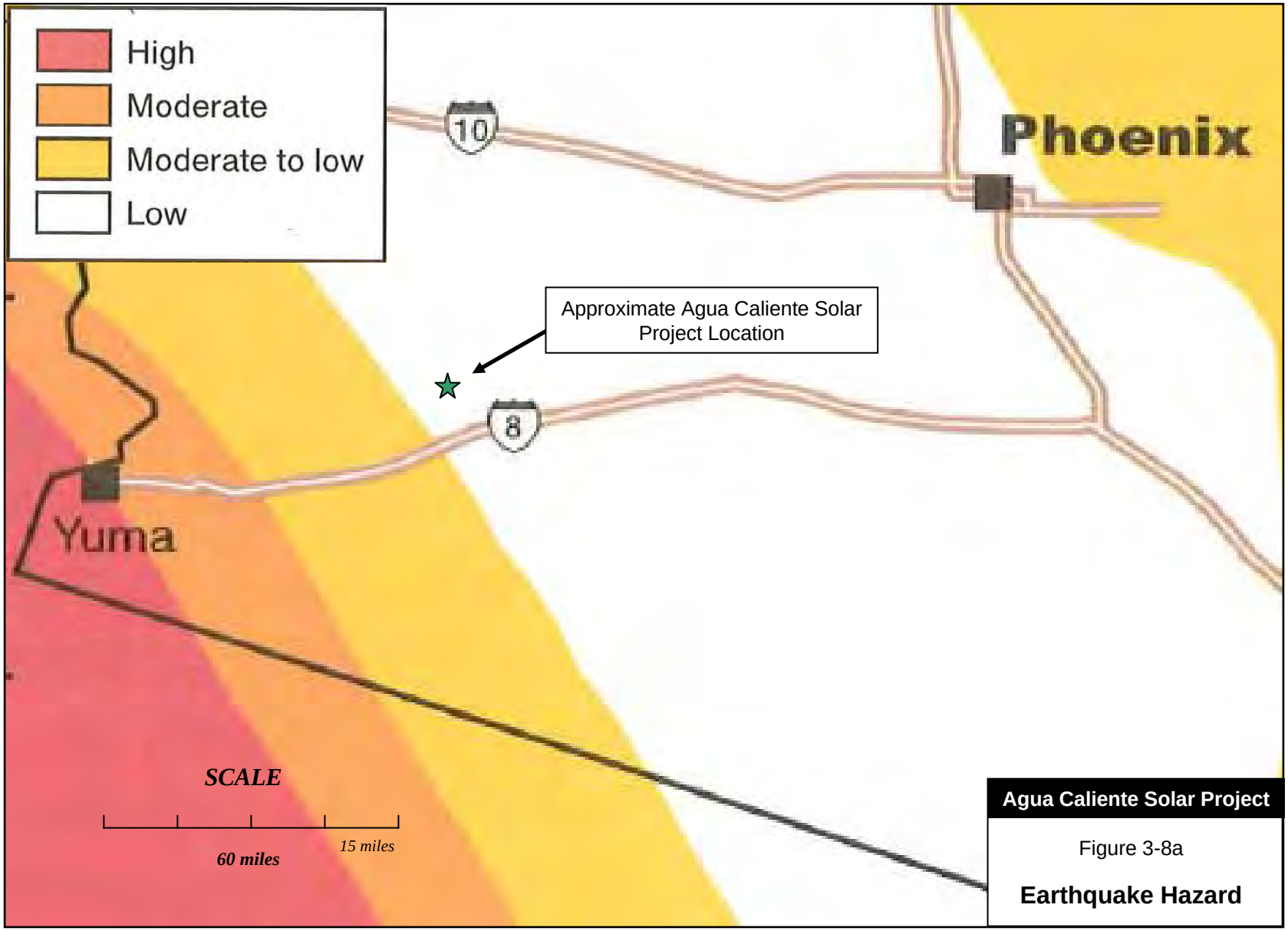
The topography of the Site is very flat, being made up of a series of laser-leveled fields that are separated by roads and ditches. Currently, there are elevation drops between each of the individual fields (across the roads and ditches) of between zero and three feet. On a whole, the elevation drops represent a general fall in elevation from the northwest to the southeast of about 0.5%. The elevation ranges from approximately 475 to 550 feet above mean sea level.

The Site is located within the western portion of the Palomas Plain, which is bounded on the southwest by the Palomas Mountains. The Palomas Plain is a typical basin found in the Basin and Range Province of the western U.S. In this area, the mountain ranges bounding the basins are all oriented to the northwest. The Palomas Mountains are an isolated portion of the Kofa-Tank Mountains complex. And its bedrock is comprised of granitic, metamorphic rocks and volcanic rocks.

The subsurface geology on the Site is underlain by recent alluvial sediments varying from 200 to 600 feet thick that overly a thick sequence of volcanic rocks that extend to a depth of at least 2,500 feet. The volcanic rocks are highly fractured and there is an irregular contact between the volcanic unit and the overlying recent alluvium.

The seismic hazard potential for the Yuma region is Seismic Zone 4 which is subject to ground shaking but the earthquake hazard risk for the area has been determined to be low by the Arizona Geologic Survey (**Figure 3-8a**). Minor faults occur in the area but no significant faults that could generate major seismic activity or areas prone to liquefaction have been identified by Yuma County in their Comprehensive Plan in eastern Yuma County where the Site is located as shown in **Figure 3-8b.** The lack of significant faults results in the low earthquake risk for the area as determined by the Arizona Geological Survey and shown on **Figure 3-8a**.

The soils on the Site are dominated by Harqua-Tremant Complex soils, with pockets of Carrizo Very Gravelly Sand and Ligurta-Cristobal Complex, 2 to 6% slopes. The USDA Natural Resource Conservation Service (NRCS) designates prime farmland as land that has the best combination of physical and chemical characteristics for agricultural production independently of current land use. The Site is not classified as prime or unique farmland.



Agua Caliente Solar Project

Figure 3-8a

Earthquake Hazard

From: Fellows, Larry D. 2000. Earthquake Hazard in Arizona. Published by the Arizona Geological Survey.

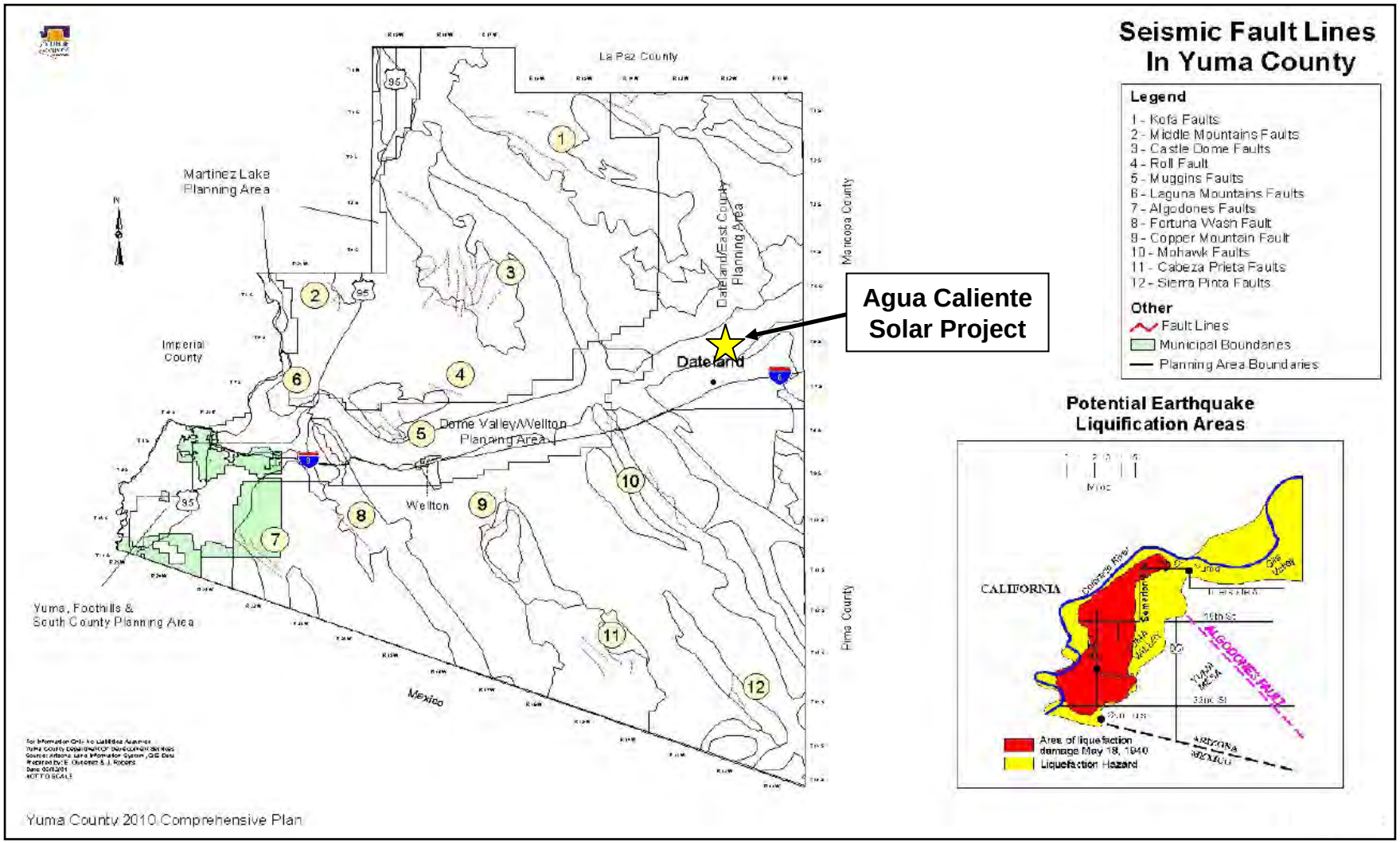


Figure 3-8b
Seismic Fault Lines in Vicinity of the Project

3.6.2 Environmental Effects

3.6.2.1 Proposed Action

Because it is flat, there are no nearby significant faults, and there is a low earthquake risk, there is a very minimal risk of landslide, fault rupture, liquefaction, or slope failure at the Project Site. All structures on the Site would employ appropriate engineering designs that are in conformance with geotechnical standards for construction as required by the Yuma County Building Code. A geotechnical engineering study would be prepared for the Site and would be incorporated into the design and construction of the Project to minimize potential soil- or foundation-related problems. As a result, geologic risks from the Project would be minimized and not significant.

The Site has been leveled and as a result has a low potential for potential soil erosion and sediment run-off. Erosion and run-off potential would be mitigated by the use of Best Management Practices (BMPs) that are required to comply with the stormwater permits for both the construction and operational phases of the Project. The potential for off-site flow of sediment associated with stormwater would also be regulated by the grading and drainage requirements of Yuma County.

3.6.2.2 No Action Alternative

If no construction would occur, there would be no impact to local geology and soils; other than those associated with the current agricultural use of the land.

3.7 Water Resources

3.7.1 Regulatory Framework

3.7.1.1 Surface Water

The Clean Water Act of 1972, as amended (33 U.S.C. 1251 *et seq.*), regulates surface water quality in waters of the United States. The Clean Water Act gives the EPA the authority to set standards for discharge of point source pollutants and set water quality standards for all contaminants in surface waters. The EPA publishes surface water quality standards and toxic pollutant criteria at 40 CFR Part 131.

The Clean Water Act mandates water-quality-based control measures. States, territories, and authorized tribes set water quality standards, and under Clean Water Act Section 303(d), states, territories, and tribes are required to develop lists of impaired waters that do not meet water quality standards and establish total maximum daily loads (TMDLs) for specific pollutants. TMDLs represent the maximum amount of a pollutant that a waterbody can receive from all contributing point and non-point sources and still meet water quality standards. The calculation must include a margin of safety to ensure that the waterbody can be used for the purposes the state has designated and must account for seasonal variations in water quality to gain EPA approval.

Under Title 18, Chapter 11, Article 1 of the Arizona Administrative Code, the ADEQ is responsible for regulation of activities and factors that could affect the quality of surface waters of the state.

3.7.1.2 Floodplains

Executive Order 11988, *Floodplain Management and Protection* (May 24, 1977), directs federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. Under DOE policy, a floodplain assessment is required for actions in a 100 year floodplain (10 CFR 1022).

In addition, the Legislature of the State of Arizona, in ARS §§ 48-3601 et seq., has delegated to each County Flood Control District the responsibility to adopt regulations designed to promote the public health, safety, and general welfare of its citizenry. Pursuant to the provisions of ARS § 48-3615 no person shall construct any structure which would divert, retard or obstruct the flow of water in any water course without securing written authorization from the Board of the District in which the water course is located.

3.7.1.3 Groundwater

The Arizona Department of Water Resources manages groundwater under the Groundwater Management Code of 1980, codified in Title 49 of the Arizona Revised Statutes. The ADEQ regulates groundwater quality in accordance with Title 18, Chapter 11, Article 4 of the Arizona Administrative Code. At present, all aquifers of the state are protected for drinking-water use.

3.7.2 Affected Environment

3.7.2.1 Groundwater

The small amount of water required by the Project would be provided by groundwater wells located on the Whitewing Ranch, the property on which the Project is located. There are multiple existing water supply wells that were previously used to support irrigated agriculture on the Site and adjacent agricultural lands. Current agricultural groundwater pumping on the Whitewing Ranch has historically ranged from 15,000 to 20,000 acre-feet/year within the past ten years. Groundwater well depths range from 600 to 1800 feet. Pumping test data confirmed that the water supply wells have the capacity to meet all water demand requirements.

Wells located within the switchyard area would be taken out of service and closed in accordance with requirements of the Arizona Department of Water Resources (ADWR). Wells located within the solar field are currently out of service and will be capped so they could be potentially used in the future. No offsite water source would be required for the Project.

Groundwater Quality

The general quality of groundwater in the area is characterized by elevated Total Dissolved Solids (TDS), which has increased in wells on the southern portion of the Whitewing Ranch. TDS concentrations range from approximately 500 milligrams per liter (mg/l) to 6,000 mg/l, and have risen over time. Water quality sampling conducted recently also indicated that fluoride, nitrate and arsenic concentrations in groundwater exceed relevant Aquifer Water Quality Standards (AWQS) at some wells on the Property.

Groundwater Rights

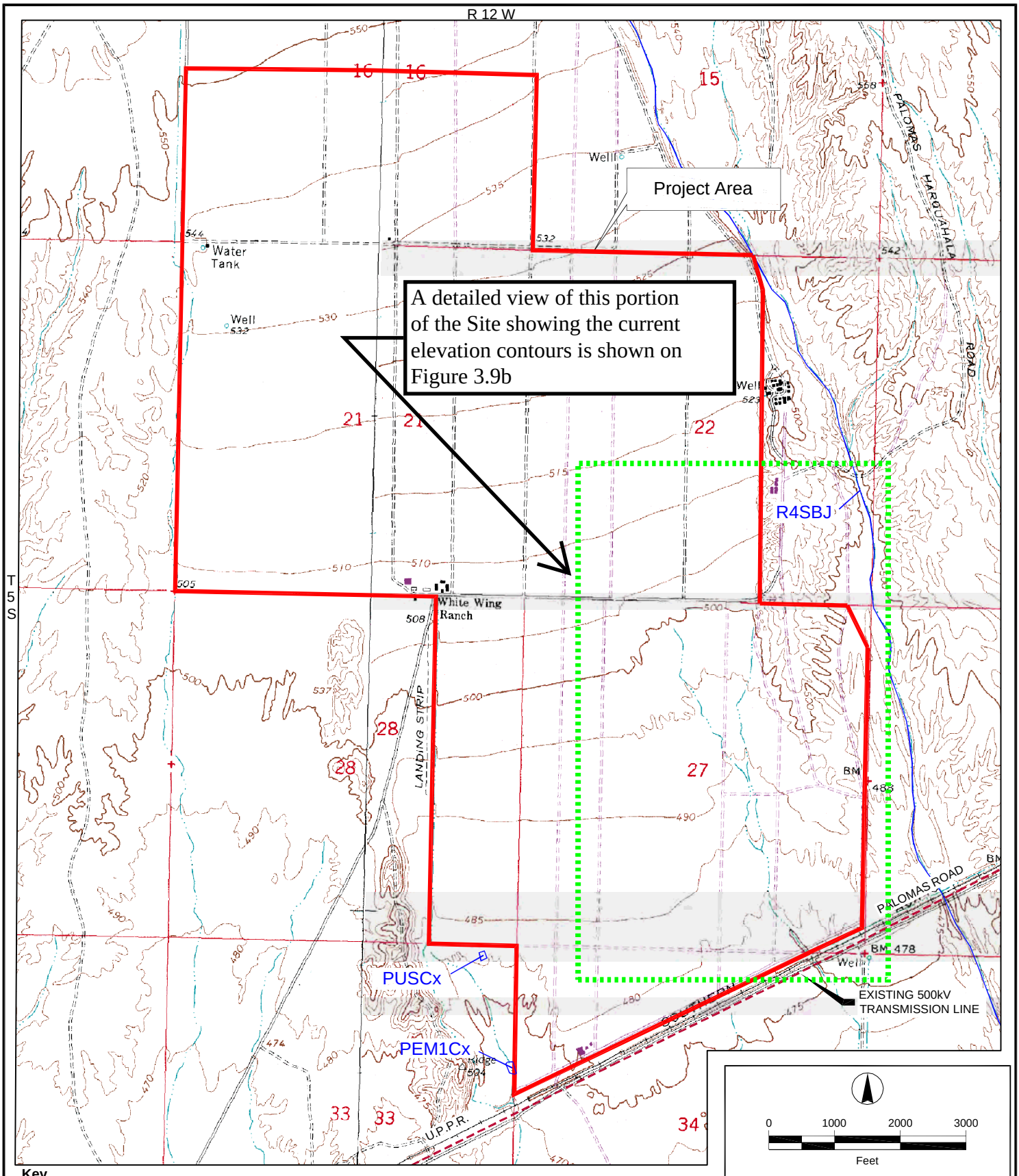
Based upon ADWR rules and applicable laws, certificated groundwater rights are not required for implementation of this Project. Groundwater rights and uses are regulated by law within Active Management Areas (AMAs) of the State of Arizona, but are not required for industrial or agricultural use outside of AMAs. This Site is outside of any AMA. Groundwater pumped outside the AMAs is required by law to be used beneficially, and is generally subject to the legal doctrine of capture.

3.7.2.2 Surface Water / Floodplains

The general area is drained by the Gila River and by the washes that run into it. The Project area drains south toward the Gila River via several small washes. The westernmost wash is named Hoodoo Wash and it wraps around the southeastern tip of the Palomas Mountains as it drains toward the Gila River. The Project area is located just east of Hoodoo Wash (Manera, 1990).

Both the Gila River and the washes are typically dry. There is no continuous surface water flowing through the area. There are no irrigation districts or structures in the area – farmlands are irrigated by well water. The Site does contain some lined irrigation canals/ditches that distribute water pumped from wells to the various fields. They are adjacent to the farm roads on the property. These irrigation ditches will be removed when the Site is leveled. There are no waters of the US on the Site.

Figure 3-9a shows the National Wetland Inventory (NWI) map for this area with the Project boundary. This map shows no wetlands, but does show an intermittent drainage in the southern portion of the Site. This and other mapping was based on dated (1960s and 1980s) USGS topographic maps that do not reflect the current conditions particularly in the southeast corner of the ranch where the USGS map shows the small drainage. The topography in this area has been modified as part of the ongoing land leveling that has taken place to improve irrigation on the ranch. **Figure 3-9b** shows the current topography in this portion of the property showing that the intermittent drainage no longer exists.



Key

Classification	System	Class	Subclass	Water Regime	Special Modifier
PUSCx	Palustrine	Unconsolidated Shore	-	Seasonally Flooded	Excavated
PEM1Cx	Palustrine	Emergent	Persistent	Seasonally Flooded	Excavated
Classification	**System**	**Subsystem**	**Class**	**Water Regime**	**Special Modifier**
R4SBJ	Riverine	Intermittent	Streambed*	Intermittently Flooded	Excavated

**Streambed is limited to tidal and intermittent subsystems, and comprises the only class in the intermittent subsystem.*

Universal Transverse Mercator
North American Datum 1927
Zone 12, Meters

Source: USGS 7.5' Quadrangles of Horn, Aztec NW, Baragan Mountain, and Palomas Mountains SE, Arizona
Wetlands digitized from Horn and Aztec NW NWI hardcopy maps.

Agua Caliente Solar Project

Fiugre 3-9 - NWI Wetland Map

Date: 4.24.10		Author: etc

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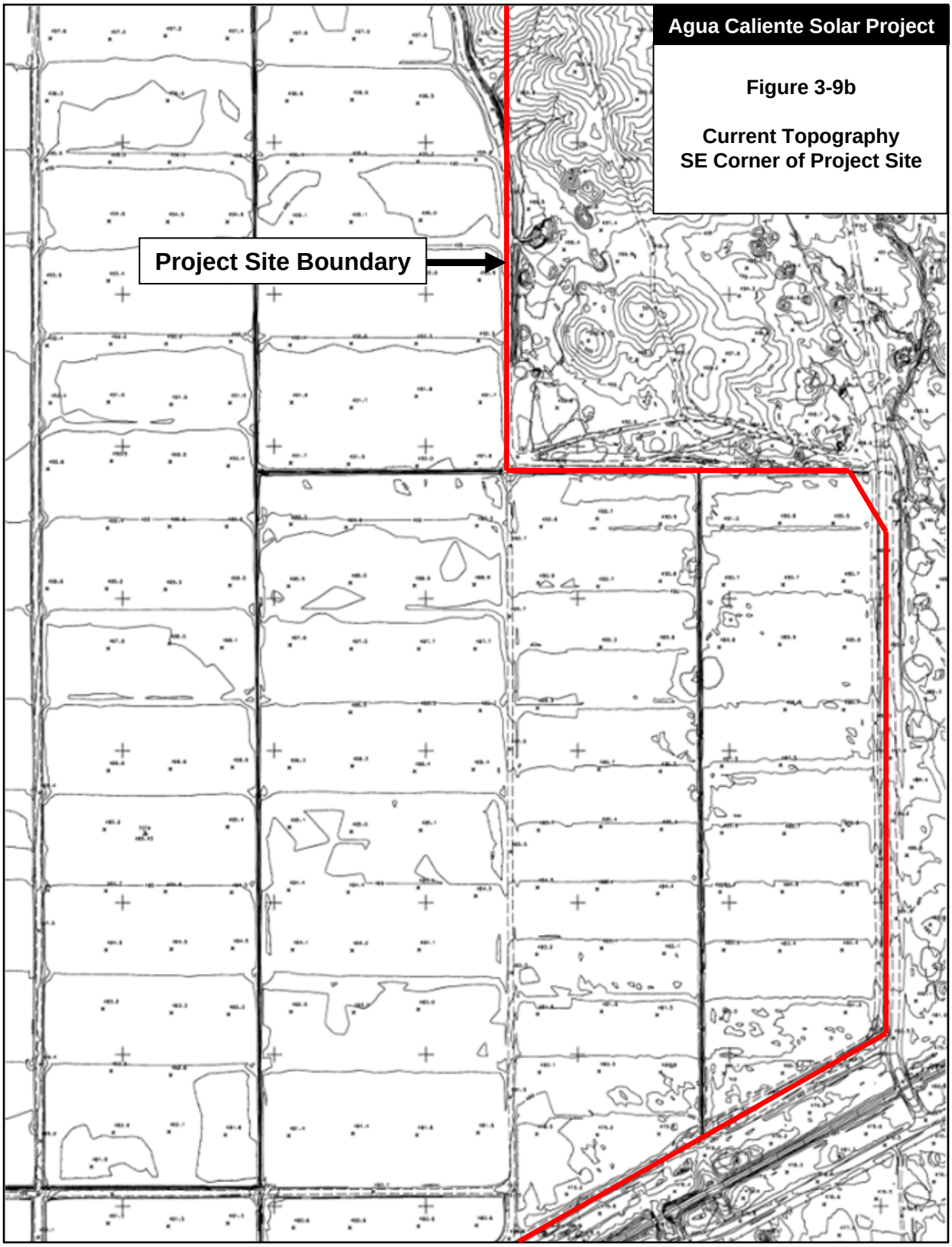
Agua Caliente Solar Project
Figure 3-9b
Current Topography
SE Corner of Project Site
Project Site Boundary

Floodplains are lowlands and relatively flat areas adjoining waters, including flood-prone areas that are subject to a one-percent or greater chance of flooding in any given year (41 CFR 46968). The 100-year floodplain may be present in low-lying regions, typically near rivers or drainages. The Site has been previously developed for agriculture and graded to improve drainage and irrigation efficiency. In addition, dry washes in the area have been diverted around the property and Project Site so surface waters do not flow onto the Site even during storm events. However, while floodwaters do not directly flow on the Site, a small area located at its southeast corner has been identified by FEMA as part of a 100-year floodplain because water in a wash located at the eastern boundary of the Project can be ponded against the berm of the adjacent railroad during high flows. **Figure 3-10** shows the location of the 100-year floodplain on the Site. As referenced above, the southeast portion of the Site has been modified since the development of the USGS maps upon which floodplain mapping was based and the current topographic conditions are shown on **Figure 3-9b**.

3.7.3 Environmental Effects

3.7.3.1 Proposed Action

Groundwater

In general, the proposed Project would use less water than the current and historical agricultural use on the same land. The lower pumping rates (relative to the current agricultural pumping rates) would be beneficial to the groundwater levels, resulting in stable or rising groundwater levels. Simulations of the groundwater flow gradients imply that TDS concentrations may also decrease over time with lowered pumping.

Impacts upon Groundwater Quantity

Agricultural groundwater pumping on the 3,800 acre Whitewing Ranch Property has historically ranged from 15,000 to 20,000 acre-feet/yr within the past ten years. The Project would utilize an estimated less than 20 acre-feet annually on the 2,400-acre Site during operations for panel washes and other non-potable uses. Agriculture would continue on the 1,400 acres on northern portions of Property not being used for the Project and the agricultural pumping associated with this is estimated to be 4,500 acre-feet/yr. Therefore, groundwater use on this 3,800-acre Property would be reduced dramatically from 15,000 to 20,000 acre-feet/yr to just over 4,500 acre-feet/yr.

The decrease in agricultural pumping would have a positive impact upon groundwater quantity, as water levels stabilize or rise in response to the changes. This suggests that the proposed Project would have positive impacts upon available groundwater quantity for the Property and other existing uses in the vicinity. The lower groundwater usage would cause generally positive impacts given the aquifer's ability to recharge, and the previous cone of depression. In addition, the Project would not result in a decrease of infiltration of precipitation on Site.

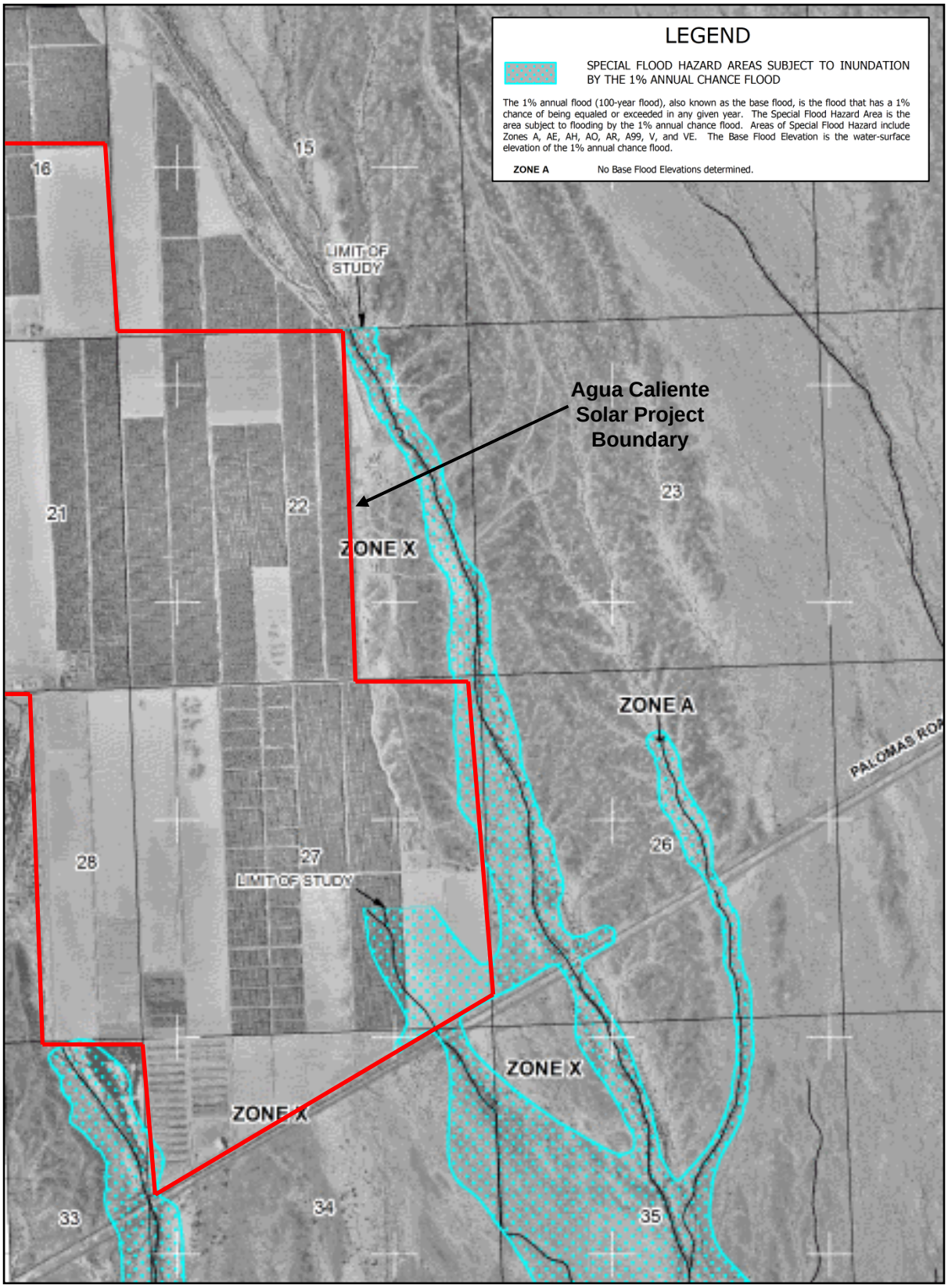

Figure 3-10

FEMA 100-Year Floodplain Map

There are registered wells for domestic water use near the Site. Wells to the west and southwest of the Site would be downgradient of the Project, and several wells are within 3-miles. Based upon the decreased pumping volumes associated with taking 2,400 acres of irrigated agricultural lands out of production, it would be expected that water levels would also increase at these wells over time.

Impacts upon Groundwater Quality

Based upon the changes in groundwater flow directions, it appears that the reduced pumping may also cause a decrease in TDS concentrations over time for groundwater and wells on the northern portion of the 3,800-acre Property. The pumping center to the west of the Property dominates the flow system, and the groundwater divide migrates northward, reducing or reversing the historical pattern of high-TDS migrations northward from the Gila River into the southern portions of the Site. Assuming that TDS concentrations become lower in the areas to the north, this suggests that TDS would decline over time as the reduced pumpage rates capture higher quality water. These assumptions do not take into account the possibility that the underlying volcanic bedrock may be sufficiently fractured to allow high TDS water to continue to be transmitted to the wells that will be continued to be pumped on the northern part of the Property. For this reason, TDS levels may not decline as changes in groundwater flow would suggest. However, the impact to the groundwater quality may be positive, based on the decreased groundwater pumpage.

Groundwater would be used to provide water for the Project that would be used for panel washing and other non-potable uses. Potable water would be provided via delivered bottled water. Quality of local groundwater is suitable for these uses.

Surface Water / Floodplains

The Project is located on agricultural lands that have been previously leveled and there are no natural surface water drainages on Site – only the ditches used to deliver irrigation water. The amount of stormwater runoff generated from the Site would be controlled in accordance with the grading and drainage design that has been approved by the County. Site stormwater drainage will be routed to a new retention pond that will be located at the southern end of the Site. The quality of stormwater from the Site would be managed by use BMPs that are required to comply with the stormwater permits for both the construction and operational phases of the Project. Also, there are no point source water discharges (locations where waste water is discharged) associated with this Project. If water is used to wash the panels, it will fall to the ground and evaporate. Therefore, development of the Project would not affect surface waters.

Some PV panels would be placed within the area of a 100-year floodplain in the southeast corner of the Site as shown on **Figure 3-10**. The portion of the floodplain area containing panels would cover approximately 40 acres of the 2,400-acre Site. Approximately 12,000 of the panel support structures would be located within this 40-acre area. The individual support structures are planned to be 6x7-inch I-beams). Therefore, the 12,000 supports would have a total area of approximately 4,200 square feet.

The location of these structures within the designated floodplain would require a Floodplain Use Permit from the Yuma County Flood Control District. This application was approved by the District in June 2010. It indicates that all equipment within the flood zone would be water (flood) resistant (like the panel support structures) or elevated one foot above the base elevation of the 100-year floodplain.

It would be unlikely that the Project would impede or redirect flood flows or result in measurably different flows compared to existing conditions because the panel support structures have a small footprint. It is also unlikely that waters within the floodplain in this area would have a significant velocity due to the flat gradient and tendency for water to evaporate, and no short-term or long-term adverse effects to the 100-year floodplain would be anticipated. In addition, a planned detention basin and other past/planned grading in what has been designated as the floodplain area would lessen the extent and potential impact of downstream flooding. Thus, based on the analysis for this floodplain assessment, and pursuant to the DOE floodplain environmental review regulations at 10 CFR 1022, DOE has determined that the proposed Project would not adversely affect the 100-year floodplain. DOE issued a notice of floodplain involvement on June 27, 2010 in the Yuma Sun newspaper (**Appendix D**).

3.7.3.2 No Action Alternative

If no construction would occur, there would be no impacts on water resources; however, the substantial existing water use related to agricultural activities on the Site would continue.

3.8 Biological Resources

3.8.1 Regulatory Framework

The principal statute pertaining to the protection of plants and animals is the federal Endangered Species Act (ESA) of 1973. The U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) administer the Endangered Species Act. The ESA establishes protection and conservation of threatened and endangered species and the ecosystems upon which they depend.

The Migratory Bird Treaty Act of 1918 is the domestic law that affirms, or implements, the United States' commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of shared migratory bird resources. Each of the conventions protect selected species of birds common to both countries (that is, species occur in both countries at some point during their annual life cycle). The act protects all migratory birds and their parts (including eggs, nests, and feathers).

3.8.2 Affected Environment

Biological resources, as described in this section, include native or naturalized plants and animals and their habitats. Protected and sensitive biological resources include specific habitats and the

plant and animal species listed as threatened or endangered by the USFWS or the Arizona Game and Fish Department (AGFD) or are otherwise protected under federal or state law.

3.8.2.1 Vegetation / Wildlife

The Project is located in a portion of the Sonoran Desert. Native vegetation communities in this part of the Sonoran Desert are dominated by what is characterized as the Sonoran Desertscrub Ecosystem (Brown 1994). The Lower Colorado River Valley Subdivision – Creosote Bush-White Bursage Series is the dominant native feature on lands surrounding the Site. Ephemeral drainages (xeroriparian areas) also occur near the Site in two significant washes: Hoodoo Wash occurs about one mile west of the Site, and Baragan Wash occurs about 2.5 miles east of the Site. There are no washes on the Site.

The Lower Colorado River Valley Subdivision is the driest of the Sonoran Desert subdivisions. Plant growth is typically sparse with few species. The most common plant association in this subdivision is the Creosote Bush-White Bursage Series. Species commonly found along drainages and on flats include creosote bush (*Larrea tridentata*), white bursage (*Ambrosia dumosa*), honey mesquite (*Prosopis glandulosa*), ironwood (*Olneya tesota*), blue palo verde (*Cercidium floridum*), foothills paloverde (*Cercidium microphyllum*), smoketree (*Psorothamnus spinosus*), ocotillo (*Fouquieria splendens*), brittlebush (*Encelia farinosa*), and saguaro (*Carnegiea gigantea*). Other shrub species in this series include four-wing saltbush (*Atriplex canensens*), brittlebush (*Encelia farinose*), and burroweed (*Isocoma tenueseca*). Cactus species including barrel cactus (*Ferrocactus wislizenii*) and jumping cholla (*Opuntia bigelovii*) can also found in low densities.

Xeroriparian areas in the surrounding native habitats support stands of catclaw (*Acacia greggii*), ironwood, or complex mixes of mesquite-catclaw-desert willow and a variety of other shrubs.

Within the Project boundary, there is no native vegetation. Local washes adjacent to the Site support xeroriparian habitat; although no washes were recorded on the Site. The entire Site consists of agricultural lands with non-native, weedy, and crop species typically dominant.

The Arizona Native Plant Law (NPL) states that if protected native plant species are to be destroyed or removed, the property owner must contact the Arizona Department of Agriculture prior to such actions. This process does not restrict the removal of such species on private property, but is meant to encourage the salvage of these plants when possible. There are no native plant species protected under the NPL that occur within the Project boundary.

Wildlife resources that have the potential to occur within the vicinity of the Site are predominantly associated with Sonoran Desertscrub habitats and agricultural lands. Species occurrence, abundance, and distribution are strongly influenced by the presence of surface water, topography, and habitat types within and surrounding the Site. The Site contains irrigated agricultural land and the surrounding lands are dominated by creosote bush uplands with palo verde and ironwood dominating washes with a low density of saguaro.

The tables in **Appendix E** list those plant and wildlife species that have the potential to occur in the Project vicinity. Although these species have the potential to occur in the Project vicinity, due to the highly disturbed nature of the Site, few of these plant and wildlife species are expected to occur on the Site. No native plants or habitats occur on the agricultural lands that will be impacted by development of the Project. Some mammals such as mule deer use the Site for forage when forage crops such as alfalfa are being grown. Likewise, birds can use some of the Site for forage. The agricultural operation actively tried to minimize use of the Site by animals in order to reduce or eliminate to the greatest extent possible animal waste that could contaminate the crops.

3.8.2.2 Protected and Sensitive Species

Special status plant and wildlife species are subject to regulations under the authority of Federal and State agencies. Special status species related to the proposed project include those species that are listed by the USFWS as Federal endangered, threatened, proposed, or candidate species under the ESA, Section 4, as amended; listed as Wildlife of Special Concern by the AGFD; or are protected under the Arizona NPL by the Arizona Department of Agriculture (AZDA). Descriptions of special status species are listed below:

- Endangered species are those species in danger of extinction throughout all or a significant portion of their range.
- Threatened species are those species likely to become endangered in the foreseeable future.
- Proposed species are those species recommended for listing under Section 4 of the ESA.
- Candidate species are those species for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. Candidate species are not protected under the ESA.

USFWS Species of Concern is an informal term that refers to those species that the USFWS believes may be in need of concentrated conservation actions. Conservation actions, such as monitoring, vary depending on the health of the populations and degree and types of threats. USFWS Species of Concern receive no legal protection under the ESA and the use of the term does not necessarily mean that the species will eventually be proposed for listing as a threatened or endangered species.

AGFD Wildlife of Special Concern are those species whose occurrence in Arizona is or may be in jeopardy, or with known or perceived threats or population declines, as described by the Arizona Game and Fish Department's listing of Wildlife of Special Concern in Arizona (WSCA, updated June 3, 2008).

AZDA Highly Safeguarded or Salvage Restricted Native Plants. Special status plants are protected under the NPL and fall into these categories: Highly Safeguarded (no collection allowed); Salvage Restricted (collection allowed only with permit); Export Restricted (transport out

of State prohibited); Salvage Assessed (permits required to remove live trees); and Harvest Restricted (permits required to remove plant by-products).

The USFWS has published a list of proposed, candidate, threatened, and endangered species occurring by county in Arizona (USFWS 2008a). In addition, the AGFD has published a list of special status species occurring by county in Arizona (AGFD 2008a) and a list of species occurrences by county (AGFD 2008b). These lists were consulted to provide a basis for special status species that might be present in the vicinity of the Project.

The USFWS and AGFD have identified 12 plant species and 28 wildlife species (one fish, nine mammals, twelve birds, and six reptiles) with special status that have the potential to occur within Yuma County. Of these, six species (one fish, one mammal, and four birds) are federally listed species under the ESA and one is a candidate species for listing. All identified sensitive species are identified in **Table 3-9** below.

An AGFD On-line Project Evaluation Program (PEP) search was completed for the Project on November 18, 2008 (AGFD 2008d) by the biologist who conducted the field surveys. The information provided in the PEP is used to guide preliminary decisions and assessments of proposed land development, management, and conservation projects, while incorporating fish and wildlife resource needs or features. The PEP indicated that there are no special status species or critical habitats that are known to occur on or within five miles of the Site.

A field survey was conducted in October, 2008 by a qualified field biologist to identify any potential habitats for special status species on or near the Site. Since this time, the habitat on the Site has not changed (still agriculture) and the potential for species impacts has not changed (still remote). Habitats were evaluated and characterized within the Project Site and vicinity. The results of this Site evaluation are summarized in **Table 3-9.**

Table 3-9
Sensitive Species that can Occur in Yuma County and their Potential to Occur on the Agua Caliente Solar Project Site

Species		Protection Status[1]		
Common Name	Scientific Name	ESA[2]	AZ[3]	Potential to Occur at Project Site (Justification)[6]
Plants				
Parish Onion	Allium parishii		SR	No (Elevation)
Gander's Cryptantha	Cryptantha gander	SC		No (Habitat)
Clustered Barrel Cactus	Echinocactus polycephalus var. polycephalus		SR	No (Habitat)
Dune Spurge	Euphorbia platysperma	SC		No (Habitat)
California Barrel Cactus	Ferocactus cylindraceus var. cylindraceus		SR	No (Habitat)
Dune Sunflower	Helianthus niveus ssp. Tephrodes	SC		No (Habitat)
Senita	Lophocereus schottii		SR	No (Habitat)
Straw-top Cholla	Opuntia echinocarpa		SR	No (Elevation)
Sand Food	Pholisma sonorae	SC	HS	No (Habitat)
Kearney Sumac	Rhus kearneyi		SR	No (Elevation)
Blue Sand Lilly	Triteleiopsis palmeri		SR	No (Habitat)
California Fan Palm	Washingtonia filifera		SR	No (Habitat)
Mammals				
Pale Townsend's Big-eared Bat	Corynorhinus townsendii Pallescens	SC		No (Elevation)
Spotted Bat	Euderma maculatum	SC	WSC	No (Habitat)
Greater Western Mastiff Bat	Eumops perotis californicus	SC		No (Habitat)
Western Yellow Bat	Lasiurus xanthinus		WSC	No (Elevation)
Lesser Long-nosed Bat	Leptonycteris curasoae yerbabuenae	E	WSC	No (Habitat)
California Leaf-nosed Bat	Macrotus californicus	SC	WSC	No (Habitat)
Yuma Myotis	Myotis yumanensis	SC		No (Habitat)
Sonoran Pronghorn	Antilocapra americana sonoriensis	E	WSC	No (Habitat)
Yuma Hispid Cotton Rat	Sigmodon hispidus eremicus	SC		No (Habitat)
Fish				
Razorback Sucker	Xyrauchen texanus	E	WSC	No (Habitat)
Birds				
Great Egret	Ardea alba		WSC	No (Habitat)
Snowy Egret	Egretta thula		WSC	No (Habitat)
Western Yellow-billed Cuckoo	Coccyzus americanusoccidentalis	C	WSC	No (Habitat)
Southwestern Willow Flycatcher	Empidonax trailli extimus	E	WSC	No (Habitat)
Cactus Ferruginous Pygmy-owl	Glaucidium brasilianium cactorum	SC	WSC	No (Elevation)
Western Burrowing Owl	Athene cunicularia hypugaea	SC		Yes (None Observed)
Bald Eagle	Haliaeetus leucocephalus	T[4], DM, SC	WSC	No (Habitat)
Least Bittern	Ixobrychus exilis		WSC	No (Elevation)

Table 3-9
Sensitive Species that can Occur in Yuma County and their Potential to Occur on the Agua Caliente Solar Project Site

Species		Protection Status[1]		
Common Name	**Scientific Name**	**ESA[2]**	**AZ[3]**	**Potential to Occur at Project Site (Justification)[6]**
California Brown Pelican	Pelecanus occidentalis	E, Proposed DM[5]		No (Habitat)
Yuma Clapper Rail	Rallus longirostris yumanensis	E	WSC	No (Habitat)
California Black Rail	Laterallus jamaicensis coturniculus	SC	WSC	No (Habitat)
Loggerhead Shrike	Lanius ludovicianus	SC		Yes (None Observed)
Reptiles				
Desert Rosy Boa	Charina trivirgata gracia	SC		No (Habitat)
Sonoran Desert Tortoise	Gopherus agassizii (Sonoran population)	SC	WSC	No (Habitat)
Banded Gila Monster	Heloderma suspectum cinctum	SC		No (Habitat)
Flat-tailed Horned Lizard	Phrynosoma mcallii	SC	WSC	No (Habitat)
Arizona Chuckwalla	*Sauromalus ater* (Arizona Population)	SC		No (Habitat)
Yuman Desert Fringe-toed Lizard	Uma rufopunctata	SC	WSC	No (Habitat)

[1] E=Endangered, T=Threatened, C=Candidate, SC=Species of Concern, DM= Delisted taxon, recovered, and being monitored for the first five years, WSR=Wildlife of Special Concern, SR=Salvage Restricted, HS=Highly Safeguarded
[2] USFWS 2008a
[3] AGFD 2008a
[4] USFWS 2008b
[5] USFWS 2008c
[6] Elevation means the species does not have the potential to occur because the Site is not within the species' elevation requirements. Habitat means the Project Site is within the species elevation requirements but there is no suitable or potential habitat for the species. References are provided in the References Section.

Federally Listed Species

As indicated in **Table 3-9** there is no potential for the six federally listed species and one candidate for listing to occur on the Site. Each species is discussed below.

The razorback sucker (*Xyrauchen texanus*) is listed as endangered and occurs below 6,000 feet. It prefers riverine and lacustrine areas and may use backwaters. They do not generally inhabit fast moving water. There are no aquatic habitats on or near the Site. The closest potential habitat for this species occurs over 80 miles downstream in the Colorado River, and this species has not been recorded within 5 miles of the Site. Therefore, the Agua Caliente Solar Project would have no effect on this species.

The lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*) is listed as endangered. Habitat consists of desert scrub with agave and columnar cacti present as food plants. Long-nosed bats are important pollinators to the saguaro cactus as they feed on nectar, pollen, and fruit of these cacti. Day roosts can be in caves and abandoned tunnels. This bat species occurs in Arizona from April to September. These habitat types do not occur on the Site and no

occurrence of this species has been recorded within 5 miles. Therefore, the Agua Caliente Solar Project would have no effect on this species.

The Sonoran pronghorn (*Antilocapra americana sonoriensis*) is listed as endangered and prefers broad, intermountain alluvial valleys with creosote-bursage and palo verde-mixed cacti associations. Bajadas are commonly used as fawning areas and sandy dune habitats can provide suitable grazing habitat. There is no suitable habitat for this species on the Site, and pronghorn are not known to occur within at least 5 miles of the Site. The current range begins over 45 miles from the Site about three miles southwest of Gila Bend, south of Interstate 8 (Cabeza Prieta National Wildlife Refuge) and continues south into Mexico. Therefore, the Project would have no effect on this species.

The Southwestern Willow Flycatcher (*Empidonax trailli extimus*) is listed as endangered. It breeds only in dense riparian vegetation near surface water or saturated soil. Nests are generally located in thickets of shrubs or trees with dense foliage from ground level up to approximately 13 feet. Habitat for the southwestern willow flycatcher includes riparian areas along rivers, streams, or other wetlands with dense growth of willows (*Salix* spp.), arrowweed (*Pluchea sevicea*), and tamarisk (*Tamarix* spp.). Other common plant species associated with nesting habitat include cottonwoods (*Populus* spp.), seepwillow (*Baccharis* spp.), boxelder (*Acer negundo*), stinging nettle (*Urtica* spp.), blackberry (*Rubus* spp.), and Russian olive (*Eleagnus angustifolia*). These habitat types do not occur on the Site and no occurrence of this species has been recorded within 5 miles. Therefore, the Project would have no effect on this species.

The California brown pelican (Pelecanus occidentalis) was listed as endangered but was delisted in November 2009. Preferred habitats include coastal land and islands. This species is an uncommon transient in Arizona on many lakes and rivers with individuals occasionally wandering up from Mexico in the summer and fall. There are no breeding records in Arizona. These habitat types do not occur on the Site and no occurrence of this species has been recorded within 5 miles. Therefore, the Project would have no effect on this species.

The Yuma clapper rail (*Rallus longirostris yumanensis*) is listed as endangered. It is a marsh bird that inhabits freshwater or brackish streamsides and marshlands. It is associated with heavy riparian and marsh vegetation and requires a wet substrate, such as a mudflat, sandbar, or slough bottom, that must be covered by dense, mature herbaceous or woody vegetation that exceeds 15 inches in height. It commonly feeds on crayfish, fish, frogs, clams, spiders, grasshoppers, crickets, dragonflies, aquatic plant seeds, bird eggs, and other crustaceans. The Yuma clapper rail establishes breeding territories in March or April and builds nests in nearby vegetation. Historically, the Yuma clapper rail may have occurred in the marshes of the Lower Colorado River and its tributaries in Mexico and the United States. Currently, the Yuma clapper rail occurs along the Colorado River, from Lake Mead to Mexico; on the Gila and Salt Rivers upstream to the area of the Verde confluence; in the lower Bill Williams drainage; around the Salton Sea; and at Picacho Reservoir. These habitat types do not occur on the Site and no occurrence of this species has been recorded within 5 miles. Therefore, the Project would have no effect on this species.

The yellow-billed cuckoo (*Coccyzus americanusoccidentalis*) is a federal candidate for listing as threatened or endangered west of the Rocky Mountains. The historic breeding range of the yellow-billed cuckoo included most of North America from southern Canada to Mexico, but presently is restricted to scattered areas where suitable habitat is present. This species breeds in large blocks of riparian habitats, particularly woodlands with cottonwoods, willows, and dense understory foliage. Breeding habitat for this species may occur along the Gila River downstream of the Site but these habitat types do not occur on the Site and no occurrence of this species has been recorded within 5 miles. Therefore, the Project would have no effect on this species.

As described above, both the USFWS and AGFD were consulted to determine the potential T&E and sensitive species that could occur in the area. Based on the species list provided by USFWS and AGFD and the analysis in this EA,DOE has determined that the proposed project will have no effect on federally listed threatened, endangered, or candidate species. DOE sent a letter to USFWS on June 21, 2010 informing them of DOE's determination. (**Appendix F**)

Sensitive Species

As shown in **Table 3-5**, which is discussed below, all but two of the 33 other sensitive species with potential to occur in Yuma County also have no likelihood of occurring on the Site and none are recorded by the AGFD to occur within five miles of the Site (AGFD 2008d).

Because the entire Site is and has been in active agriculture, there is no habitat for any of the sensitive plant species. Likewise, there are no suitable habitats for any of the sensitive mammals and reptiles that could occur in the area. There also is no suitable habitat for any of the sensitive birds that could occur in the area except for the western burrowing owl and loggerhead shrike that could potentially use the agricultural lands if present. The potential for impacts to these species is discussed in the following section.

3.8.3 Environmental Effects

3.8.3.1 Proposed Action

Construction and operation of the Project would not result in impacts to vegetated native habitat or impacts to native plant species. While many of the plant and wildlife species described in the tables in **Appendix C** (which lists those plant and wildlife species that have the potential to occur in the Project vicinity) have the potential to occur within Yuma County, there would be minimal or negligible potential impacts to these species by Project construction and operations because the Site is currently used mainly for agriculture and is actively disturbed. There would be minimal off-site impacts because all transmission interconnections would be located on this already disturbed site. The Project would tie in with the existing Palo Verde - North Gila #1 500kV transmission line located along the southern Project boundary via a short Gen-Tie line and a new utility owned Q43 switchyard – both of which would be located on the Project Site. In addition, after Project construction, there would still be adjacent agriculture and Sonoran Desertscrub habitats in the area for use by those species that use such habitats.

Common bird species with some potential to occur within the vicinity of the Project Site would include those who use the Site for foraging and nesting, but the Site provides low quality avian habitat compared to the surrounding areas. The majority of the birds present in the Project Site area during any given season are small songbirds, raptors, and white-winged doves. After the Project is constructed there would still be many existing agricultural lands and native habitats adjacent to the Site that provide quality foraging and nesting habitats, resulting in minimal potential effects to bird species.

There would, however, be a slight increased risk of collisions with the short new transmission line. There would be an increased potential for bird strikes with the short transmission interconnect on the Site between the power block and the new APS Q43 switchyard. To minimize the risk of collisions, the lines would be constructed following industry standards aimed at reducing raptor and avian collisions (APLIC 2006) and in accordance with the requirements of the CEC. If significant risks for collision are identified (such as the location of significant bird flight paths or nearby critical habitats), management options such as marking the line or overhead groundwire removal could be implemented.

Non-native, weedy, and crop species typically dominate disturbed agricultural lands, irrigation canals, and disturbed native habitats. Because the Site is already disturbed, development of the Project is not expected to increase the potential for noxious weeds.

Federally-Listed Species

As mentioned above, there is no potential for the six federally listed species and one candidate for listing to occur on the Site. Therefore, construction and operation of the Project would have no effect on these species.

Other Sensitive Species

While there are 33 other sensitive plant and wildlife species identified with the potential to occur within Yuma County, there would be minimal potential impacts to nearly all of these species by Project construction and operations because the Site is currently used for agriculture and is actively disturbed. Also, none are recorded by the AGFD to occur within five miles of the Project Site (AGFD 2008d). Of the 12 special status plant species having the potential to occur within Yuma County, either the elevation of the Site is outside of the range suitable for these plants or there is no suitable habitat at the Site. Therefore, the Project would have no impacts on these plant species and no mitigation measures would be needed.

No special status wildlife species are recorded by AGFD as occurring on or within five miles of the Site (AGFD 2008d). However, suitable habitat for two sensitive species, the Western Burrowing Owl and Loggerhead Shrike (which are not federally listed but are species of concern) exists at and near the Site. There are no documented occurrences of these species within five miles of the Site and they were not observed during the field survey. Previous ground disturbances at the Site have cleared native vegetation and created suitable conditions for the burrowing owl. Burrowing owls could use the raised sides of canal roads and agricultural fields

(excluding orchards) at the Site for habitat. Burrowing owls are active hunters during both day and night hours. They feed on flying insects, small mammals, reptiles, and birds. Hunting is done from perches, in flight, and from the ground and typically occurs within two acres of active burrow locations. They are predominately non-migratory throughout most of their range in Arizona; however, they disperse widely. In non-migratory populations, such as those that could occur near the Site, they use and maintain burrows year-round. Home range size is approximately 2.0 acres (AGFD 2001c). Although no Western Burrowing Owls were observed during the reconnaissance survey, it is possible that they could occupy burrows and forage at the Site.

The Project has the potential to impact burrows used by this species during construction and maintenance activities. This could result in direct mortality if the burrows are occupied during the time of collapse, or could cause undue stress if alternate burrows are not available and would also result in a loss of suitable habitat. To avoid these potential impacts to these species, lands within the impacted areas would be surveyed for the presence of burrowing owls prior to construction. Any active burrows/nests found during the pre-construction survey would be mapped and qualified biologists would clear any occupants from the burrows and construct alternative burrows off-site following guidelines proposed by AGFD (AGFD 2008e).

Implementation of the Project is not likely to negatively impact the Loggerhead Shrike because similar foraging habitats would still surround the Site, even if implementation of the Project could result in the loss of foraging habitat at the Site. Moreover, agricultural lands would still occupy the northern half of the Property and no loss of habitat would occur in this area of the Property. Thus, overall, the loss would not be significant. There could be a slight increased risk of collisions with new transmission lines for the Loggerhead Shrike, but this risk would be reduced with the implementation of APLIC guidelines.

There would be minimal off-site impacts because all Project interconnections would also be located on this already disturbed land. The Project would tie in with the existing Palo Verde - North Gila #1 500kV transmission line located along the southern Project boundary via a loop in this line to the new Q43 switchyard located on the Site. In addition, after Project construction, there would still be adjacent agriculture and native lands in the area for use by these two species that use such habitats.

There are no suitable habitats for the remainder of the special status species at or in the vicinity of the Site. It is also unlikely that any of these special status mammal, bird, or reptile species would forage at the Site; therefore, no significant impacts to these species are expected.

3.8.3.2 No Action Alternative

If no construction would occur, there would be no impact on biological resources or changes to the baseline conditions described in Section 3.8, Biology.

3.9 Cultural Resources

3.9.1 Regulatory Framework

The term “cultural resource” refers to a broad category of resources that includes prehistoric and historic archaeological sites, buildings, districts, structures, locations, or objects considered important to a culture or community for scientific, traditional, religious, or other reasons. Cultural resources deemed significant for their contribution to broad patterns of history, prehistory, architecture, engineering, and culture are listed on the *National Register of Historic Places (NRHP)* and afforded certain protections under the National Historic Preservation Act (NHPA). Regardless of age, cultural resources listed on or eligible for listing on the National Register are termed *historic properties*.

Because the Project might be funded in part through a DOE loan guarantee, it is a project subject to compliance with Section 106 of the NHPA of 1966, as amended (16 U.S.C. 470 *et seq.*). Section 106 regulations (36 CFR Part 800, as amended August 5, 2004) require federal agencies to consider the effects of their undertakings on historic properties, and consult with the State Historic Preservation Officer (SHPO).

To be eligible for listing on the National Register, a property must be significant under one or more of the four evaluation criteria:

Criterion A: Associated with events that have made a significant contribution to the broad patterns of our history.

Criterion B: Associated with the lives of persons significant in our past.

Criterion C: Embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components might lack individual distinction.

Criterion D: Yielded, or may be likely to yield, information important in prehistory or history.

In addition, a property must be able to convey its significance through the retention of specific aspects of integrity, such as location, design, setting, materials, workmanship, feeling, and association. In general, properties less than 50 years of age, unless of exceptional importance, are not eligible for listing on the National Register.

3.9.2 Affected Environment

3.9.2.1 Area of Potential Effects

The Site is located on 2,400 acres of land that has been actively farmed for decades. As such, this location has undergone long-term and continuing disturbance associated with agricultural activities. Based on current inventories, archaeological and historical overviews, and previous

surveys in the area, the proposed Site is expected to contain few, if any, prehistoric or historic cultural resources.

A Class I cultural resources survey was conducted where site and project files were checked at the Arizona State Museum (ASM). The data received were examined to determine if previously recorded cultural resources were within the Project Site and a one-mile buffer. A copy of the Class I survey is included in **Appendix G**. The ASM records check revealed that four cultural resource surveys have been conducted within the buffer area, and that two of these surveys included portions of the Project Site (the surveys for the Southern Pacific Pipeline Project and the Level 3 Fiber Optic Line Project that crosses the southern boundary of the Project).

No cultural resource sites have been previously recorded within the Site. However, three cultural resource sites have been recorded within the one-mile radius as discussed in **Appendix G**. Two were not considered eligible for the National Register. One historic site (Wellton-Phoenix-Mesa-Eloy Spur of the Southern Pacific Railroad – presently the Union Pacific Railroad line) is considered eligible for the National Register of Historic Places. This is the existing railroad that is located just south of the Site.

A Class III cultural resources pedestrian field survey was conducted on the 2,400-acre Site including the Q43 switchyard site. Portions of one previously-recorded historic site (the Union Pacific Railroad line) and one newly-recorded historic site were identified as potentially eligible sites.

The newly-recorded site consists of four barracks buildings associated with the Whitewing Ranch (Ranch buildings) that are estimated to be 50 to 60 years old. This site was determined to be potentially eligible to the NRHP under Criterion A – having been associated with events that have made a contribution to the broad patterns of our history. In addition, three isolated occurrences (IOs) were also recorded on the Site (two historic and one pre-historic). These IOs were determined not to be potentially eligible for listing in the National Register of Historic Places.

There are no known significant Native American / tribal cultural resources associated with the Site or other nearby lands. Tribes in the area were consulted as part of the Project permitting process to identify any issues or the tribes' potential interest in participating in the planned field surveys. No significant issues were identified.

3.9.3 Environmental Effects

3.9.3.1 Proposed Action

No significant impacts on historic, archaeological, or Native American resources are expected due to the expected lack of these resources at the Site, as described in Section 3.9, Cultural Resources. There are no known historic sites or structures or archaeological sites that would be adversely affected by the proposed Project. The past agricultural activities on the Site limit the potential for archaeological resources to be present. The nearby potentially eligible historic site (the Union Pacific Railroad line immediately south of the Site) would not be adversely affected by

the Project, although there would be a new road crossing sought from the railroad at the southwest corner of the Site to facilitate access to the Project. The Union Pacific Railroad line would not be materially impacted because the railroad is inactive, the number of access roads to the property would not materially change from the current circumstances, and the transmission Gen-Tie line between the existing transmission lines and the on-site substation would be via overhead.

The Ranch buildings would be removed as part of the proposed project. The Class III survey originally determined the Ranch buildings were potentially eligible for listing on the NRHP. As part of the Section 106 consultation process with the Arizona SHPO, the Ranch buildings were in fact determined to "not" be eligible for listing on the NRHP.

Based on the completion of the consultation process with the Arizona SHPO, DOE determined that the proposed project would have no adverse affects on any potentially eligible or listed Historic Properties. DOE, in accordance with Section 106 of the NHPA, sent a letter to the Arizona SHPO on September 2, 2010 making a no adverse affect determination. Arizona SHPO concurred with the no adverse affect determination on September 3, 2010 (**Appendix H**).

There would be no significant grading required for the development of the Project because the Site has been previously laser-leveled to improve irrigation. In addition to having little potential for impacts to cultural resources, the Project would also follow cultural resource conditions included in the CEC issued by the State of Arizona designed to further reduce any potential impacts to cultural resources. These provisions detail procedures to be followed in the event of the unanticipated discovery or recognition of any human remains. Specifically, this requires that if human remains and/or funerary objects are encountered on private land during the course of any ground-disturbing activities relating to the development of the subject property, the Applicant shall cease work on the affected area of the Project and notify the Director of the Arizona State Museum pursuant to A.R.S. § 41-865.

3.9.3.2 No Action Alternative

If no construction would occur, there would be no impact on historic, archaeological, or Native American resources.

3.10 Socioeconomics and Environmental Justice

3.10.1 Affected Environment

3.10.1.1 Socioeconomics

The Project is located in Yuma County, Arizona. Yuma County covers 5,500 square miles and is characterized by a mixture of environments and cultures. Its characteristics include a strong rural heritage, strategic location, river corridor and a diverse economy supported by bi-national activities including retirement communities, military facilities, government employment and

tourism. Yuma County also has some of the highest incident solar radiation in the country and has attracted significant interest in the development of solar energy.

Like many places in Arizona, Yuma County has been experiencing significant growth. Since 1990, Yuma County has experienced a 49.7% increase in population. Recent growth has slowed, but previous growth rates estimated by the County suggest that the population would increase from the 160,895 residents in 2000 to a projected 239,565 by 2010.

The Project would be located in the eastern portion of Yuma County that is very sparsely populated and has limited economic opportunities. Yuma County refers to this portion of the county as the Dateland / East County Planning Area.

The Dateland / East County Planning Area is a relatively large area of 861 square miles but only contains a population of 1,137 (2000 Census). Contrary to the County as a whole, this reflects a population drop of 20% between 1990 and 2000. The background study prepared for this planning area by Yuma County indicates that over 60% of Planning Area residents work in the agricultural sector. U.S. Census data for 2000 indicates the average household income in the zip code that covers this part of Yuma County to be $24,417.

The housing stock in the Dateland/East County Planning Area is very limited, and is older than that found in Yuma County and Arizona as a whole. Between January 1, 2000 and August 31, 2007, 89 building/placement permits for residential dwelling units were issued in the Dateland/East County Planning Area. Ninety-four percent of these additional units were classified as manufactured or mobile homes. Most of these building/placement permits that were issued for the Planning Area occurred in the relatively small area near the community of Dateland.

Dateland is the largest community in the planning area and is located at the interchange of Avenue 64E and I-8 about 10 miles south of the Site. It is unincorporated and has very few residents but is the location of the school and other services.

There are no residences located near the Site except for those on the Property owned by the Applicant. The closest nearby residence is located on a farm in the area approximately 1.5 miles away from the Project boundary.

3.10.1.2 Environmental Justice

As mentioned earlier, the Project would be located in the eastern portion of Yuma County that is very sparsely populated and has very limited economic opportunities. According to the County, the critical issue facing the Dateland/East County Planning Area is the need for economic development.

Demographic data for the area is provided by census derived data for Census Tract 106. All census data reflects the characteristics of the population in the 2000 Census. While this is somewhat dated, the census remains the best source of demographic data for the Dateland/East County Planning Area because, unlike any other source, it provides data at a geographically

sufficient level allowing the area to be examined or compared with other areas. The population of the Dateland/East County Planning Area comprises less than one percent of the total population for Yuma County. As such, conclusions about the characteristics of the population of the Dateland/East County Planning Area cannot be accurately drawn from statistics about the entire population of Yuma County.

The table below shows how the demographics of the Dateland/East County Planning Area compared with Yuma County and the State of Arizona in 2000. As shown in the table, the majority of the population in the Dateland/East County Area (72.7%) classify themselves as Hispanic.

Demographic Comparison with Yuma County and State of Arizona			
	Dateland/East County Area	Yuma County	Arizona
Total Population	1,137	160,026	5,130,632
White / Non-Hispanic	298	70,956	3,274,258
Hispanic	827	80,772	1,295,617
African American	3	3,136	149,941
Other	4	3,313	161,490

Between 1990 and 2000 the population of the Dateland/East County Planning Area declined by 295 individuals, a decrease of 20.6%. A much different trend occurred in Yuma County and Arizona as a whole, where the population of Yuma County increased by 49.7% and the State of Arizona's population increased by 40% during the same time period.

The economic sector and industry that residents in the Dateland/East County Planning Area work in were also reported in the 2000 U.S. Census. However, this data does not indicate where these jobs were located and it is likely many of them were located outside the Planning Area with residents commuting to these jobs. The agricultural industry employs the most Planning Area residents, with over 60% of Planning Area residents working in agriculture. Retail trade employs the second highest percentage, 7.7%, of planning area residents. It is the agricultural sector that drives the economy in the Dateland/East County Planning Area; jobs in other industries are largely created to support workers in the agricultural sector. This Census data also showed that 17% of the workforce, and 29% of those working in agriculture live in what the Census Bureau terms "agriculture workers' dormitories on farms." U.S. Census data for 2000 indicates that the average household income in the zip code that covers this part of Yuma County is $24,417 which is lower than the US average of $41,994 for the same period.

The Whitewing Ranch where the Project is located has historically employed local and seasonal agricultural workers. In total, the Ranch (approximately 3,800 acres) could have employed up to 25 to 30 full-time workers and varying numbers of seasonal workers for planting and harvest seasons.

3.10.2 Environmental Effects

3.10.2.1 Proposed Action

Under the proposed action, direct and indirect beneficial impacts on socioeconomic resources are expected as a result of additional job opportunities. Short-term impacts would include

construction employment for the proposed project. There are expected to be between 150 and 450 workers for the duration of the construction period.

Construction job opportunities for general labor would be offered to local residents. Specialty trades and workers would likely come from the Phoenix or Yuma areas. Those that don't commute daily from those areas would likely use available hotel accommodations and other services in the Yuma or Gila Bend areas. Therefore, the economic benefit from the Project would likely be felt in both Yuma and Maricopa Counties.

Approximately 10 to15 full-time and some seasonal agricultural jobs will be lost by the removal of the 2,400-acre Site from agricultural production. However, 15 to 20 full-time jobs are expected to be created by the operational phase of the Project. Many of these jobs would be general maintenance positions for unskilled labor that could be filled by local workers. In addition, some of the Project positions would be higher-paying professional and technical jobs associated with operating the Project.

Additional beneficial impacts are anticipated as a result of indirect spending and job creation in local communities. Because the long-term employment is relatively small, the Project is not expected to directly or indirectly significantly impact local housing market, social services, and the overall income and employment levels.

Implementing the proposed action is not anticipated to result in disproportionately high and adverse health or environmental impacts on any low-income or minority population. Although the majority of the local community is both minority and low income, the Project would provide more construction job opportunities and about the same number of operational job opportunities for the local population as the agricultural jobs that would be lost by taking the Site out of agricultural production. Also, the Project would not negatively affect other agricultural operations in the area from which most members of the local community make their living. There are no public schools and very few residences within 5 miles of the Project so the impacts of air emissions, noise, or construction dust on any population (including children or minorities) in the area would be minimal.

3.10.2.2 No Action Alternative

If no construction would occur, there would be no impacts to socioeconomic resources or minority or low-income populations over baseline conditions described in Section 3.10, Socioeconomics and Environmental Justice.

3.11 Public Health and Safety

3.11.1 Regulatory Framework

3.11.1.1 Occupational Safety and Health Act

The Occupational Safety and Health Act of 1970 recognized that personal injuries and illnesses incurred in a work setting result in reduced productivity, wage loss, and medical expenses. As a

result of the act, the Occupational Safety and Health Administration was established to ensure the health and safety of workers by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health (29 CFR Part 1910).

The Arizona Division of Occupational Safety and Health operates under an approved plan with the U.S. Department of Labor to retain jurisdiction over occupational safety and health issues in Arizona, excluding mining operations, Indian Reservations, and federal employees. This jurisdiction encompasses approximately 2.1 million employees and 130,000 public and private establishments.

3.11.1.2 Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) of 1976 charges the EPA with controlling the generation, transportation, treatment, storage, and disposal of hazardous waste (42 U.S.C. 6901 *et seq.*). RCRA also promulgated a framework for the management of nonhazardous solid wastes. The 1986 amendments to RCRA enabled the EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances.

3.11.1.3 Comprehensive Environmental Response, Compensation, and Liability Act

Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that could endanger public health or the environment. CERCLA:

- Established prohibitions and requirements concerning closed and abandoned hazardous waste sites;
- Provided for liability of persons responsible for releases of hazardous waste at these sites; and
- Established a trust fund to provide for cleanup when no responsible party could be identified.

The law authorizes two kinds of response actions:

- Short-term removals, where actions can be taken to address releases or threatened releases requiring prompt response.
- Long-term remedial response actions that permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening. These actions can be conducted only at sites listed on the EPA National Priorities List.

CERCLA also enabled the revision of the National Contingency Plan, which provided the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, or contaminants. The National Contingency Plan also established the National Priorities List. CERCLA was amended by the Superfund Amendments and Reauthorization Act on October 17, 1986, which included several changes and additions to the program.

3.11.2 Affected Environment

A Phase I Environmental Site Assessment in accordance with 40 CFR Part 312 and American Society for Testing and Materials Practice E1527-05 was conducted for the Site in June 2008. The purpose of the Phase I Environmental Site Assessment was to characterize the Site and surrounding area and to identify the potential for chemical/pollution related liabilities associated with current and/or previous uses of the Site and adjacent properties.

The Environmental Site Assessment identified a few recognized environmental conditions (RECs) on the Site. There is soil staining associated with waste oil disposal practices at a shop area in the Whitewing Ranch headquarters location. In addition, surface staining was observed near some well locations. Some of the older residential buildings across the Site also appeared to contain potential asbestos-containing materials (ACM).

3.11.3 Environmental Effects

All activities associated with construction and operation of the Agua Caliente Solar Project would be conducted in accordance with local, state, and federal regulations to protect the health and safety of Project employees and the general public, as described below.

3.11.3.1 Proposed Action

Construction and operation of the Project is not expected to have any significant effects on public health and safety. There are no local residents in the vicinity of the Project with the nearest residence being approximately 1.5 miles away from the Project boundary. The Project does not produce hazardous materials, significant air emissions, or liquid discharges. Hazardous materials used and stored on Site would be handled as required by the applicable regulations. There is very limited risk of accidents or upset conditions that could affect health and safety.

Construction

Hazardous Materials Management

Construction of the Project would generate limited amounts of certain hazardous and solid wastes such as used oils/lubricants and general office wastes. Demolition of some of the existing buildings on Site would be required and the results of an asbestos survey confirmed that some of the buildings contain limited amounts of ACM. These materials and all other generated

construction wastes would be managed and disposed of in accordance with all applicable regulations under RCRA, the Clean Air Act and equivalent Arizona statutes.

Recognized Environmental Conditions

As part of a Phase 1 Environmental Site Assessment of the property, searches of available databases indicated that there is no record of significant contamination at the Project Site. However, as described in Section 3.11.2, the Phase I Environmental Site Assessment indicated are a few RECs including small areas that exhibit staining from oil leaks or spills and ACM in buildings. These RECs are typical of agricultural lands and farming operations and abatement of these conditions can be accomplished at a minimal cost and effort. These would be addressed before construction is initiated.

Worker Safety

During construction, health and safety procedures would be implemented in accordance with Occupational Health and Safety Administration and Arizona Department of Occupational Safety and Health standards to minimize the risk of accidents or injuries. Safety planning and regular training sessions would occur to ensure that workers were adequately prepared to address any site-specific hazards, such as electrocution, fires, accidents (such as slips, trips, or falls), or exposure to poisonous wildlife (such as snakes and scorpions). In addition, workers would be trained on the appropriate use of safety equipment and personal protective equipment.

Public Safety

Construction sites can also pose a safety hazard for members of the general public who access the site unauthorized. The Site would be fenced with a minimum 8-foot tall, chain link metal-fabric security fence with 1-foot barbed wire or razor wire on top to discourage access by the public. Controlled access gates would be located at the Site entrance.

Operations

Hazardous Materials Management

Management of hazardous materials during operation of the Project would pose little risk of significant environmental impacts. Very limited hazardous materials would be used or generated during operations, including gasoline, diesel fuel, oil, lubricants, solvents, paints, and water treatment chemicals. All hazardous materials used and generated during operations would be carefully managed in compliance with the manufacturers' guidance and in accordance with state and federal standards applicable to conditionally exempt small quantity generators under RCRA. This would ensure that all materials were handled safely and that any releases were quickly and comprehensively managed to minimize any risk of environmental harm.

The PV modules use a CdTe technology, and the cadmium in the PV modules is in the environmentally stable form of a compound rather than a metal. (National Renewable Energy

Laboratory http://www.nrel.gov/pv/cdte/). Moreover, the CdTe compound is encapsulated in the PV module (National Renewable Energy Laboratory http://www.nrel.gov/pv/cdte/). Also, a CdTe PV module contains very little cadmium, as it consists of less than 0.1% cadmium by weight. An 8-square-foot area of a CdTe panel (the panel size used for this Project) contains less cadmium than one size-C NiCd flashlight battery.

Several peer-reviewed studies have evaluated the environmental, health, and safety (EHS) aspects of CdTe PV panels. These studies have consistently concluded that during normal operations, CdTe PV panels do not present an environmental risk (French MEEDAT, 2009). Specifically, it has been demonstrated that there are no cadmium emissions to air, water, or soil during standard operation of CdTe PV systems (French MEEDAT, 2009).

CdTe releases are unlikely to occur during accidental breakage (Fthenakis 2004). Furthermore, studies have been conducted of the panels when the stability of the encapsulation is jeopardized such as if a broken panel was exposed to fire. These studies indicate that even these events result in negligible cadmium emissions, most likely because CdTe has a very high melting temperature of 1041^{o}C (Brookhaven National Laboratory, 2005).

Disposal risks of cadmium are minimized because of the encapsulation within the panel and because the cadmium can be effectively recycled at the end of the panels 25 to 30 year life. The PV module manufacturer for this Project has established the industry's first comprehensive, prefunded module collection and recycling program. The program is designed to maximize the recovery of valuable materials for use in new modules or other new products and minimize the environmental impacts associated with PV system production. Approximately 90% of each collected PV module can be recycled into new products, including new PV modules. In addition, today's CdTe PV modules pass federal (TCLP-RCRA) leaching criteria for non-hazardous waste (Fthenakis 2002) which means they would not pose a risk for cadmium leaching if placed in a landfill.

Destructive Acts

The fire risk for a PV solar project such as Agua Caliente is very low due to the limited extent of the use of combustible materials in the solar field – the PV modules are composed of non-combustible materials (metal and glass) and the site would be managed to keep it clear of vegetation. Therefore, the risk of unintentional destructive acts caused by fire would be very low.

With regard to intentional destructive acts, prior to beginning operations, the Project would develop a comprehensive security plan. As mentioned above, the Site would be fenced and access restricted via a security gate. The Project would provide 24-hour onsite security personnel to discourage any destructive behavior or acts of vandalism. With these security measures in place, the risk of intentional destruction would be very small.

Employee Safety

During operations, health and safety procedures would be implemented in accordance with Occupational Safety and Health Administration and Arizona Department of Occupational Safety and Health standards to minimize the risk of accidents or injuries. Safety planning and regular training sessions would occur to ensure that employees are adequately prepared to address any site-specific operations hazards, such as electrocution, fires, accidents (such as slips, trips, or falls), or exposure to poisonous wildlife. In addition, employees would be trained on the appropriate use of safety equipment and personal protective equipment.

Public Safety

During operations, as discussed above for construction, public access to the Site would be restricted through us of security fencing and controlled access gates. No hazardous materials would be generated or regularly used during operations so there would be no potential for off-site exposure.

3.11.3.2 No Action Alternative

If no construction would occur, no personnel or members of the public would be exposed to hazardous conditions beyond those that currently exist.

3.12 Transportation

This section presents existing transportation routes and the roadways around the proposed Site.

3.12.1 Affected Environment

Primary access to the Site for workers and equipment would be via Interstate 8 (I-8) and two interchanges – one at Dateland (Avenue 64E) and the other at Sentinel (Agua Caliente Road). It is likely that the Dateland exit would be used by those coming from the west and Sentinel by those coming from the east. From these interchanges, either road would be taken north to Palomas / Hyder Road which parallels the southern boundary of the Project. The roadways adjacent to and in the Project vicinity are lightly used because they provide access to very small numbers of residences and to the agricultural operations in the area.

With a posted speed limit of 50 mph, Palomas / Hyder Road is a two lane undivided road paralleled by overhead power lines and the Union Pacific railroad. It is paved for approximately 17 miles, from Avenue 64E on the west to Agua Caliente Road to the east. It provides access to the various farm fields that run parallel to the road. Bidirectional traffic counts were conducted on Palomas / Hyder Road west of the Project intersection to determine the amount of existing traffic in the area associated with the local agricultural operations. The existing weekday peak hour traffic volumes were 95 vehicles eastbound and 80 vehicles westbound.

Level of service (LOS) is a qualitative measure of the traffic operations at an intersection or on a roadway segment. Level of service is ranked from LOS A, which signifies little or no congestion and is the highest rank, to LOS F, which signifies congestion and jam conditions. LOS C or better is typically considered adequate operation at signalized and un-signalized intersections in rural areas. The LOS at the intersection of Palomas / Hyder Road with Avenue 64E was calculated to be LOS A in the weekday AM and PM weekday peak hours.

The Union Pacific railroad line that parallels the Palomas / Hyder Road is currently not in use.

3.12.2 Environmental Effects

3.12.2.1 Proposed Action

Access to the Site would be provided from driveways off of Palomas / Hyder Road. The existing two-way driveway serving the Whitewing Ranch would be relocated to the east and would serve as the construction entrance. The second primary two-way access is located at the eastern end of the Property through an existing public road crossing of the Union Pacific Railroad on the Aztec-Harquahala Mine Road. This Site entrance point would provide access during operations to the solar plant, the Q43 switchyard, and also to the northern portions of Whitewing Ranch that would remain in agricultural production.

As discussed above, the roadways that provide access to Palomas / Hyder Road from I-8 are lightly used because they provide access to few and dispersed numbers of residences and to the agricultural operations in the area. As explained below, because of the very low current use on these roads (LOS A and peak traffic of only 80 to 95 vehicles per hour), the Project is not expected to have significant negative effect on the existing traffic infrastructure or local traffic patterns during construction and no impact during operation.

Trip generation for the construction phase of the Project was developed for a four (4) year construction schedule and assumed that all workers traveling to and from the Site would most likely commute from the Yuma and Gila Bend areas. At the expected construction peak, 400 workers would be needed on Site. In order to analyze the worst case scenario (i.e. the peak of construction) it was determined that 400 vehicles carrying both workers and supplies/equipment would be traveling to and from the Site each day during the typical AM and PM peak hours.

Trip distribution for construction of the Project was based on the relative accessibility of cities and towns in the vicinity of the Site that would be able to provide housing or RV sites for construction workers. The gravity model was used to obtain a weighted percentage of trips based on the population and distance from the closest towns to the Agua Caliente Solar Project. The following areas would most likely provide workers during construction: Yuma, Gila Bend, and Dateland.

In order to assess the impacts of the Project on future traffic operations, levels of service were calculated with the weekday peak hour traffic volumes without the project combined with the estimated trips generated by the Project. With the addition of the Project, weekday LOS at the

intersection of Palomas / Hyder Road and Avenue 64 E remained at A for the morning peak and B for the evening peak.

In addition, the intersection of Palomas / Hyder Road and the primary access to the Agua Caliente Solar Project was also evaluated. At un-signalized intersections, LOS is calculated for those movements which must either stop for or yield to oncoming traffic and is based on average control delay for the particular movement. Control delay is the portion of total delay attributed to traffic control measures such as stop signs and traffic signals. The criteria for level of service at un-signalized intersections are shown below:

Level of Service	Delay
A	<10 seconds
B	>10 and < 15 seconds/vehicle
C	>15 and < 25 seconds/vehicle
D	>25 and < 35 seconds/vehicle
E	>35 and < 50 seconds/vehicle
F	>50 seconds/vehicle

Similarly, the LOS was A for the morning peak and B for the evening peak. As mentioned above, a LOS of C or better is typically considered adequate operation at intersections in rural areas. Therefore, with LOS projected to be A or B on all local roads with the addition of construction traffic, the Project is not expected to have significant effects on local traffic during construction.

The 15 to 20 daily trips generated by the 15 to 20 permanent employees during operation are also not expected to impact local roads or traffic. This would have a limited effect on the LOS of the Project area intersections all of which are predicted to continue operating at an adequate LOS (A) during the weekday peak hours.

3.12.2.2 No Action Alternative

If no construction would occur, no change in traffic levels would occur in the project area.

CHAPTER 4
CUMULATIVE EFFECTS

The following sections describe the potential cumulative environmental effects that could result from implementing the proposed action. A cumulative effect is defined as, "the impact on the environment that results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other action" (40 CFR Part 1508.7).

This chapter defines the area DOE considered in the cumulative effects analysis, provides an overview of relevant past and present actions in the Project vicinity, presents the reasonably foreseeable actions in the area of consideration based on information from local planning agencies and the availability of documentation for future projects, and concludes with the cumulative effects analysis that covers all resources to which the proposed action contributes environmental effects.

4.1 Area of Evaluation

The area evaluated for the cumulative effects analysis was an approximate 10-mile radius around the Project. This area was selected based on topography and land management as representative of that where impacts from the proposed Project could combine with those from other projects. The timeframe for actions considered reasonably foreseeable were those that had the potential to occur within a near-term time period as evidenced by submitted applications. **Figure 4-1** shows the 10-mile area surrounding the Project and the relative locations of the other projects within that area.

4.2 Past and Present Actions

As described in Section 3.1, Land Use, past and present actions in the Project vicinity consist primarily of irrigated agriculture which occurs on private lands and lands leased from the State. In this area, irrigation water is generated from local groundwater resources. A large portion of the land in this area is federal land managed by the BLM. There are no significant projects or activities on BLM lands in the area and most use is limited to recreation.

There are very few residences in the area. The closest community is Dateland about 10 miles south along I-8 and it is unincorporated with a small number of residents and limited commercial development. There are no industrial developments in the area.

Utilities in the area include the existing Palo Verde – North Gila #1 500 kV transmission line located at the south boundary of the Project. There is also a 69 kV line in this same general corridor. Adjacent to these lines is the Union Pacific Railroad, which is currently not in operation.

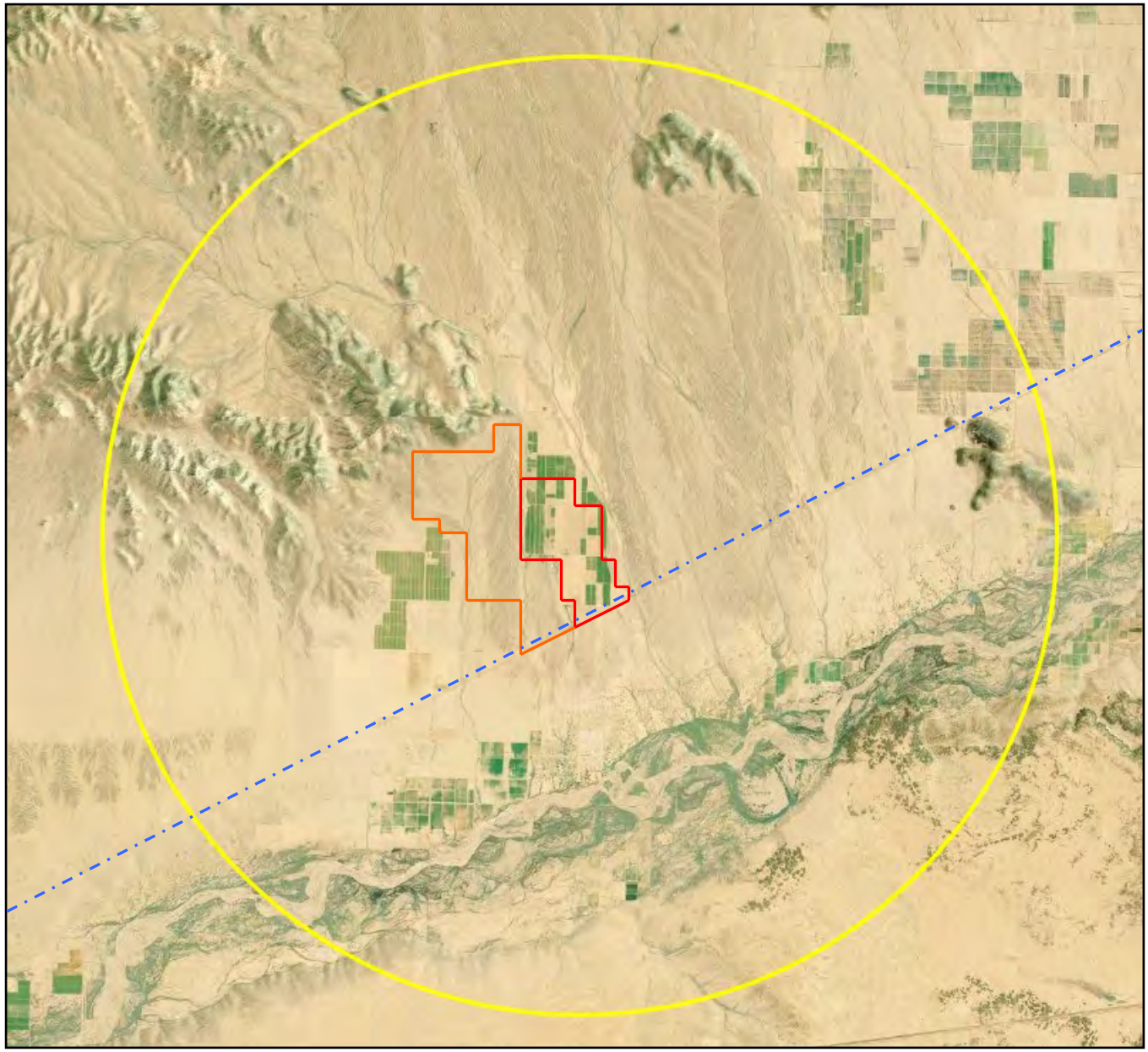

Figure 4-1

Relative Location of Other Proposed Projects within 10 Miles of Agua Caliente Project

4.3 Reasonably Foreseeable Actions

The projects listed below were identified in the 10-mile Project area and have the potential to occur within a near-term time period.

Palo Verde – North Gila #2 Transmission Line

A second 500kV transmission line known as the Palo Verde – North Gila #2 transmission line has been approved by the Arizona Corporation Commission and the BLM and will be built parallel and north of the existing Palo Verde – North Gila #1 line, Palomas / Hyder Road, and north of the railroad. This line is proposed by a group of utilities including APS as the managing partner. It will be approximately 110 miles long, and will provide increased transmission capacity between the Palo Verde Energy hub in central Arizona to the Arizona/California border. It is completely unrelated to the Project other than its proposed physical location. The southern portion of the Project general arrangement layout is designed to accommodate the planned construction and operation of the approved Palo Verde – North Gila #2 500 kV line. Development of this project would result in physical impacts at the locations of structure sites and the addition of a visual element to the landscape similar to the adjacent / existing 500 kV line.

Other Regional Solar Projects

Because of the high solar radiation in Yuma County, there are other solar projects being considered near the Site in the eastern part of the County. These are described below:

- The Palomas Solar Project is being proposed by an affiliate of the Applicant using either PV and/or CSP technology on BLM lands adjacent to the Agua Caliente Project. This is a separate and independent project and would be developed, if approved, at a later date than the Agua Caliente Project. This Project could impact up to 4,200 acres of BLM land located between lands that have been intensively used for agriculture. This land currently has limited public use and low quality habitats that would be impacted by project development.

Outside of the 10-mile area surrounding the Project, Iberdrola Resources is proposing the Hyder Solar project on BLM lands in Maricopa County. The Hyder Solar project would be approximately 15 miles northeast of the Agua Caliente Project and is proposed to be a 300 MW Concentrating Solar Power project.

There is interest in other potential solar projects in the area but there is no published information describing any of them. While these projects could occur in the future, none are known to have made formal applications that would define them and none have received final approval. Also, there are no projects in the area that are known to have a contract for their electricity output. Without a power purchase contract in place, a potential solar project would be considered speculative because they could not be financed and constructed without such a contract.

4.4 Cumulative Effects Analysis

This section analyzes the cumulative effects from the past, present, and reasonably foreseeable future projects when added to the Agua Caliente Solar Project. This analysis addresses only those resources to which the Agua Caliente Project has the potential to contribute an incremental impact (positive or negative).

The EA analysis identified no significant effects from implementing the proposed action. The following sections describe the cumulative effects that could occur.

Land Use – The projects identified in the area would be required to comply with adopted land use plans and zoning requirements. Therefore, the identified projects would be consistent with the overall land use policies of Yuma County, the BLM, and Arizona Department of State Lands and would not result in any cumulative effects that would be incompatible with existing or long-term land use patterns. Removal of 2,400 acres of agricultural land from production for the proposed Project would represent an incremental increase in farmlands converted to non-agricultural uses. Development of the Palomas Solar project would result in a change from their existing limited public use as BLM lands that are somewhat isolated from other BLM lands in the area and surrounded by agriculture. This project and other solar projects located on BLM lands would not contribute to the significant conversion of agricultural lands to other uses. Construction of the new 500 kV transmission line would be within a corridor designated for the construction of linear utility projects and would impact the same land uses as the existing line, railroad, and road that it parallels in this area and, therefore, would not be expected to result in significant local land use impacts.

Air Quality - The Agua Caliente Project area is in an attainment area for all criteria air pollutants. The construction emissions generated by the Project are not expected to overlap with construction periods of the other identified projects in the area. Operational emissions from the Project would be limited to those from the emergency fire pump and vehicular travel to and from the Site. Emissions from the fire pump would be regulated in accordance with a General Permit. All other projects in the area would be required to obtain applicable air permits to prevent operations emissions from exceeding applicable thresholds. The small incremental increase in air emissions associated with the Agua Caliente Project would not contribute to cumulatively significant impacts to air quality. By potentially displacing the use of natural gas and other fossil fuels to produce electricity, the Project could contribute to long-term beneficial cumulative effects on air resources, specifically the reduced generation of CO_2 and other greenhouse gasses.

Visual Resources - Although development of the Project would result in a change to the existing visual landscape through the introduction of the solar project and associated facilities, the overall visual impact would be very small because of the presence of existing man-made facilities in the area including the existing 500 kV line, railroad, and agricultural facilities. Construction of the proposed additional Palo Verde – North Gila #2 500 kV transmission line and other potential solar projects would result in additional visual change to the landscape. The Palomas Solar Project would be screened from public view by the railroad berm along Palomas / Hyder Road similar the Project. The new 500 kV line will be adjacent to and the same construction as the existing 500 kV

line and will result in similar visual impacts. No cumulatively considerable impacts to visual resources would be anticipated given the screening of the Agua Caliente and Palomas projects from public views, similar visual impacts from the new and existing transmission lines, and the 15-mile separation with the Hyder Solar Project.

Biological Resources – There is no native vegetation or habitats that would be affected by development of the Site; however, the Project would result in the loss of forage and cover habitats for the species that use the agricultural lands. Other projects in the area would further remove native vegetation and habitats if developed. There could be minor long-term adverse cumulative effects on biological resources due to the regional loss of undeveloped habitat that potentially serves as habitat for a variety of species due to the other potential projects in the area.

Water Resources - The Agua Caliente Solar Project site does not contain waters of the United States. Potential dredge or fill activities within waters of the United States conducted by the other projects in the area would be regulated under an Army Corps of Engineers Section 404 permit. During construction and operation, the Agua Caliente Project and other projects in the area would be required to implement BMPs under a Storm Water Pollution Prevention Plan and comply with Floodplain Regulations for Yuma County. There could be long-term beneficial effects on area water resources due to reduction of groundwater pumping associated with the Project compared to water use associated with ongoing long-term agriculture on the Site.

Transportation - The Project would not significantly affect traffic on local roadways even during construction because the traffic analysis showed that LOS would not be significantly affected. It is unlikely that construction of the other projects in the area would occur simultaneously, and therefore no overlapping cumulative impacts to traffic or transportation are anticipated from construction. Operational traffic impacts would be very low for all projects.

Socioeconomics - It is unlikely that construction of the other projects in the area would occur simultaneously, and therefore no overlapping cumulative impacts to socioeconomics are anticipated from construction. The other identified projects in the area are proposed on BLM land and their development would not affect the local agricultural job base because the BLM lands are not currently in agricultural use. With agricultural jobs not affected by other potential projects, the cumulative effects on socioeconomics from operational job creation from the proposed Project in combination with the other identified potential projects could be expected to be beneficial. Cumulatively, the projects could provide construction and operational job opportunities to the local minority and low income populations and would not result in disproportionately high and adverse health or environmental impacts on any low-income or minority population.

CHAPTER 5
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CHAPTER 6
LIST OF ENTITIES CONTACTED

AGENCIES

- Arizona Corporation Commission
- Arizona Department of Environmental Quality
- Arizona Department of Transportation
- Arizona Department of Water Resources
- Arizona Game and Fish Department
- Arizona State Historic Preservation Office
- Bureau of Land Management, Yuma Field Office
- City of San Luis
- City of Somerton
- City of Yuma
- Customs and Border Protection, Arizona
- Dateland
- Greater Yuma Economic Development Corporation
- Greater Yuma Port Authority
- Hillander "C" Irrigation District.
- International Boundaries and Water Commission
- Marine Corps Air Station
- Mexican Consulate of Yuma
- Town of Wellton
- U.S. Army Yuma Proving Ground
- U.S. Border Patrol CBP, Yuma Sector
- U.S. Fish and Wildlife Service
- Wellton Mohawk Irrigation & Drainage District
- Western Arizona Council of Governments
- Yuma Convention and Visitor Bureau
- Yuma County Airport Authority
- Yuma County Chamber of Commerce
- Yuma County, County Administrator
- Yuma County, Dept. of Development Services
- Yuma County Farm Bureau
- Yuma Metropolitan Planning Organization

NATIVE AMERICAN

- Ak-Chin Indian Community
- Cocopah Tribe
- Colorado River Indian Tribes
- Fort McDowell Yavapai Nation

- Fort Mohave Indian Tribe
- Fort Yuman-Quechan Tribe
- Gila River Indian Community
- The Hopi Tribe
- Salt River Pima-Maricopa Indian Community
- Tohono O'odham Nation
- Yavapai-Prescott Indian Tribe

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APPENDIX A
HAZARDOUS MATERIAL USED / WASTES GENERATED DURING OPERATIONS

HAZARDOUS MATERIALS USED DURING OPERATIONS

Chemical	Use	Storage Location	State	Storage Quantity
Various solvents, Cleaning Chemicals/Detergents, paints and other cleaners, oils, lubricants	Building maintenance and periodic cleaning	Warehouse/shop area	Liquid	Commercial 1- and 5-gal containers
FM-200	Fire protection	Warehouse/shop area	Gaseous	15,000 pounds
Vegetable or Mineral Transformer insulating oil	Transformers/Q43 switchyard	Contained within transformers and electrical switches	Liquid	84,000 gal total
Cadmium-Telluride	Solar panel component	Encapsulated in panels in solar field	Solid	Not stored

WASTES GENERATED DURING OPERATIONS[1]

Waste	Origin and Composition	Classification	Estimated Quantity	Disposal
Office and packaging materials from supplies deliveries	Office and warehouse paper, wood, plastic, and cardboard	Non-hazardous	Intermittent – 4 cubic yards per week	Weekly collection for recycling and/or recycling and/or approved waste disposal
Sanitary wastewater solids	Restrooms, Sanitary waste	Non-hazardous	2,000 gallons per week	Dispose to sanitary leach field
Spent batteries	Lead acid, alkaline, gel cell, nickel, and cadmium	Hazardous, recyclable	<5 units per week	Store for less than 30 days. Dispose to authorized waste recycling facility
Oily absorbent and spent oil filters	Vehicle and equipment maintenance	Hazardous	One 55-gal drum per quarter	Store for less than 90 days, dispose to authorized recycle facility
Oily rags	Vehicle and equipment maintenance	Hazardous	One 55-gal drum per quarter	Store for less than 90 days, dispose to authorized recycle facility
Used hydraulic fluid, oils and grease	Vehicle and equipment maintenance	Hazardous, recyclable	Less than 5 gallons per month	Store for less than 90 days, dispose to authorized recycle facility

1 Total amount of solid waste generated is approximately 31 tons per year as calculated using conversion factor from EPA 1997, Publication No. EPA530-R-97-011.

APPENDIX B
CEC AND SUP ENVIRONMENTAL CONDITIONS

The items below are the conditions relative to the environment that were imposed on the Project as conditions of the Certificate of Environmental Compatibility (CEC) issued by the Arizona Corporation Commission and the Special Use Permit (SUP) issued by Yuma County.

CEC CONDITIONS

The CEC for the Project was granted upon the following conditions:

- Applicant, or its assignee(s), shall obtain all required approvals and permits necessary to construct the Project.

- Applicant, or its assignee(s), shall comply with all existing applicable ordinances, master plans, county comprehensive plans, and regulations of the State of Arizona, the Yuma County, the United States, and any other governmental entities having jurisdiction over the construction and operation of the Project.

- During the construction and maintenance of the Project, to the extent applicable, Applicant, or its assignee(s), will use existing roads for access, and to the extent applicable, taking into the account that the Site lies within a cultivated agricultural area, minimize impacts to wildlife and vegetation on the Project Site.

- Pursuant to A.R.S. § 41-844, if any archaeological, paleontological or historical site or object that is at least fifty years old is discovered on state, county or municipal land during Project-related activities, the person in charge shall promptly report the discovery to the Director of the Arizona State Museum, and in consultation with the Director, shall immediately take all reasonable steps to secure and maintain the preservation of the discovery. If human remains and/or funerary objects are encountered on private land during the course of any ground-disturbing activities relating to the development of the subject property, Applicant shall cease work on the affected area of the Project and notify the Director of the Arizona State Museum pursuant to A.R.S. § 41-865.

- In connection with the construction of the Project, Applicant, or its assignee(s), shall use commercially reasonable efforts, where feasible, to give due consideration to use of qualified Arizona contractors.

- Prior to the date construction commences on the Project, Applicant, or its assignee(s), will provide known homebuilders and developers of record within one mile of the Project the identity, location, and a pictorial depiction of the type of power plant being constructed, accompanied by a written description, and encourage the developers and homebuilders to include this information in the developers' and homebuilders' homeowners' disclosure statements.

- Applicant, or its assignees(s), shall design the Gen-Tie transmission line to incorporate reasonable measures to minimize impacts to raptors.

- Applicant, or its assignee(s), shall use non-secular conductor and dulled surfaces for the Gen-Tie transmission line structures.

SUP CONDITIONS

- All requirements of the Yuma County Zoning Ordinance shall be met.

- All requirements of the Yuma County Comprehensive Building Code shall be met in future construction, alteration, or remodeling of buildings.

- All requirements of Yuma County Flood Control District shall be met.

- All requirements of the Environmental Health laws, including but not exclusively, Arizona Revised Statutes Titles 36 and 49, and Arizona Administrative Code, Rule 9 and 18, shall be met.

- The owner/ operator shall employ a chief safety professional and provide a 24 hour emergency contact phone number.

- The applicant shall dedicate a 20 foot wide minimum access easement as depicted on the site plan. This easement shall be improved with asphalt from Palomas Road to the north end of the project site to provide access to the existing parcels to the north.

- A minimum 6 foot high fence shall be built and maintained around the project site.

- The applicant shall combine the existing 18 parcels into a single Yuma County Assessors tax parcel prior to construction.

- Prior to construction but no later than five (5) years after Board of Supervisors approval, a Traffic impact Analysis covering the expected construction period of approximately four (4) years shall be completed in accordance with the Arizona Department of Transportation guidelines and Yuma County Public Works Department standards, which analysis shall address (1) project site access at Palomas/Hyder Road; (2) truck turning radii at the corner of Avenue 64E and Palomas/Hyder Road; and only if CSP technology is selected, (3) the on and off ramps at Interstate 8 and Avenue 64E.

APPENDIX C
CONSTRUCTION EQUIPMENT EMISSION CALCULATIONS

EMISSION FACTORS
CONSTRUCTION EQUIPMENT

Equipment	Description	HP	VOC lb/hr/unit	CO lb/hr/unit	NOx lb/hr/unit	PM10 lb/hr/unit	PM2.5 lb/hr/unit	SO2 lb/hr/unit	CO2 lb/hr/unit
Air Compressors	Diesel	175	0.0469	0.1485	0.6023	0.0336	0.0326	0.0140	64.9033
Back-Hoes	Diesel	75	0.0451	0.2126	0.1910	0.0328	0.0319	0.0043	19.9924
Bobcat	Diesel	50	0.0393	0.1496	0.1271	0.0230	0.0223	0.0031	14.3640
Crane	Diesel	300	0.0699	0.2044	0.9862	0.0448	0.0435	0.0257	119.4570
Forklift	Diesel	75	0.0295	0.2732	0.3332	0.0298	0.0289	0.0103	47.7877
Mini Excavator	Diesel	25	0.0143	0.0860	0.1241	0.0109	0.0106	0.0036	16.6600
Motor/Road Grader	Diesel	300	0.0883	0.3754	1.1662	0.0754	0.0731	0.0347	161.1787
Roller	Diesel	75	0.0400	0.2974	0.3812	0.0417	0.0404	0.0101	46.9808
Track Hoe	Diesel	100	0.0640	0.3134	0.2699	0.0482	0.0467	0.0060	27.8892
Tractor	Diesel	300	0.1365	0.6341	1.5935	0.1179	0.1143	0.0354	164.7363
Compactor/Tamper	Diesel	25	0.0171	0.0633	0.1095	0.0104	0.0101	0.0024	11.3383
One-ton Trucks	Diesel	300	0.1381	0.4721	0.8653	0.0858	0.0833	0.0152	70.7164
Generator	4 stroke	25	0.4075	12.0684	0.1469	0.0037	0.0034	0.0070	33.7950
Water Trucks	Diesel	300	0.1381	0.4721	0.8653	0.0858	0.0833	0.0152	70.7164

*Emission factors per EPA's NONROAD2008 model for construction emissions

ESTIMATED MONTHLY / ANNUAL CONSTRUCTION EMISSIONS
AGUA CALIENTE SOLAR PROJECT

Equipment	Number of Units	Hours/Month Per Unit	VOC T/mo	CO T/mo	NOx T/mo	PM10 T/mo	PM2.5 T/mo	SO2 T/mo	CO2 T/mo
Air Compressors	1	120	0.003	0.009	0.036	0.002	0.002	0.001	3.894
Back-Hoes	1	80	0.020	0.094	0.084	0.014	0.014	0.002	8.797
Bobcat	1	100	0.002	0.007	0.006	0.001	0.001	0.001	0.718
Crane	1	160	0.006	0.016	0.079	0.004	0.008	0.002	9.557
Forklift	2	120	0.004	0.033	0.040	0.004	0.004	0.001	5.734
Mini Excavator	1	120	0.001	0.005	0.007	0.001	0.001	0.001	1.000
Motor/Road Grader	2	120	0.011	0.045	0.140	0.009	0.009	0.004	19.341
Roller	1	140	0.003	0.021	0.027	0.003	0.003	0.001	3.289
Track Hoe	1	160	0.005	0.025	0.022	0.004	0.004	0.001	2.231
Tractor	2	200	0.027	0.127	0.319	0.024	0.024	0.007	32.947
Compactor/Tamper	1	80	0.001	0.003	0.004	0.001	0.001	0.001	0.454
One-ton Trucks	2	200	0.028	0.094	0.173	0.017	0.017	0.001	14.143
Generator	2	200	0.082	2.537	0.029	0.001	0.001	0.001	6.759
Water Trucks	2	200	0.028	0.094	0.173	0.017	0.017	0.001	14.143
TOTAL MONTHLY CONSTRUCTION EMISSIONS			0.221	3.11	1.139	0.102	0.106	0.025	123.007
TOTAL ANNUAL CONSTRUCTION EMISSIONS	Tons		**2.65**	**37.32**	**13.67**	**1.22**	**1.27**	**0.30**	**1476.08**
TOTAL CONSTRUCTION EMISSIONS	Tons	4 years	**10.60**	**149.28**	**54.68**	**4.88**	**5.08**	**1.20**	**5904.32**

Note: Numbers are based on 50 acres of the site being under active development at any one time.

APPENDIX D
DOE FLOODPLAIN NOTICE

Publisher's Affidavit of Publication

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STATE OF ARIZONA }
COUNTY OF YUMA }

UNITED STATES
DEPARTMENT
OF ENERGY
Notice of Floodplain Involvement
Agua Caliente Solar Project
ENVIRONMENTAL ASSESSMENT

The Department of Energy (DOE) Loan Guarantee Program Office (LGPO) is hereby providing notice of a proposed DOE action in a floodplain. DOE is considering a Federal loan guarantee pursuant to the Energy Policy Act of 2005 for the Agua Caliente, LLC Solar Project in Yuma County, Arizona, approximately 10 miles north of Dateland, Arizona. The project would occupy approximately 2,400 acres of a 3,800-acre site that is currently in agricultural use and known as the White Wing Ranch. According to the Federal Emergency Management Agency Flood Insurance Rate Map a portion of the proposed project is within the 100-year floodplain. DOE will be preparing a floodplain assessment as required by DOE regulation 10 CFR 1022. The floodplain assessment will be included as part of an environmental assessment (EA) that DOE is preparing for this project under the National Environmental Policy Act. Interested parties are requested to comment within fifteen days of this notice. Comments or requests for more information may be submitted to Doug Boren at 202-287-5346 or via email at douglas.boren@hq.doe.gov. Another notice will be made when the draft EA is available for review, and the draft EA will be posted to the LGPO website (http://www.lgprogram.energy.gov/NEPA-1.html).
Daily June 27, 2010 #L43800

Joni Brooks or Jose Obana, having been first duly sworn, deposes and says: that Yuma Sun is a newspaper of general circulation published daily in the City of Yuma, County of Yuma, State of Arizona; that (s)he is the publisher or business manager of said paper; that the

NOTICE OF FLOODPLAIN INVOLVEMENT AGUA CALIENTE SOLAR PROJECT

a printed copy of which, as it appeared in said paper, is hereto attached and made a part of this affidavit, was published in Yuma Sun

For ONE issues; that the date of the first publication of said NOTICE OF FLOODPLAIN INVOLVEMENT AGUA CALIENTE SOLAR PROJECT

was JUNE 27 ,2010 and the date of the last publication being JUNE 27 ,2010 and that the dates when said

NOTICE OF FLOODPLAIN INVOLVEMENT AGUA CALIENTE SOLAR PROJECT

was printed and published in said paper were

JUNE 27, 2010

Subscribed and sworn to before me, by the said Joni Brooks or Jose Obana

1 day of July, 2010

Notary Public

OFFICIAL SEAL
BARB BAJO
Notary Public - State of Arizona
YUMA COUNTY
My Comm. Expires November 1, 2013

My commission expires NOV 1, 2013

APPENDIX E
SPECIES THAT COULD OCCUR WITHIN PROJECT AREA

Table E-1 Common Plant Species Potential Occurrence in Native Habitats in the Vicinity of the Project Site[1]		
Common Name	Scientific Name	Ecosystem
Triangleleaf bursage	Ambrosia deltoidea	Sonoran Desertscrub, Sonoran Riparian
White bursage	Ambrosia dumosa	Sonoran Desertscrub
Fiddlehead	Amsinckia intermedia	Sonoran Riparian
Purple three-awn	Aristida purpurea	Sonoran Desertscrub
Four-wing saltbush	Atriplex canescens	Sonoran Desertscrub
All scale	Atriplex polycarpa	Sonoran Desertscrub
Datura	Datura stramonium	Sonoran Riparian
Englemann's hedgehog cactus	Echinocereus englemannii	Sonoran Desertscrub
Brittlebush	Encelia farinosa	Sonoran Desertscrub, Sonoran Riparian
Skeletonweed	Eriogonum deflexum	Sonoran Desertscrub
Filaree	Erodium cicutarium	Sonoran Desertscrub
Barrel cactus	Ferocactus wislizenii	Sonoran Desertscrub
Ocotillo	Fouquieria splendens	Sonoran Desertscrub
Rhatany	Krameria parviflora	Sonoran Desertscrub, Sonoran Riparian
Creosote bush	Larrea tridentata	Sonoran Desertscrub, Sonoran Riparian
Wolfberry	Lycium spp.	Sonoran Desertscrub, Sonoran Riparian
Little fishhook cactus	Mammillaria thornberi	Sonoran Desertscrub
Teddybear cholla	Opuntia bigelovii	Sonoran Desertscrub
Prickly pear cactus	Opuntia engelmannii	Sonoran Desertscrub
Jumping cholla	Opuntia fulgida	Sonoran Desertscrub
Desert mistletoe	Phoradendron californicum	Sonoran Desertscrub
Galleta grass	Pleuraphis jamesii	Sonoran Desertscrub, Sonoran Riparian
Mesquite	Prosopis spp.	Sonoran Riparian
Bladdersage	Salazaria mexicana	Sonoran Desertscrub
Russian thistle	Salsola iberica	Sonoran Desertscrub, Sonoran Riparian
London rocket	Sisymbrium irio	Sonoran Desertscrub, Sonoran Riparian
Globe mallow	Sphaeralcea spp.	Sonoran Desertscrub, Sonoran Riparian
[1] Brown 1994		

Table E-2 Mammal Species Potential Occurrence in the Vicinity of the Project Site[1]	
Common Name	Scientific Name
Harris' antelope squirrel	Ammospermophilus harrisii
Pallid bat	Antrozous pallidus
Coyote	Canis latrans
Desert kangaroo rat	Dipodomys deserti
Merriam's kangaroo rat	Dipodomys merriami
Big brown bat	Eptesicus fuscus
Spotted bat	Euderma maculatum
Bobcat	Felis rufus
Southern yellow bat	Lasiurus ega xanthinus
Black-tailed jackrabbit	Lepus californicus
California myotis	Myotis californicus
Cave myotis	Myotis velifer
White-throated wood rat	Neotoma albigula
Desert wood rat	Neotoma lepida
Desert mule deer	*Odocoileus hemionus crooki*
Muskrat	Ondatra zibethicus
Southern grasshopper mouse	Onychomys torridus
Arizona pocket mouse	Perognathus amplus
Bailey's pocket mouse	Perognathus baileyi
Rock pocket mouse	Perognathus intermedius
Little pocket gopher	Perognathus longimembris
Desert pocket mouse	Perognathus penicillatus
Canyon mouse	Permyscus crinitus
Cactus mouse	Peromyscus eremicus
Deer mouse	Peromyscus maniculatus
Western pipistrelle	Pipistrellus Hesperus
Raccoon	Procyon lotor
Western harvest mouse	Reithrodontomys megalotis
Round-tailed ground squirrel	Spermophilus tereticaudus
Western spotted skunk	Spilogale gracilis
Desert cottontail	Sylvilagus audubonii
American free-tailed bat	Tadarida brasiliensis
Pocketed free-tailed bat	Tadarida femorosacca
Big free-tailed bat	Tadarida macrotis
Badger	Taxidae taxus
Botta's pocket gopher	Thomomys bottae
Kit fox	Vulpes macrotis
[1] Hoffmeister 1986.	

Table E-3 Bird Species Potential Occurrence in the Vicinity of the Project Site[1]	
Common Name	Scientific Name
Cooper's Hawk	Accipiter cooperii
White-throated Swift	Aeronautes saxatalis
Red-winged Blackbird	Agelaius phoeniceus
Black-throated Sparrow	Amphispiza bilineata
Cinnamon Teal	Anas cyanoptera
Black-chinned Hummingbird	Archilochus alexandri
Western Burrowing Owl	Athene cunicularia hypugaea
Verdin	Auriparus flaviceps
Great Horned Owl	Bubo virginianus
Red-tailed Hawk	Buteo jamaicensis
Lark Bunting	Calamospiza melanocorys
Gambel's Quail	Callipepla gambelii
Anna's Hummingbird	Calypte anna
Costa's Hummingbird	Calypte costae
Cactus Wren	Campylorhynchus brunneicapillus
Northern Cardinal	Cardinalis cardinalis
Pyrrhuloxia	Cardinalis sinuatus
Lesser Goldfinch	Carduelis arealtria
House Finch	Carpodacus mexicanus
Turkey Vulture	*Cathartes aura*
Hermit Thrush	Catharus guttatus
Canyon Wren	Catherpes mexicanus
Vaux's Swift	Chaetura vauxi
Killdeer	Charadrius vociferus
Lark Sparrow	Chondestes grammacus
Lesser Nighthawk	Chordeiles acutipennis
Northern Harrier	Circus cyaneus
Gilded Flicker	Colaptes chrysoides
Rock Dove	Columba livia
Inca Dove	Columbina inca
Common Ground-dove	Columbina passerine
Common Raven	Corvus corax
Yellow-rumped Warbler	Dendroica coronata
Yellow Warbler	Dendroica petechia
Townsend's Warbler	Dendroica townsendi
Pacific-slope Flycatcher	Empidonax difficilis
Gray Flycatcher	Empidonax wrightii
Horned Lark	Eremophila alpestris
Prairie Falcon	Falco mexicanus
American Kestrel	Falco sparverius

Table E-3 Bird Species Potential Occurrence in the Vicinity of the Project Site[1]	
Common Name	Scientific Name
Greater Roadrunner	Geococcyx californianus
Blue Grosbeak	Guiraca carulea
Cliff Swallow	Hirundo pyrrhonota
Barn Swallow	Hirundo rustica
Bullock's Oriole	Icterus bullockii
Hooded Oriole	Icterus cucullatus
Bullock's Oriole	Icterus galbula
Loggerhead Shrike	Lanius ludovicianus
Gila Woodpecker	Melanerpes uropygialis
Song Sparrow	Melospiza melodia
Elf Owl	Micrathene whitneyi
Northern Mockingbird	Mimus polyglottos
Bronzed Cowbird	Molothrus aeneus
Brown-headed Cowbird	Molothrus ater
Ash-throated Flycatcher	Myiarchus cinerascens
Brown-crested Flycatcher	Myiarchus tyrannulus
MacGillivary's Warbler	Oporornis tolmiei
Western Screech Owl	Otus kennicottii
House Sparrow	Passer domesticus
Phainopepla	Phainopepla nitens
Common Poorwill	Phalaenoptilus nuttallii
Black-headed Grosbeak	Pheucticus melanocephalus
Ladder-backed Woodpecker	Picoides scalaris
Abert's Towhee	Pipilo aberti
Green-tailed Towhee	Pipilo chlorurus
Western Tanager	Piranga ludoviciana
Black-tailed Gnatcatcher	Polioptila melanura
Vermillion Flycatcher	Pyrocephalus rubinus
Great-tailed Grackle	Quiscalus mexicanus
Rock Wren	Salpinctes obsoletus
Black Phoebe	Sayornis nigricans
Say's Phoebe	Sayornis saya
Brewer's Sparrow	Spizella breweri
Northern Rough-winged Swallow	Stelgidopteryx serripennis
Western Meadowlark	Sturnella neglecta
European Starling	Sturnus vulgaris
Bendire's Thrasher	Toxostoma bendirei
Crissal Thrasher	Toxostoma crissale
Curve-billed Thrasher	Toxostoma curvirostre
Le Conte's Thrasher	Toxostoma lecontei
Western Kingbird	Tyrannus verticalis

Table E-3 Bird Species Potential Occurrence in the Vicinity of the Project Site[1]	
Common Name	Scientific Name
Barn Owl	Tyto alba
Orange-crowned Warbler	Vermivora celata
Lucy's Warbler	Vermivora luciae
Nashville Warbler	Vermivora ruficapilla
Bell's Vireo	Vireo bellii
Warbling Vireo	Vireo gilvus
Wilson's Warbler	Wilsonia pusilla
White-winged Dove	Zenaida asiatica
Mourning Dove	Zenaida macroura
White-crowned Sparrow	Zonotrichia leucophrys

Corman 2008; Corman and Wise-Gervais 2005; Glinski 1998.

Table E-4 Reptile and Amphibian Species Potential Occurrence in the Vicinity of the Project Site[1]	
Common Name	Scientific Name
Arizona glossy snake	Arizona elegans noctivaga
Sonoran desert toad	Bufo alvarius
Great plains toad	Bufo cognatus
Red-spotted toad	Bufo punctatus
Woodhouse's toad	Bufo woodhousii
Common zebra-tailed lizard	Callisaurus draconoides
Desert rosy boa	Charina trivergata
Variable sandsnake	Chilomeniscus cinctus
Western shovel-nosed snake	Chionactus occipitalis
Great Basin whiptail	Cnemidophorus tigris tigris
Desert banded gecko	Coleonyx variegatus variegatus
Western diamond-backed rattlesnake	Crotalus atrox
Sonoran sidewinder	Crotalus cerastes cercobombus
Speckled rattlesnake	Crotalus mitchellii pyrrhus
Black-tailed rattlesnake	Crotalus molossus
Mojave rattlesnake	Crotalus scutulatus
Great Basin collared lizard	Crotaphytus bicinctores
Desert iguana	Dipsosaurus dorsalis
Long-nosed leopard lizard	Gambelia wislizenii
Desert tortoise	Gopherus agassizii
Gila monster	Heloderma suspectum
Night snake	Hypsiglena torquata
Sonoran mud turtle	Kinosternon sonoriense
California kingsnake	Lampropeltis getula
Western blind snake	Leptotyphlops humilis
Red racer	Masticophis flagellum
Sonoran coral snake	Micruroides euryxanthus
Desert horned lizard	Phrynosoma platyrhinos
Spotted leaf-nosed snake	Phyllorhynchus decurtatus
Sonoran gopher snake	Pituophis catenifer
Bullfrog	Rana catesbeiana
Western long-nosed snake	Rhinocheilus lecontei
Western patch-nosed snake	Salvadora hexalepis
Common chuckwalla	Sauromalus obesus
Couch's spadefoot	Scaphiopus couchii
Desert spiny lizard	Sceloporus magister
Western ground snake	Sonora semiannulata
Southwestern black-headed snake	Tantilla hobartsmithi
Checkered garter snake	Thamnophis marcianus

Table E-4 Reptile and Amphibian Species Potential Occurrence in the Vicinity of the Project Site[1]	
Common Name	Scientific Name
Western lyre snake	Trimorphodon biscutatus
Spiny softshell	Trionyx spiniferus
Long-tailed brush lizard	Urosaurus graciosus
Ornate tree lizard	Urosaurus ornatus
Common side-blotched lizard	Uta stansburiana
Stebbins 2003.	

APPENDIX F
DOE LETTER TO US FISH AND WILDLIFE SERVICE

Department of Energy
Washington, DC 20585

JUN 21 2010

Steven L. Spangle, Field Supervisor
U.S. Fish and Wildlife Service
Arizona Ecological Services Field Office
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951

Subject: No Effect Determination on Threatened, Endangered, or Candidate Species for the Agua Caliente Solar, LLC Solar Project in Yuma County, Arizona

Dear Mr. Spangle:

The Department of Energy (DOE) is preparing an Environmental Assessment (EA) under the National Environmental Policy Act for a Federal energy loan guarantee to Agua Caliente Solar, LLC (Agua Caliente) to support construction of the 290 MW Agua Caliente solar project in Yuma County, Arizona. The site is approximately 10 miles north of Dateland, 45 miles west of Gila Bend, and 65 miles east of Yuma (map attached). As part of the review process for this facility, DOE has determined that the proposed project will have no effect on federally listed threatened, endangered, or candidate species.

The USFWS has published a list of proposed, candidate, threatened, and endangered species occurring by county in Arizona (http://www.fws.gov/southwest/es/EndangeredSpecies/lists/ListSpecies.cfm). This list was used to identify threatened or endangered species within Yuma County, Arizona that have the potential for occurring in the project vicinity. As described below, DOE has determined that there is no potential for the five federally listed species and one candidate for listing to occur on the Agua Caliente solar project site.

The razorback sucker (*Xyrauchen texanus*) is listed endangered and occurs below 6,000 feet. It prefers riverine and lacustrine areas and may use backwaters. They do not generally inhabit fast moving water. There are no aquatic habitats on or near the site. The closest potential habitat for this species occurs over 80 miles downstream in the Colorado River, and this species has not been recorded within 5 miles of the site. Therefore, the Agua Caliente Solar Project would have no effect on this species.

The lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*) is listed endangered. Habitat consists of desert scrub with agave and columnar cacti present as food plants. Long-nosed bats are important pollinators to the saguaro cactus as they feed on neetar, pollen, and fruit of these cacti. Day roosts can be in caves and abandoned tunnels. This bat species occurs in Arizona from April to September. These habitat types do not occur

on the site and no occurrence of this species has been recorded within 5 miles of the site. Therefore, the Agua Caliente solar project would have no effect on this species.

The Sonoran pronghorn (*Antilocapra americana sonoriensis*) is listed endangered and prefers broad, intermountain alluvial valleys with creososte-bursage and palo verde-mixed cacti associations. Bajadas are commonly used as fawning areas and sandy dune habitats can provide suitable grazing habitat. There is no suitable habitat for this species on the site, and pronghorn are not known to occur within at least 5 miles of the site. The current range begins over 45 miles from the site about three miles southwest of Gila Bend, south of Interstate 8 (Cabeza Prieta National Wildlife Refuge) and continues south into Mexico. Therefore, the Agua Caliente solar project would have no effect on this species.

The Southwestern Willow Flycatcher (*Empidonax trailli extimus*) is listed endangered. It breeds only in dense riparian vegetation near surface water or saturated soil. Nests are generally located in thickets of shrubs or trees with dense foliage from ground level up to approximately 13 feet. Habitat for the southwestern willow flycatcher includes riparian areas along rivers, streams, or other wetlands with dense growth of willows (*Salix* spp.), arrowweed (*Pluchea sevicea*), and tamarisk (*Tamarix* spp.). Other common plant species associated with nesting habitat include cottonwoods (*Populus* spp.), seepwillow (*Baccharis* spp.), boxelder (*Acer negundo*), stinging nettle (*Urtica* spp.), blackberry (*Rubus* spp.), and Russian olive (*Eleagnus angustifolia*). These habitat types do not occur on the site and no occurrence of this species has been recorded within 5 miles of the site. Therefore, the Agua Caliente solar project would have no effect on this species.

The Yuma clapper rail (*Rallus longirostris yumanensis*) is listed as endangered. It is a marsh bird that inhabits freshwater or brackish streamsides and marshlands. It is associated with heavy riparian and marsh vegetation and requires a wet substrate, such as a mudflat, sandbar, or slough bottom, that must be covered by dense, mature herbaceous or woody vegetation that exceeds 15 inches in height. It commonly feeds on crayfish, fish, frogs, clams, spiders, grasshoppers, crickets, dragonflies, aquatic plant seeds, bird eggs, and other crustaceans. The Yuma clapper rail establishes breeding territories in March or April and builds nests in nearby vegetation. Historically, the Yuma clapper rail may have occurred in the marshes of the Lower Colorado River and its tributaries in Mexico and the United States. Currently, the Yuma clapper rail occurs along the Colorado River, from Lake Mead to Mexico; on the Gila and Salt Rivers upstream to the area of the Verde confluence; in the lower Bill Williams drainage; around the Salton Sea; and at Picacho Reservoir. These habitat types do not occur on the site and no occurrence of this species has been recorded within 5 miles of the site. Therefore, the Agua Caliente solar project would have no effect on this species.

The yellow-billed cuckoo (*Coccyzus americanusoccidentalis*) is a federal candidate for listing as threatened or endangered west of the Rocky Mountains. The historic breeding range of the yellow-billed cuckoo included most of North America from southern Canada to Mexico, but presently is restricted to scattered areas where suitable habitat is present. This species breeds in large blocks of riparian habitats, particularly woodlands with

cottonwoods, willows, and dense understory foliage. Breeding habitat for this species may occur along the Gila River downstream of the site but these habitat types do not occur on the site and no occurrence of this species has been recorded within 5 miles of the site. Therefore, the Agua Caliente solar project would have no effect on this species.

Please send comments to me at the following address: U.S. Department of Energy, 1000 Independence Ave., SW, LP-10, Washington, DC 20585, or by email at douglas.boren@hq.doe.gov. If you have any questions or require additional information contact me by telephone at 202-287-5346 or by email.

Respectfully,

Douglas Boren
Loan Guarantee Program
NEPA Document Manager

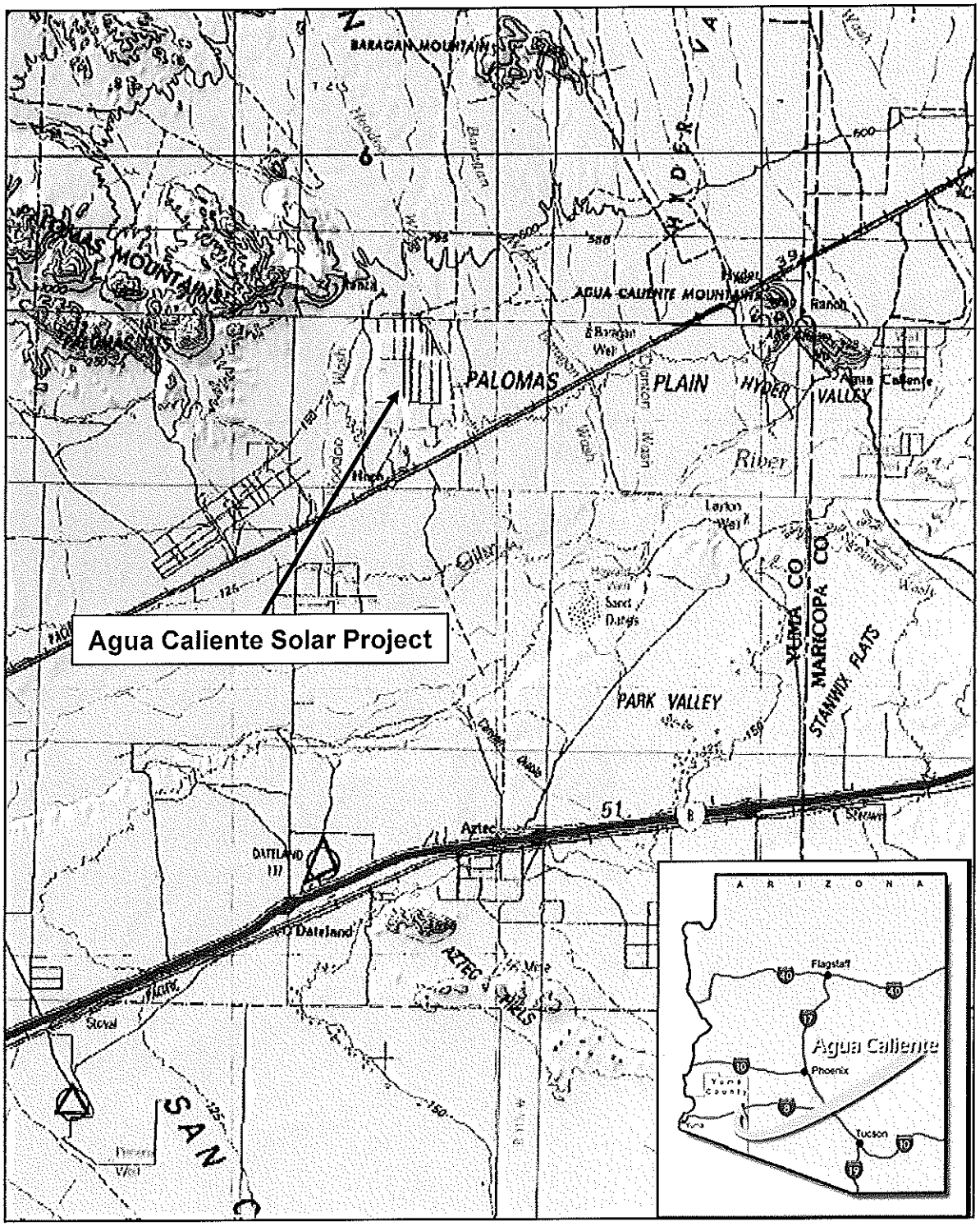

Figure ES-1
AGUA CALIENTE SOLAR PROJECT
Project Location

APPENDIX G
CLASS I CULTURAL RESOURCES SURVEY REPORT

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SHPO Standardized Report Abstract

AGENCY: Arizona State Land Department

REPORT TITLE: Class I Cultural Resource Report for the Proposed Agua Caliente Solar Project, Yuma County, Arizona

DATE OF REPORT: May 7, 2009

PROJECT DESCRIPTION: Class I report of previously recorded cultural resources within the proposed Agua Caliente Solar Project and the associated APS Q43 Substation Project, Yuma County, Arizona.

LOCATION: Township 4 and 5 South, Range 12 West, Sections 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 20, 21, 22, 23, 26, 27, 28, 29, 31, 32, 33, 34, and 35 of the Palomas Mountains SE, Baragan Mountain, Horn, Aztec NW, Arizona USGS 7.5' topographic quadrangles, Yuma County, Arizona.

NUMER OF ACRES REVIEWED: approximately 15,000

METHODOLOGY: The previously recorded cultural resources and investigations in the Project Area (defined below), including a one mile-wide buffer, were examined using data received from the Arizona State Museum site file check to determine if known cultural resources would be potentially impacted by the proposed Project. Information from the Bureau of Land Management General Land Office, National Register of Historic Places, Arizona Historic Site List, and historic trails listings from National Parks Service, BLM, and Arizona State Parks were also reviewed.

NUMBER OF SITES: 3 (2 outside Project Area)

ELIGIBLE: 1 (inside Project Area)

SITES OF UNKNOWN ELIGIBILITY: 0

NOT ELIGIBILE SITES: 2 (outside Project Area)

COMMENTS: The literature search and records review of the Project Area conducted by kp environmental identified no sites previously recorded within the Project Area. One eligible site (the Wellton-Phoenix-Eloy Spur of the Southern Pacific Railroad also known as the Sunset Route); is located within the Project Area.

1.0 Introduction

Agua Caliente Solar, LLC requested that kp environmental, LLC complete a Class I cultural resource literature search and records review for the proposed Agua Caliente Solar Project and the associated APS Q43 Substation Project.

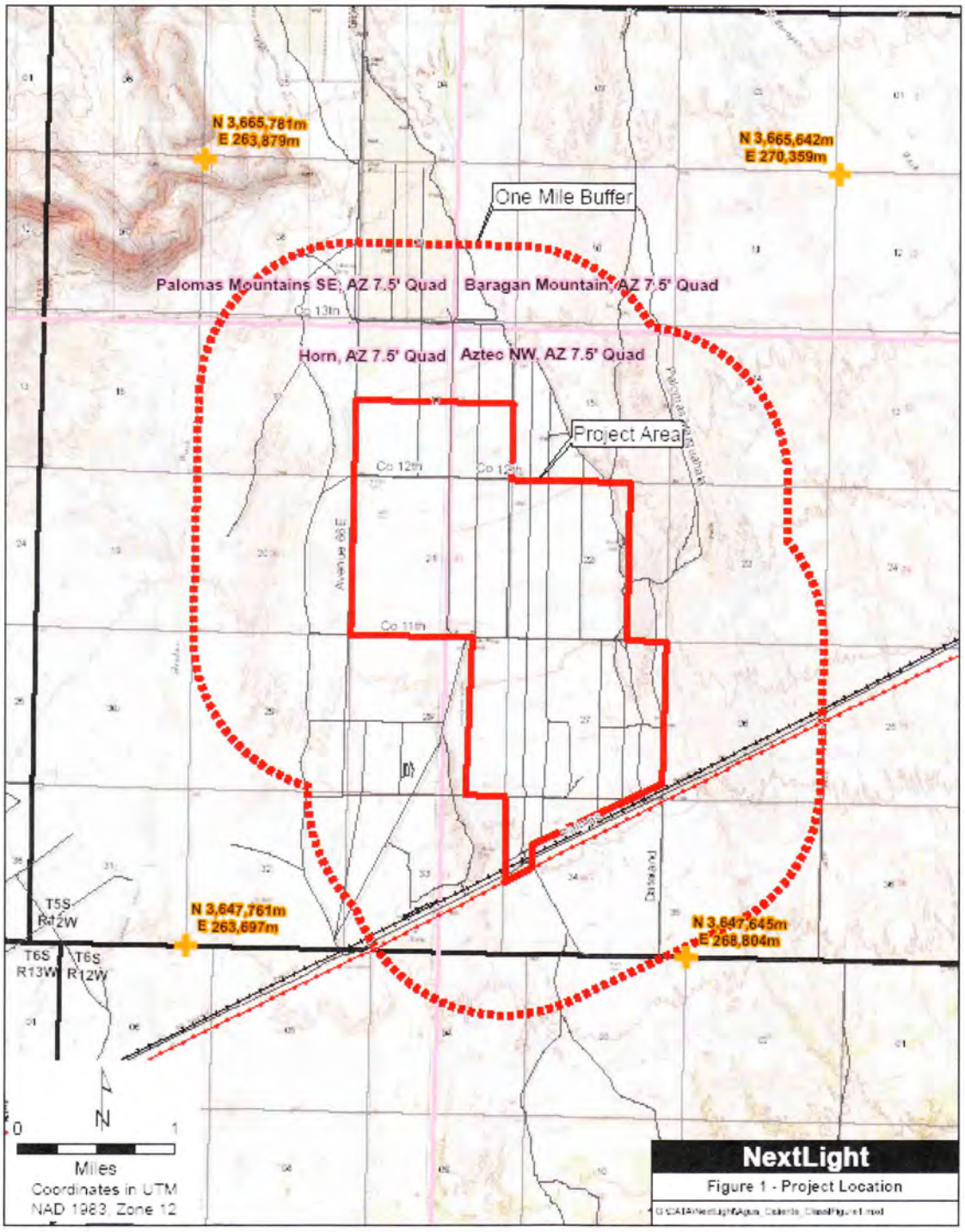
The Agua Caliente Solar Project is a solar generating facility that will utilize either photovoltaic (PV) technology or concentrating solar thermal power (CSP) with proven parabolic trough technology. If the Agua Caliente Solar Project (Project) is developed using PV technology, the Project will utilize crystalline silicon, or possibly thin film, PV technology on single-axis trackers, or fixed tilt supports. The Project is located in Yuma County approximately 10 miles north of Dateland, Arizona about 45 miles west of Gila Bend, Arizona and 65 miles east of Yuma, Arizona. The Project will be located on a portion of a 3,800 acre private agricultural property referred to as the "Whitewing Ranch" (Property) located along Palomas Road (also referred to as Palomas/Hyder Road). The Project Site will occupy approximately 2,400 acres of the Property. The remaining acres of the Property will be leased to Del Monte for continued agricultural use.

The APS Q43 Substation Project is a new 500 kV Switchyard, 500kV/69kV Substation and other transmission facilities that will provide an interconnection with the existing Hassayampa - North Gila 500kV transmission line located just south of the Property boundary. The Substation will be located on approximately 30 acres in the southwest corner of the Property. The existing Hassayampa – North Gila 500kV transmission line will be looped into the Substation. To facilitate the Hassayampa – North Gila tie to the Substation, each line termination will have a new turning structure located within the existing transmission line right-of-way. From each of the turning structures there will be a single 500kV span of approximately 800 feet (Tie Lines) into a dead-end structure located within the Substation.

The combined area impacted by the Agua Caliente Solar Project and the APS Q43 Substation Project has been defined as the Project Area.

2.0 Project Area

The Project Area is located in Sections 4, 5, 9, 15, 16, 21, 22, 27, 28, and 34 of Township 5 South, Range 12 West (Gila and Salt River Baseline and Meridian) of the Horn and Aztec NW, Arizona USGS 7.5' topographic quadrangles, in Yuma County, Arizona. The literature search and records review included a 1-mile buffer so additional sections, Township, and USGS 7.5' topographic quadrangles were included. These included Sections 3, 6, 7, 8, 10, 14, 17, 20, 23, 26, 29, 31, 32, 33, and 35; Township 4 South; and Palomas Mountains SE and Baragan Mountain USGS 7.5' topographic quadrangles. The Project Area is just northeast of the community of Dateland, Arizona and north of Palomas Road and the Southern Pacific Railroad right-of-way (Figure 1).


N 3,665,781m
E 263,879m
N 3,665,642m
E 270,359m
One Mile Buffer
Palomas Mountains SE, AZ 7.5' Quad
Baragan Mountain, AZ 7.5' Quad
Horn, AZ 7.5' Quad
Aztec NW, AZ 7.5' Quad
Project Area
Co 13th
Co 12th
Co 11th
N 3,647,761m
E 263,697m
N 3,647,645m
E 268,804m
T5S
R12W
T6S
R13W
T6S
R12W
0
1
Miles
Coordinates in UTM
NAD 1983 Zone 12
NextLight
Figure 1 - Project Location

3.0 Methods

The previously recorded cultural resources and investigations in the Project Area, including a one mile-wide buffer, were examined using data received from the Arizona State Museum (ASM) site file check to determine if known cultural resources would be potentially impacted by the proposed Project. Information from Bureau of Land Management (BLM) General Land Office (GLO), National Register of Historic Places (NRHP), Arizona Historic Site List, and historic trails listings from National Parks Service (NPS), BLM, and Arizona State Parks were also reviewed.

4.0 Cultural-Historical Setting

The following description of the cultural history of the Project Area is summarized in large part from the following sources: Bilsbarrow and Palus (1997); City of Casa Grande (2006); Clemensen (1992); Craig and Hackbarth (1997); Deaver and Altschul (1994); Gilpin and Phillips (1998); Haynes (1986); Janus (1989); Marmaduke (1993); Myrick (1980); Russell (1975); Spier (1970); Whittlesey et al. (1994); Wright (2002); Wright et al. (2002). The following discussion is divided into prehistoric and historic periods. The prehistoric periods include the Paleoindian, Archaic, and Hohokam, and the historic periods include the Protohistoric and Historic.

Prehistoric

Paleoindian

The earliest known record of human habitation in Arizona's desert regions dates to approximately 12,000 years (Haury 1950). These Paleoindian hunters-gatherers were highly mobile, and surface cultural remains associated with their habitation and subsistence sites are rare, as Paleoindian cultural materials are often buried deep beneath Holocene sedimentary deposits.

The Paleoindian period, approximately 10,000 to 7500 B.C., is characterized by small, nomadic bands that followed megafauna and gathered wild plants. Sites from this period have been documented in southern Arizona (Cordell 1984; Haury 1950; Haynes 1986; Huckell 1984). However, sediments from this period are generally not exposed in the Casa Grande area. No Paleoindian sites have be reported near the Project Area.

The subsistence practices of early hunter-gatherers changed approximately 10,000 to 8000 B.C. with the extinction of large game, as well as with the environmental changes associated with the Pleistocene/Holocene climatic transition (Guthrie 2006; Martin 1967). The overall lifestyle of the early hunter-gatherers continued into the Archaic period (ca. 8000 to 200 B.C.), but increased aridity during the early- to mid-Holocene brought about a change in the occurrence of plant species in the Southwest (Van Devender et al. 1987). Many of these drought-tolerant plants, such as mesquite, paloverde, and screwbean pods; saguaro and other cactus fruits; and agave, were

exploited by prehistoric peoples. These plants provided a protein-rich food source that supplemented the Archaic diet of small game.

Archaic

The Early Archaic period, approximately 7500 to 5000 B.C., is characterized by a hunting and gathering lifestyle, similar to the preceding Paleoindian period. A major difference however was a climatic drying and warming trend leading to desert conditions, and the disappearance of Pleistocene big game, through natural or human agents. Hunting focused on modern game animals and gathering focused on seasonally available resources, with Archaic groups maintaining a significant degree of residential mobility. As the Archaic period progressed (Middle Archaic, ca. 5000 to 2000 B.C.), some populations began to experiment with encouraged plants. Various wild plant resources were encouraged through selective planting or reseeding, weeding of competitor species, and supplemental watering. Seasonal rounds were generally maintained, with encouraged plant stands being revisited during harvest time. Tools identified during the Archaic period such as metates, manos, and mortars demonstrate a significant focus on processing wild plant foods. Small seasonally occupied villages were present, but larger more permanent villages did not develop until the Late Archaic period.

The Late Archaic, approximately 2000 B.C. to A.D. 1, is a period of increasing sedentism although group mobility was still maintained to varying degrees. Encouraged plants began to give way to small-scale horticulture, especially with the introduction of domestic cultigens. Maintaining small fields and crops meant increased sedentism, and Late Archaic populations along floodplains and alluvial fans began to assemble into permanent villages. Sites of this type are known from the Tucson area, the Project Area, and the Phoenix area. Experimentation with domestic cultigens from Mexico appeared first in the Tucson area (corn circa. 1700 to 1200 B.C.), which is located closer to the source area for these cultigens. Late Archaic villages are deeply buried under alluvium because of their location on floodplains and alluvial fans.

Hohokam

A summary of Hohokam chronology is presented in Table 1. A brief discussion of each period in its chronological sequence is presented below. The Pioneer, Colonial, and Sedentary periods are collectively referred to as Preclassic.

Pioneer Period

The first period of Hohokam development involves a transition in local populations, as opposed to the influx of peoples from Mesoamerica as had been previously believed. During the transition from the Late Archaic to the Pioneer period, populations slowly began to shift their subsistence strategy to focus on a more sedentary, agriculture-dependent way of life. Hunting and gathering available wild foods remained important,

but the Hohokam developed a complex water control system that made irrigation agriculture possible. Ceramics first appeared during this period as plainware utilitarian items, and expanded to include many types of decorated wares including: redwares, red-on-gray, and red-on-buff. The Snaketown phase, at the end of the Pioneer period, saw several changes which indicated a growing population, increased trade contacts, and growing complexity: more diverse ceramic vessel forms and designs; expansion of irrigation systems; the presence of ceramic figurines, slate palettes, carved stone bowls, and other ritual and ceremonial items; presence of shell from the Gulf of California; and trade goods from Mesoamerica and the Mogollon rim area.

Table 1
Hohokam Chronology (Dean 1991)

Period	Phase	Approximate Time Span (A.D. years)
Pioneer	Red Mountain	0-300
	Vahki	300-500
	Estrella	500s
	Sweetwater	600s
	Snaketown	700s
Colonial	Gila Butte	775 to 850/900
	Santa Cruz	850-900 to 950/1000
Sedentary	Sacaton	950/975 to 1100/1150
		1100 to 1200
Classic	Soho	1150/1200 to 1300
	Civano	1300 to 1450/1500

Colonial Period

During this period, the number, size, type, and complexity of Hohokam sites in the area increased. Pithouses within villages tended to cluster in courtyard groups, probably occupied by extended families, which opened onto communal plaza areas. Numerous large villages contained ballcourts, which are posited to be related to the Mesoamerican game. These ballcourts probably served as a focus for community integration, where peoples from smaller surrounding hamlets would come to trade, renew kinship ties, and take part in various community activities. Smaller villages and subsistence-related sites were increasingly established during this period. Exotic trade items such as macaws and copper bells from Mesoamerica often overshadow continuing trade with Mogollon Rim and Colorado Plateau populations. By the end of

the Colonial period, Hohokam sites were established throughout central and southern Arizona in a variety of environmental settings.

Sedentary Period

Throughout this period, patterns established during the preceding Colonial period were intensified. Economic complexity increased with certain villages specializing in particular crafts. In addition, a possible hierarchical distinction between sites, especially those along shared canal systems, is indicated. Platform mounds began to be constructed during this period, and appear to have served as a type of public architecture possibly associated with hierarchical divisions within villages, with ceremonial activities, or both. As the ballcourt slowly began to go out of use, the focus of community activities began to switch to the platform mound. There are few changes to Hohokam material culture during this time with the exception of the beginnings of platform mounds, adobe/jacal surface structures, and redware.

Classic Period

Most familiar Hohokam traits disappeared or underwent radical changes during this period. Many large villages were abandoned, although, several grew as outlying populations and groups in smaller settlements aggregated with existing communities (or formed new communities) along major watercourses. Pithouses disappeared almost completely and were replaced by surface structures of adobe and masonry, which were often organized into roomblocks, then compounds with the addition of enclosing walls. Platform mounds effectively replaced ballcourts as the focus of community activities. Red-on-buff pottery was replaced by red and polychrome wares. Treatment of the dead changed: inhumation became common while cremation declined. Trade patterns shifted from a Mesoamerican focus to a more northern and eastern focus. As the trade patterns shifted to the north and east, architectural and material culture traits of the Classic period Hohokam were being derived from contact with populations in that region of eastern Arizona and western New Mexico—the Salado culture. The reorganization of Classic period Hohokam architectural and material culture styles into styles that more closely resembled the Salado indicated increased regional interaction between the two groups. In the past it was believed to represent an invasion by Salado peoples, but this is no longer thought to be the case.

There may also be a late/post-Classic Hohokam occupation known as the Polvoron phase. The existence of the phase is still a matter of debate, as well as how it fits into the generally accepted Hohokam chronology. It may extend Hohokam culture into the 16th century, or it may merely represent the end of the Hohokam sequence around A.D. 1450 to 1500. This phase is defined in the archaeological record by the reoccupation of late Classic structures, a return to pithouses, and the end of inhumation burial.

Protohistoric

The Protohistoric period dates from approximately 1450/1500, the end of the Hohokam sequence, to the establishment of the Tubac presidio by the Spanish in 1753. The Protohistoric period saw reoccupation of several prehistoric sites by the Maricopa, Kohatk, or Pima, as well as the development of new settlements. In addition, ethnohistoric accounts (Harwell and Kelly 1983:72) place the Maricopa westernmost point of earlier territorial claims as the Mohawk Mountains, which would include the Project Area.

The Jesuit missionary, Father Eusebio Francisco Kino was the first Spanish explorer to provide written accounts of the Gila River area. He was assigned to missionize in the Pimeria Alta (Land of Upper Pimas), a region that today includes northern Mexico and southern Arizona. During Kino's travels, he established many visitas and a few missions from the modern international border to the Gila River region. In addition, his explorations served as an important first step toward an overland route between Sonora, the Pima villages of the Gila River, and settlements along the California coast. Kino visited villages along the Gila River at least six times between 1691 and 1702. During his journeys, Kino mapped and described Pima villages and his interactions with various groups. Kino does not describe irrigation agriculture, so it is suspected that local populations subsisted by floodwater agriculture, hunting, and gathering. By 1744 however, the Pima were growing wheat with irrigation agriculture, and by 1775 irrigated wheat was a major crop in most Pima villages. Throughout the 1700s, the Spanish continued to expand the mission system in southern Arizona and continued to introduce non-native crops, animals, trade goods, religion, and culture.

Historic

The Historic period in Arizona dates roughly from 1753 to 1954. The 1753 date was chosen as it represents the founding of the first permanent Spanish settlement in Arizona. Dates of Protohistoric and Historic periods can differ across Arizona, usually based on dates of contact with Europeans and dates of permanent settlement by Europeans. For the purposes of this study, the aforementioned dates will be used.

According to the National Parks Service, the year 1775 marks the year Juan Bautista de Anza (Anza) successfully opened an overland route of emigration and supply from Sonora to the missions and settlements of Alta California. The 198 soldiers and families that Anza escorted brought with them on their 1,200 mile trek their language, traditions, and diverse New World Hispanic culture. The backgrounds of all soldiers and settlers were carefully recorded as español, mulato, or mestizo. Almost all the expedition members were born on this continent and had mixed European, African or Indian parentage. These influences changed the lives of the indigenous peoples and shaped the development of Arizona and California. The route Anza opened supplied the settlements of Alta California long enough for them to become established. In 1781, the Yumas revolted against Spanish rule and closed the route during the rest of the

colonial period. In later years, Anza's trail served the military, settlers, cattlemen, forty-niners and other desert travelers.

The Mexican War of Independence did not have a direct affect on the area, as most of the battles took place far south of southern Arizona. However, the Spanish did have to withdraw their troops to central Mexico, which left a vacuum that the Apache exploited. During the 1820s, Apache raiders were estimated to have killed approximately 5,000 people in Sonora and southern Arizona. Mexico was victorious in the war, and declared independence in 1821. The new Mexican government abolished the mission system. In Arizona, settlements and occupation contracted to Tucson and Tubac. In response to increased Apache raiding, Piman settlement also contracted south and west. During the Mexican (1821 to 1853) and subsequent American occupations, Pima wheat production increased dramatically, as a result the Pima sold excess crop to settlers and travelers using the Gila Trail. Arizona north of the Gila River became part of the United States in 1848, although the American phase did not officially begin until 1853, when this area was sold to the United States by Mexico as part of the Gadsden Purchase. American fur trappers and traders began working the Gila River in 1825 (the American phase dates from 1853 to present). During the Mexican-American War, American military forces passed through southern Arizona on their way to California, commonly using routes centered on the Santa Cruz and Gila rivers. These routes were well blazed by the Army, and increased use occurred after the end of the war. One specific route, the Gila Trail, was by this time a widely used mail, freight, and emigrant route. At the close of the American Civil War, settlement in the Gila River valley increased dramatically. This was due in part to the American Army's attempts to pacify the Apache. Arizona was first included as part of the Territory of New Mexico, and then the Territory of Arizona, and officially received American statehood in 1912.

After the Civil War, Americans began to settle permanently along the Gila River because of the availability of good agricultural lands. Agricultural activities by American settlers along the Middle Gila and further upstream caused an insufficient supply of water for Pima farmers. By 1872, the water reaching Pima crops was so limited that some Pimas relocated to the Salt River valley. However, this is not the only reason the Pima moved. Commercial pursuits in the growing Phoenix-Mesa-Lehi area, land and water availability, and the Anglo desire for a buffer between themselves and the raiding activities of the Apache also served as agents to pull Pimas from the Gila River valley to the Salt River valley. Settlers came not only from the east to settle within Arizona's agricultural lands, and rich mining districts, but also from Utah. Mormon settlers established towns in northern and eastern Arizona, and into northern Mexico. Some of the largest areas of Mormon settlement are the modern Mesa and Safford areas, although significant settlement also took place along the Little Colorado and San Pedro Rivers. From 1880 to 1900, the population of southern Arizona doubled, and by the turn of the century, Arizona had a population of 100,000. Many communities were established. The major town centers within the AOS are discussed below. Arizona went on to become a major producer of cotton and copper, although these industries have had their ups and downs. Agriculture tends to remain as the major economic focus within the AOS. The 20th century saw the transformation of significant portions of

Arizona into military installations. Prisoner of war camps where established in proximity to the communities of Florence and Queen Creek and along the Gila River between 1942 and 1945 (Iritani 1994).

Southern Pacific Railroad

Mainline

After the close of the Civil War, a southern railroad route along the now defunct Butterfield Stage Route was being explored as an option to move goods and people across the country in a timely fashion. The Southern Pacific Railroad Company (SPRR) was to lay track from San Francisco to Yuma, while the Texas and Pacific Railroad Company (TPRR) was to lay track westward across Texas, New Mexico, and Arizona to meet with the SPRR at Yuma. As the SPRR reached the Arizona border, the TPRR was stalled in the vicinity of Fort Worth, Texas, nowhere near the interconnection point at Yuma. Having no authority to continue into Arizona, the SPRR courted the U.S. Congress, but failed to receive approval. The SPRR then turned to the territorial legislatures of Arizona and New Mexico, and received approval to continue laying track eastward.

The first train arrived in Maricopa Station, modern Heaton, on April 29, 1879. Maricopa Station quickly became a boomtown, as it was the closest point to retain alternative transportation to reach Phoenix. Maricopa Station soon had a large office building, a warehouse, and a hotel. As with most railroad boomtowns, the town soon succumbed to the ups-and-downs of railroad economy, and a new junction for the transfer of goods to Phoenix was located eastward. The SPRR continued to push eastward and reached Casa Grande on May 19, 1879. Casa Grande served as the end of the line for several months, and came to be known as Terminus. In January 1880, construction continued eastward. As 1881 drew to a close, the SPRR track through Arizona connected to the nationwide system of rail lines. The economy and settlement of southern Arizona quickly changed as it was now reliably connected to the rest of the country. The SPRR was taken over by the UPRR in 1997 (Union Pacific Railroad 2006).

Wellton-Phoenix-Mesa-Eloy

This segment of the transcontinental Sunset Route of the SPRR was constructed in 1926. It spurs off of the mainline in Wellton and travels through Phoenix, Tempe, Mesa, Gilbert, and Coolidge before rejoining the mainline at Eloy. This spur was constructed using over a thousand men and 600 mules to provide mainline access to Phoenix, which had developed into Arizona's most important city by the mid-1920s. The single-track rail line was updated with modern track, computers, and electronic signaling (Janus 1989) but has not been used for at least the past five years.

5.0 Previous Research

Site and project files were checked at the ASM and the data received were examined to determine if previously recorded cultural resources were within the Project Area and buffer. Three sites have been recorded within a one-mile radius of the Project Area. One historic site (Wellton-Phoenix-Mesa-Eloy Spur of the Southern Pacific Railroad) considered eligible, was present within the Project Area (Figure 2).

The ASM records check revealed that four projects have been conducted within the one mile-wide buffer of the Project Area. Three of the projects are linear projects that cross the southernmost boundary of the Project Area (Figure 2, Table 2). The fourth project (1955-2.ASM) was conducted approximately 1/3 mile southeast of the southeastern corner of the Project Area.

David A. Breternitz conducted a brief archaeological survey of the lower Gila River in the summer of 1955 using private funding (1955-2.ASM). This was apparently private research and the result of the survey was published in KIVA (Breternitz 1957). The survey followed the Gila River from Yuma to the Painted Rock Mountains and included the discovery and recording of 14 prehistoric Native American and 19th century U.S. settler sites in the Lower Gila River region. All materials were recovered from the surface and the sites range from trails to campsites to petroglyph sites. Ceramics were the most abundant material (various series of Lower Colorado Buff ware). Breternitz's survey was located within the southern corner of the 1-mile buffer of the Project Area, and one site (AZ Y:3:5) was recorded and collected within the southern corner of the 1-mile buffer (Figure 2).

The Southern Pacific Pipeline Survey (SPPS) Project (1955-3.ASM) crosses the southern boundary of the Project Area (Figure 2). None of the 15 sites they recorded for the SSP project was located within the Project Area.

The Yuma 500 kV Transmission Line Project (1981-162.ASM) was located within the Project Area (Figure 2). None of the 33 sites they recorded for the Yuma project was located within the Agua Caliente Solar Project Area.

The Parsons Brinckerhoff Network Services (PBNS) Project (1999-587.ASM) crosses the southern boundary of the Project Area (Figure 2). None of the 14 sites they recorded for the PBNS project was located within the Project Area.

Table 2. Summary of Previous Archaeological Research

Location	Agency No. / Project Description	Sites	Reference	Project Area
AZ Y:3	1955-2.ASM / Brief Archaeological Survey of the Lower Gila River	14	Breternitz 1957	Within 1 mile buffer area
AZ Y:2 AZ Y:3	1955-3.ASM / Southern Pacific Pipeline Survey Project	15	Komerska and Breternitz 1955	Within Project Area
AZ Y:2 AZ Y:3	1981-162.ASM / Yuma 500 kV Transmission Line Project	33	Effland and Green 1982	Within Project Area
AZ Y:2 AZ Y:3	1999-587.ASM / PBNS Level 3 Fiber Optic Line Project	13	Doak 1999, 2001	Within project Area

Only one site, the historic Southern Pacific Railroad (AZ T:10:84), has been considered eligible for the National Register and is located within the Project Area (Figure 2).

The remaining sites are also outside of the Project Area and are not considered eligible for the National Register. These include sites AZ Y:3:5 and AZ Y:2:29 (Figure 2). Site AZ Y:3:5 was recorded by Breternitz (1957) as a possible campsite on a trail between Gila and the mountains to the north. The site was recorded as a surface deposit and collected; therefore, surface manifestation of the site no longer exists.

Site AZ Y:2:29 was recorded by Effland and Green (1982) as the Horn Railroad Station building complex and debris. This station is associated with the Southern Pacific Railroad and is an Anglo-historic post-1926 construction; however, it is recorded as destroyed. The site dimension is 3500 m^2 and is comprised of historic brick, concrete, and metal construction material. The destruction of the standing structures of the complex has compromised the integrity of the complex; therefore, it would not be considered eligible for the National Register based on the debris alone.

Review of the National Register of Historic Places website found that one listed National Register site, the Camp Horn Monument (#3000900), is present in the vicinity of the Project Area; however, this historic resource is approximately 5 miles west of the Project Area and it is not anticipated that any impacts from the Agua Caliente Solar Project will occur to this National Register listed site.

Review of the historic trails listings from National Parks Service website also found that a portion of the Anza Trail corridor is present within the vicinity of the Project Area; however, it is also outside of the Project Area and the 1-mile buffer. It is not anticipated

that any impacts from the Agua Caliente Solar Project will occur to this trail corridor or any associated campsites that may be present because the Project Area is well to the north of the documented trail corridor.

5.1 National Register of Historic Places Evaluation

To be eligible for listing in the National Register, a cultural resource must meet one of the four criteria defined by Title 36, Part 60, of the Code of Federal Regulations (36 CFR 60), which reads as follows:

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and

> (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) that are associated with the lives of persons significant in our past; or
>
> (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d) that has yielded, or may be likely to yield, information important in prehistory or history.

In addition to these four criteria, there is a general stipulation that the property be 50 years old or older (for exceptions, see 36 CFR 60.4, Criteria Considerations). The importance of information that a property may yield is measured by its relevance to identified research questions that can be addressed through the analysis of particular property types. In addition to research potential, the cultural resources of Native Americans, Euroamericans, and other ethnic communities may possess public and ethnic value. Finally, cultural resources may also have broader public significance, such as serving to educate the public about important aspects of national, state, and local history and prehistory.

The first step in determining the significance of cultural resources is to define appropriate historic contexts. A historic context is a body of information about patterns or trends in history organized by three basic elements: theme, place, and time (NPS 1997). In essence, a historic context is a historically meaningful segment of the history or prehistory of a particular geographic area. Together, all of the various possible historic contexts for an area would form a comprehensive summary of all aspects of the area's history and prehistory.

A theme is the equivalent of a research problem, and a historic context is developed by placing the problem in an appropriate setting in both time and space. The context is linked to tangible cultural resources by the concept of a property type.

The historic contexts are presented below and follow the same structure. A short discussion of current research issues is followed by a set of research questions in each of the following sections. A discussion of data requirements, including a listing of pertinent property types, closes each context.

5.2 Research Questions

Chronology

Chronology is a key component in understanding the processes of cultural change in the Arizona desert regions. Sites located in southwestern Arizona and also known as Papagueria are primarily scattered ruins, once thought to be so numerous that there was often not much to the stratigraphic depth (Haury 1950).

Prehistoric residential sites do, however, contain the remains of houses, pit features, and other subsurface cultural deposits. Chronology in this area is a major research issue for Gila River drainage system. Short of reliable absolute dates from well-understood contexts, archaeologists in Gila River valley in the past have been forced to rely heavily on artifact cross dating, the origin of which was with black-on-white sherds from the Western Anasazi area (Gumerman and Haury 1979:76). It is no surprise, therefore, that our knowledge of the chronology of cultures in the region continues to change and that our comprehension of regional cultural processes remains a work in progress. Key research questions are presented below.

Research Questions

- Can the sites yield information relating to established regional lithic and ceramic typologies?
- Can the Hohokam ceramic chronology be further refined?
- Are there variations in the temporal framework in Hohokam manifestations in relationship to the distance from the core Hohokam area?

Data Requirements

In most areas of the Southwest, addressing issues of chronology requires samples suitable for absolute-dating analysis. Sample materials include botanical and faunal remains for radiocarbon dating, burned clay associated with cultural features for archaeomagnetic dating, and wood samples from specific species for tree-ring dating. Other, less-precise absolute-dating methods include thermoluminescence and obsidian

hydration analyses. Sites that can provide the kind of samples described above in interpretable contexts are extremely rare in the archaeological record of the Gila River area.

Subsistence

The Sonoran Desert area of southern Arizona is in a region of alternating mountains and plains, with major streams that were the lifelines of the Hohokam people (Gumerman and Haury 1979:75). They provided water for irrigation canals, and the mountains provided ecozones for natural food sources not found on the river plains.

Paleoindian and Archaic foraging strategies changed to hunting and gathering cultures bound to floodplain resources, and progressed to floodplain-based, logistically organized horticultural societies that continued to exploit wild riparian and desert resources. For the horticulturalists, using wild resources minimized risk imposed by an agricultural adaptation. The degree of organizational complexity needed to be responsive to a variety of environmental factors. As a result, household size, composition, and organization; the size of local population aggregates; the mix of resources used (cultigens or wild plants, riverine or desert resources) varied based on the distribution and availability of resources.

Research Questions

- What mix of resources did the Archaic people and the Hohokam use?
- If the resource mix changed through time, do these changes correlate with increasing population density, environmental fluctuations, or both?
- Are ethnographic models representative of prehistoric and/or protohistoric periods?

Data Requirements

Data required to answer these questions consist of faunal and floral remains from use contexts in Archaic, Hohokam period, and protohistoric residential sites. Macrofloral and palynological samples from sealed cultural contexts (features) and from an array of plant and animal food-processing equipment are important components in defining the resource mix, and immunoassay residue analysis on lithic tools recovered from cultural contexts could potentially provide information on patterns of animal exploitation. As with chronological needs, contexts that can provide these data are rare.

Land-Use Patterns

Land-use patterns form an important part of a culture's adaptation to its surrounding environment, and its strategy characterizes and describes the ways in which a culture

interacts with and exploits its natural resources. The organization of land-use strategies is patterned and is reflected in the set of functional site types embedded in the land-use system.

Analysis of land-use systems provides considerable insights into interactions between economic adaptations and changing environmental and social circumstances, and like subsistence systems, they operate in an ecological context and are, therefore, responsive to fluctuations in environmental conditions. Essentially land-use systems influence, and are influenced by a myriad of extant social conditions, such as organizational complexity, labor organization and scheduling, ritual and ceremonial activities, and interrelations with neighboring communities, among other factors.

Research Questions

- Did Hohokam site locations co-vary with environmental factors? If so, what factors appear to have been the most significant?
- How do site location and site type relate to the spatial distribution of raw-material sources in the region?
- Did site complexity influence the direction of trade relations with the Southern tribes versus the Northern and Eastern tribes?

Data Requirements

By obtaining information about residential, subsistence, and functional site-type patterning, we can reconstruct land-use strategies. Using subsistence, spatial, and chronological information obtained from residential sites, nonresidential site types, and land-use systems, the entire system can be defined. Elements comprising land-use systems (including issues of economy and seasonality) must be discerned from subsistence-related data recovered from each class of sites.

Contact and Interaction between Native Americans and Europeans and Euroamericans

Historical-period accounts of the primary Native American group in the Project Area, the Pima, exist from the mid eighteenth and mid-nineteenth centuries. The first written account of Pima lifeways was first recorded by the Spanish Fr. Kino in the mid eighteenth century. Archaeological information to support or augment ethnohistoric data is largely lacking. Important questions about protohistoric and historical-period Pima subsistence and settlement systems remain.

Research Questions

- To what degree were protohistoric and historical-period Pima integrated into the local Euroamerican economy?
- To what degree, if at all, did this Native American group rely on wild botanical and faunal resources during the mid eighteenth and early nineteenth centuries?
- Are ethnohistoric data representative of Pima subsistence and land use patterns? What resource mix did they rely on during the early historical period?
- How well, if at all, were European-introduced domesticated plants and animals incorporated into the Pima resource mix?

Data Requirements

Data required to answer these questions can best be obtained from one or more eighteenth to nineteenth century Pima residential sites. If the sites have stratigraphic depth, they may include structures and sealed features that contain data that inform on subsistence, economic, social, and ritual aspects of past lifeways.

Historical-Period Occupation

The eighteenth and nineteenth century occupation of southern Arizona had a significant impact on the lives of the Native American people of the area. While changes were already underway in the Project Area when the Europeans first encountered the area, more drastic changes followed. The phases of the Hohokam period saw an intensification, peak, and decline in agricultural activities. During the protohistoric and historic periods the Native Americans returned to a more intensive agricultural practice with the addition of non-native crops, animals, trade goods, religion, and culture.

Research Questions

- How did the establishment of missions and presidios, as well as the introduction of new crops and livestock, affect settlement pattern, subsistence strategies and cultural traditions?
- Can the study of historic archaeological sites, in conjunction with archival research, tell about the lives of the Spanish, Mexican, and Euroamerican soldiers and settlers in the Pima area?

- How did the coming of the railroad affect patterns of settlement and rural economies? How did sidings, camps, spurs and other associated sites function in relation to the railroads and surrounding sites?

Data Requirements

While few historic resources have been previously recorded in the Project Area, there is great potential for further research into the lives of migrants into the area. Excavation of historic archaeological sites, as well as ethnohistoric data and sources can reveal a wealth of information that may provide insight into the social fabric of the lives of the migrants into the area and the effects of those cultures on the Native culture.

6.0 Management Recommendations

The kp environmental intensive Class I cultural inventory of approximately 15,000 acres within the proposed Project Area identified one site considered eligible for the National Register namely the Wellton-Phoenix-Mesa-Eloy Spur of the Southern Pacific Railroad. However, the site will not be impacted by the development of the Agua Caliente Solar Project or the APS Q43 Substation Project given that (i) the rail is no longer in operation, (ii) the number of access roads to the Property will not materially change from present circumstances, and (iii) the transmission tie lines between the Hassayampa – North Gila 500kV transmission line and the Substation will be over head lines and will not impact the historic site. The construction and operation of the projects will not have any negative physical impact on the rail line.

The Project Area has not been subjected to intensive field investigations, therefore it is recommended that a sample or Class II field survey plan be developed and implemented for the Project Area to ensure that if unrecorded historical and archaeological resources exist they are identified in the Project Area prior to construction. This sample survey plan would take into account variables including, but not limited to, previously recorded sites/previous research; historic and prehistoric settlement analysis; trade patterns/routes; topography; hydrology; and biological and geological resources to determine within the overall Project Area, the areas with the greatest likelihood of encountering cultural resources.

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APPENDIX H
SHPO CONCURRENCE OF NO ADVERSE EFFECT

SHPO-2009-0714 (86928)

Department of Energy
Washington, DC 20585

SEP 2 2010

David Jacobs
Compliance Specialist
State Historic Preservation Office
Arizona State Parks
1300 West Washington Street
Phoenix, Arizona 85007

Subject: Determination of No Adverse Effects to National Register Eligible Historic Properties, Agua Caliente Solar, LLC Solar Generation Project

Dear Mr. Jacobs:

This letter is a follow-up to the letter originally sent to your office on June 18, 2010 and is being sent in response to continued coordination between your office and the Department of Energy (DOE). As you are aware, DOE is preparing an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) for a proposed Federal loan guarantee to Agua Caliente Solar, LLC (Agua Caliente) to support construction of a 290 megawatt (MW) solar generation project. In accordance with Section 106 of the National Historic Preservation Act (NHPA), DOE is consulting with you regarding the proposed project. This letter is to request your concurrence on our finding of "*No Adverse Effect on Historic Properties*" for the proposed project on the basis of those materials required by 10 CFR Part 800.11(d)(1) through (3).

1) A description of the undertaking, specifying the Federal involvement, and its area of potential effects (APE), including photographs, maps, drawings, as necessary:

The proposed project relating to the Federal loan guarantee is a 290 MW solar power generation facility. The proposed facility would occupy approximately 2,400 acres of an existing 3,800-acre parcel that is currently in agricultural use and known as the White Wing Ranch. The power generated at the proposed facility would be connected into the existing Palo Verde – North Gila 500 kilovolt transmission line adjacent to the southern boundary of the site. The proposed facility would produce approximately 637 gigawatt hours per year of renewable energy, sufficient to power approximately 102,000 homes per year and potentially substitute for fossil fuel electricity generation. The project site is located in Yuma County, Arizona approximately 10 miles north of Dateland, 45 miles west of Gila Bend, and 65 miles east of Yuma.

The APE is the 2,400-acre project site. Agua Caliente would clear the site for construction; however, given the site has previously been laser leveled for agriculture activities, very little grading would be required. A detailed description of the APE was included in a report as an attachment to the June 18th letter, *A Class III (Intensive) Cultural Resources Assessment Survey of the 2400-Acre Agua Caliente Solar Project and the Associated Q43 Substation, Yuma County, Arizona.*

2) A description of the steps taken to identify historic properties, including, as appropriate, efforts to seek information pursuant to Part 800.4(b);

In April 2010, a cultural resources survey was performed for the proposed solar generation facility APE. The archaeological survey included archival and other background studies in addition to a field survey of the APE. The archival research consisted of a literature and records search conducted for the project in addition to an examination of historic maps and historic site inventories. This information was used to identify previously recorded resources and determine the types of resources that might occur in the APE.

Additionally, DOE provided the local Tribes that may have an interest in the area with a description and location of the proposed project and invited them to initiate government to government consultation and share any concerns they might have regarding sites of religious and cultural significance. No concerns have been reported to DOE, and there are no known sites of religious or cultural significance in the immediate vicinity of the proposed project.

3) **The basis for determining that no historic properties are adversely effected.**

The archaeological inventory methods and procedures described in the survey attached to the June 18th letter resulted in the identification of a portion of one previously recorded archeological site (AZ T:10:84(ASM)) and one newly recorded potential archeological site (AZ Y:3:70(ASM)) within the APE. Site AZ T:10:84(ASM) is an approximate one-mile long portion of a rail spur of the Southern Pacific Railroad at the southern boundary of the property. The number of access roads to the project site that cross the rail spur will not materially change, and the transmission line tie-in from the facility to the existing 500 kilovolt transmission line will cross the rail spur via an overhead tie-in. Therefore, DOE has determined that the proposed project will have *No Adverse Effect* on site AZ T:10:84(ASM).

Site AZ Y:3:70(ASM) consists of several buildings associated with the White Wing Ranch property. The significance of the site was evaluated based on National Register criteria (36 CFR § 60.4 (a) through (d)). Site AZ Y:3:70(ASM) was originally determined to be potentially eligible for inclusion in the National Register of Historic Places (NRHP) under criterion (a) – having been associated with events that have made a contribution to the broad patterns of our history. As a result of further consultation between DOE and your office, site AZ Y:3:70(ASM) was determined to "not" be eligible for inclusion in the NRHP. Therefore, DOE has determined that the removal of site AZ Y:3:70(ASM) will have *No Adverse Effect on Historic Properties.*

We would appreciate your concurrence with our determination of *No Adverse Effect on Historic Properties* for the proposed Agua Caliente solar generation project. You may mail this information to me at, U.S. Department of Energy, LP-10, 1000 Independence Ave. S.W., Washington, DC 20585 or you may email it to me at douglas.boren@hq.doe.gov. If you have any questions or comments, please contact me by phone at (202) 287-5346 or via email at the above email address.

Respectfully,

Doug Boren
DOE Loan Guarantee Program Office
Environmental Compliance Division

NO ADVERSE EFFECT

3 SEPT 10

Arizona State Historic Preservation Office